

Advance Data Visualization

DECAP794

Edited by
Ajay Kumar Bansal



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Ajay Kumar Bansal**

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Unit 01: Introduction to Data Visualization

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Objectives

After studying this unit, you will be able to:

- Understand data visualization
- Analyze tools of data visualization
- Analyze data using tablu

Introduction

In our increasingly data-driven world, it's more important than ever to have accessible ways to view and understand data. After all, the demand for data skills in employees is steadily increasing each year. Employees and business owners at every level need to have an understanding of data and of its impact.

That's where data visualization comes in handy. With the goal of making data more accessible and understandable, data visualization in the form of dashboards is the go-to tool for many businesses to analyze and share information.

1.1 Data Visualization

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data. Additionally, it provides an excellent way for employees or business owners to present data to non-technical audiences without confusion.

Data visualization is the practice of translating information into a visual context, such as a map or graph, to make data easier for the human brain to understand and pull insights from. The main goal of data visualization is to make it easier to identify patterns, trends and outliers in large data

sets. The term is often used interchangeably with others, including information graphics, information visualization and statistical graphics.

Data visualization is one of the steps of the data science process, which states that after data has been collected, processed and modeled, it must be visualized for conclusions to be made. Data visualization is also an element of the broader data presentation architecture (DPA) discipline, which aims to identify, locate, manipulate, format and deliver data in the most efficient way possible.

Data visualization is important for almost every career. It can be used by teachers to display student test results, by computer scientists exploring advancements in artificial intelligence (AI) or by executives looking to share information with stakeholders. It also plays an important role in big data projects. As businesses accumulated massive collections of data during the early years of the big data trend, they needed a way to get an overview of their data quickly and easily. Visualization tools were a natural fit.

Visualization is central to advanced analytics for similar reasons. When a data scientist is writing advanced predictive analytics or machine learning (ML) algorithms, it becomes important to visualize the outputs to monitor results and ensure that models are performing as intended. This is because visualizations of complex algorithms are generally easier to interpret than numerical outputs.

Why is data visualization important?

Data visualization provides a quick and effective way to communicate information in a universal manner using visual information. The practice can also help businesses identify which factors affect customer behavior; pinpoint areas that need to be improved or need more attention; make data more memorable for stakeholders; understand when and where to place specific products; and predict sales volumes.

Other benefits of data visualization include the following:

- ✓ the ability to absorb information quickly, improve insights and make faster decisions;
- ✓ an increased understanding of the next steps that must be taken to improve the organization;
- ✓ an improved ability to maintain the audience's interest with information they can understand;
- ✓ an easy distribution of information that increases the opportunity to share insights with everyone involved;
- ✓ eliminate the need for data scientists since data is more accessible and understandable; and
- ✓ an increased ability to act on findings quickly and, therefore, achieve success with greater speed and less mistakes.

1.2 Keys Factors of Data Visualization

Data visualization is a crucial part of data analytics that helps you visualize your data and uncover significant trends and patterns that would otherwise have been lost. Effective data visualization depends on your software as nobody has the time to code the visualizations themselves with loads of data involved in the process.

Several data visualization tools, such as Oracle Visual Builder Cloud Service (VBCS), Tableau, Power BI, etc., have comparable features and capabilities, making selecting the right tool for your needs even more challenging. So, what are the factors to be considered in choosing the right data visualization solution for your use case?

Let us talk deep on it. Here are the main specifics.

1. Dashboard Design

It is important to check on the right balance between the simplicity and complexity of a dashboard when it comes to enterprise reporting. While simpler designs may be easy to use, they may not be able to pack in much helpful information. However, complex dashboards could clutter your screen and make it difficult to understand the data right in front of your eyes. If you're not an expert and don't know much about dashboard design, know that the dashboard must have balanced colors naturally appealing to the eye. It is intuitive to have colorful highlights between appropriate white spaces. Too much white space could over-simplify the design, while too much color could affect usability. Modern tools like Oracle Visual Builder Cloud Service strike a balance between simplicity and complexity and avoid highly complex designs even if they could deliver much more information in a compact setting.

2. Use Case

Different use cases demand different types of dashboards. For example, a simple use-case like the real-time analytics of a store will be very different from a more complex use-case like viewing stock market reports. It's a great way to personalize your data visualization, and several modern Analytics & BI Applications like Oracle Visual Builder Cloud Service offer this feature. Not only is the solution tailored to your needs, but it also provides an enhanced user experience.

3. Data Connectivity

Data is key to your visualization; poor data integration or missing data can have a considerable impact. Business data is the primary input for a data visualization tool, so ensuring that the right data sources are connected to the tool is of paramount importance. Data is often pulled from multiple dynamic sources, so it needs to be up-to-date for your visualizations to stay relevant. The ability to connect and integrate with other data sources is a critical factor in enabling effective data visualization.

4. Target Audience

Data visualizations often convey information to users who don't fully understand the application or the process. They could include line-of-business users, external users, and other stakeholders. They only need access to the data relevant to their role in the organization. The ability of data visualization tools like Oracle VBCS to adapt according to the audience plays a key role. So, ensure the tool is specific to the target audience and provides role-based user access.

5. Functionality

Keeping the data visualization tool's functionality aligned with your organization's needs is crucial. Business leaders often consider going for the software packed with the most number of features or with greater functionality, when in reality, they only require a fraction of these capabilities. Not only does it increase complexity, but it also drives up costs and impacts your ability to use it for its true purpose. Ultimately, you're left with too many features you don't need and will never use. Focus on acquiring the functionality your organization truly needs instead of fancy features, and you can keep adding more functionality as your business grows. Oracle VBCS allows you to add features based on your evolving needs.

1.3 Data Visualization Tools and type of data

Data visualization tools are cloud-based applications that help you to represent raw data in easy to understand graphical formats. You can use these programs to produce customizable bar charts, pie charts, column charts, and more.

Following is a handpicked list of Top Data Visualization Tool with their popular features and website links. The list contains both open-source(free) and commercial(paid) software.

Followings are some popular data visualization tools

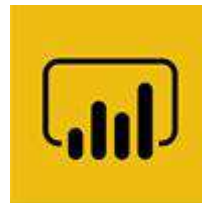
1) Zoho Analytics

Zoho Analytics is a robust and versatile data visualization tool. It allows users to create insightful reports and dashboards, and visually analyze any data in minutes. It features an AI powered assistant that enables users to ask questions and get intelligent answers in the form of meaningful reports.



2) Power BI

Power BI is a Business Intelligence and Data Visualization tool which helps you to convert data from various data sources into interactive dashboards and reports. It provides multiple software connectors and services.



3) Whatagraph

Whatagraph is a data visualization tool that enables you to monitor and compare the performance of multiple campaigns. This application allows you to transfer custom data from Google sheet and API.



4) Tableau

Tableau is a robust tool for visualizing data in a better way. You can connect any database to create understandable visuals. It is one of the best visualization tools that enables you to share visualization with other people.



5) Qlik

Qlik is a data visualization software which is used for converting raw data into knowledge. This software acts like a human brain which works on “association” and can go into any direction to search the answers.



6) Adaptive Insights

Adaptive Insights is a data visualization tool built to boost your business. It is one of the best data visualisation tools that helps you to plan, budget, as well as forecast to make better decisions.



7) Dundas BI

Dundas BI is an enterprise-ready Business Intelligence platform. You can deploy it as the central data portal for your company or integrate into any website.



8) Domo

Domo is a cloud platform that helps you to conduct analysis and create interactive visualization. It enables you to examine important data using graphs and pie charts. This app helps you to simplify administration data.



9) Cluvio

Cluvio is a platform that enables you to run SQL queries for your database. It allows you to visualize the result in a better and understandable way.



10) Datawrapper

Datawrapper is an open-source tool that enables you to create interactive charts. You can load CSV (Comma-separated Values data files into this app and embed maps onto your website.

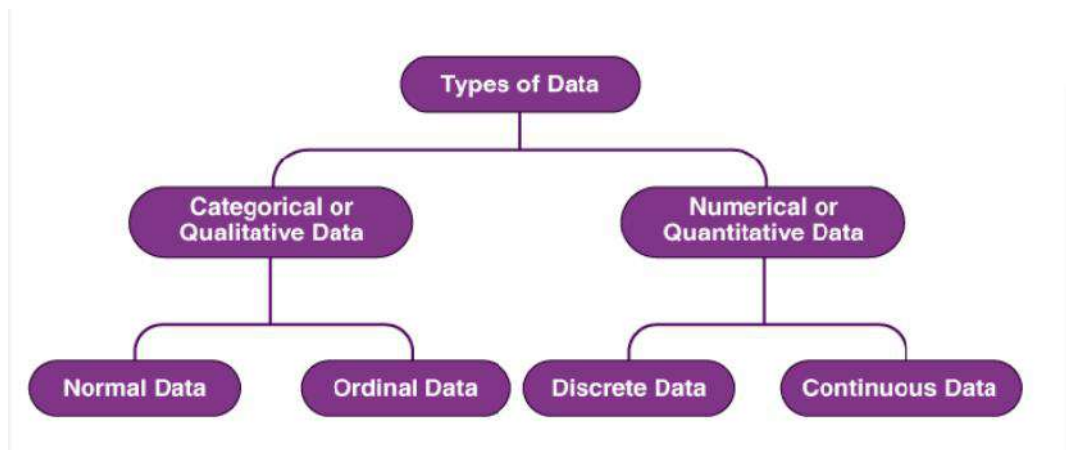


Types of data

The data is classified into majorly four categories:

1. Nominal data
2. Ordinal data
3. Discrete data
4. Continuous data

Further, we can classify these data as follows:



Qualitative or Categorical Data

Qualitative data, also known as the categorical data, describes the data that fits into the categories. Qualitative data are not numerical. The categorical information involves categorical variables that describe the features such as a person's gender, home town etc. Categorical measures are defined in terms of natural language specifications, but not in terms of numbers.

Sometimes categorical data can hold numerical values (quantitative value), but those values do not have a mathematical sense. Examples of the categorical data are birthdate, favourite sport, school

postcode. Here, the birthdate and school postcode hold the quantitative value, but it does not give numerical meaning.

Nominal Data

Nominal data is one of the types of qualitative information which helps to label the variables without providing the numerical value. Nominal data is also called the nominal scale. It cannot be ordered and measured. But sometimes, the data can be qualitative and quantitative. Examples of nominal data are letters, symbols, words, gender etc.

The nominal data are examined using the grouping method. In this method, the data are grouped into categories, and then the frequency or the percentage of the data can be calculated. These data are visually represented using the pie charts.

Ordinal Data

Ordinal data/variable is a type of data that follows a natural order. The significant feature of the nominal data is that the difference between the data values is not determined. This variable is mostly found in surveys, finance, economics, questionnaires, and so on.

The ordinal data is commonly represented using a bar chart. These data are investigated and interpreted through many visualisation tools. The information may be expressed using tables in which each row in the table shows a distinct category.

Quantitative or Numerical Data

Quantitative data is also known as numerical data which represents the numerical value (i.e., how much, how often, how many). Numerical data gives information about the quantities of a specific thing. Some examples of numerical data are height, length, size, weight, and so on. Quantitative data can be classified into two different types based on the data sets. The two different classifications of numerical data are discrete data and continuous data.

Discrete Data

Discrete data can take only discrete values. Discrete information contains only a finite number of possible values. Those values cannot be subdivided meaningfully. Here, things can be counted in whole numbers.

Example: Number of students in the class

Continuous Data

Continuous data is data that can be calculated. It has an infinite number of probable values that can be selected within a given specific range.

Example: Temperature range

Summary

- Data visualization is the representation of data through use of common graphics, such as charts, plots, infographics, and even animations. These visual displays of information

communicate complex data relationships and data-driven insights in a way that is easy to understand.

- Data visualizations are used to discover unknown facts and trends. You can see visualizations in the form of line charts to display change over time. Bar and column charts are useful for observing relationships and making comparisons. A pie chart is a great way to show parts of a whole. And maps are the best way to share geographical data visually.
- To craft an effective data visualization, you need to start with clean data that is well-sourced and complete. After the data is ready to visualize, you need to pick the right chart.

Keywords

Data: In computing, data is information that has been translated into a form that is efficient for movement or processing.

Data Visualization: Data and information visualization is an interdisciplinary field that deals with the graphic representation of data and information.

Charts: A data chart is a type of diagram or graph, that organizes and represents a set of numerical or qualitative data. Maps that are adorned with extra information (map surround) for a specific purpose are often known as charts, such as a nautical chart or aeronautical chart, typically spread over several map sheets.

Data analysis: Data Analysis. Data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data.

Self-Assessment

1. What is true about Data Visualization?

- A. Data Visualization is used to communicate information clearly and efficiently to users by the usage of information graphics such as tables and charts.
- B. Data Visualization helps users in analyzing a large amount of data in a simpler way.
- C. Data Visualization makes complex data more accessible, understandable, and usable.
- D. All of the above

2. Which are pros of data visualization?

- A. It can be accessed quickly by a wider audience.
- B. It can misrepresent information
- C. It can be distracting
- D. None Of the above

3. Data can be visualized using?

- A. graphs
- B. charts
- C. maps
- D. All of the above

4. Which are cons of data visualization?

- A. It conveys a lot of information in a small space.
- B. It makes your report more visually appealing.
- C. visual data is distorted or excessively used.
- D. None Of the above

5. Which of the following is not a data visualization tool?

- A. Tableau
- B. Cluvio
- C. Microsoft Word
- D. Domo

6. Data visualization is also an element of the broader _____.

- A. deliver presentation architecture
- B. data presentation architecture
- C. dataset presentation architecture
- D. data process architecture

7. Which of the intricate techniques is not used for data visualization?

- A. Bullet Graphs
- B. Bubble Clouds
- C. Fever Maps
- D. Heat Maps

8. Which method shows hierarchical data in a nested format?

- A. Treemaps
- B. Scatter plots
- C. Population pyramids
- D. Area charts

9. Which one of the following is most basic and commonly used techniques?

- A. Line charts
- B. Scatter plots
- C. Population pyramids
- D. Area charts

10. The best feature Tableau are except _____ -

- A. Collaboration of data
- B. Data Blending
- C. Real time analysis
- D. Data is more small and fit

11. Where can we apply global filters?

- A. Dashboards
- B. Stories
- C. Sheets
- D. All of the above

12. _____ is the representation of data through use of common graphics, such as charts, plots, infographics, and even animations.

- A. Data visualization
- B. Data
- C. Tablue
- D. None of above

13. Who is the parent company of Tableau?

- A. Salesforce
- B. Workday
- C. Microsoft
- D. Google

14. What are the file extensions in Tableau ?

- A. Tableau Packaged Workbook (.twbx)
- B. Tableau Data Source(.tds)
- C. Tableau Workbook (.twb)
- D. All of the above

15. Power BI is a product of _____

- A. Facebook
- B. Oracle
- C. Microsoft
- D. SAP

Answers for Self-Assessment

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. D | 2. A | 3. D | 4. C | 5. A |
| 6. B | 7. C | 8. A | 9. A | 10. D |
| 11. D | 12. A | 13. A | 14. D | 15. C |

Review Questions

- 1. What do you mean by data visualization?
- 2. Explain the need for data visualization tools in now's industry.

3. What is the difference between data and data visualization?
4. Explain Types of Data Visualizations Elements.
5. What do you mean by data visualization tools? Explain with an example.



Further Readings

1. Communication Data With Tableau, Ben Jones, O' Reilly Publications



Web Links

<https://www.tableau.com/>

<https://www.datacamp.com/tutorial/data-visualisation-tableau>

Unit 02: Introduction to Tableau

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Objectives

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- 2.1 Usage of Tableau software:
- 2.2 Why Tableau?
- 2.3 Features of Tableau:
- 2.4 Tableau Product Suite
- 2.5 Installation steps
- 2.6 Configure Tableau Server for a forward proxy

Summary

Keywords

Self-assessment questions

Answers for Self Assessment

Review Question

Further Readings

Objectives

- After studying this unit, you will be able to:
- Understand concept of data visualization.
- install software for data visualization.
- Understand real time analysis.
- Collaboration with data.

Introduction

Tableau is an excellent data visualization and business intelligence tool used for reporting and analyzing vast volumes of data. It is an American company that started in 2003—in June 2019, Salesforce acquired Tableau. It helps users create different charts, graphs, maps, dashboards, and stories for visualizing and analyzing data, to help in making business decisions. Tableau has a lot of unique, exciting features that make it one of the most popular tools in business intelligence (BI). Let's learn more about some of the essential Tableau Desktop features. Now that we know what is tableau exactly, let us understand some of its salient features.

Tableau is capable of connecting with a wide range of data sources. It can connect to files present in your system, such as Microsoft Excel, text files, JSON, PDF, etc. It can also work on data present on a database server, such as Microsoft SQL Server, MySQL, Oracle, Teradata, etc. There are other saved data sources that Tableau can connect with. It also can connect and fetch data from cloud sources, like AWS, Azure SQL Data Warehouse, and Google Cloud SQL.

Tableau Uses:

2.1 Usage of Tableau software:

The best features of Tableau software are

Data Blending

Real time analysis

Collaboration of data

The great thing about Tableau software is that it doesn't require any technical or any kind of programming skills to operate. The tool has garnered interest among the people from all sectors such as business, research.

Tableau is a powerful and fastest growing data visualization tool used in the Business Intelligence Industry. It helps in simplifying raw data in a very easily understandable format. Tableau helps create the data that can be understood by professionals at any level in an organization. It also allows non-technical users to create customized dashboards.

Data analysis is very fast with Tableau tool and the visualizations created are in the form of dashboards archers, different industries, etc.

Business Intelligence

Data Visualization

Data Blending

Data Collaboration

Query translation into visualization

To create no-code data queries

Real-time data analysis

To manage large size metadata

To import large size of data

2.2 Why Tableau?

Why use Tableau software when there are a whole lot of tools available to perform data visualization?

Tableau is greatly used because data can be analyzed very quickly with it. Also, visualizations are generated as dashboards and worksheets. Tableau allows one to create dashboards that provide actionable insights and drive the business forward. Tableau products always operate in virtualized environments when they are configured with the proper underlying operating system and hardware. Tableau is used by data scientists to explore data with limitless visual analytics.



2.3 Features of Tableau:

- Tableau Dashboard

- Collaboration and Sharing
- Live and In-memory Data
- [Data Sources in Tableau](#)
- Advanced Visualizations
- Mobile View
- Revision History
- Licensing Views
- Subscribe others
- ETL Refresh and many more make Tableau one of the most famous Data Visualization tools.

What is Data Visualization in Tableau?

Data Visualization is a pictorial representation of a dataset or information using maps, graphs, charts, and other visual elements. Data Visualization helps in easy understanding of the trend, insights, patterns, and other connections in a Dataset. Tableau is one of the most popular Data Visualization tools used by many enterprises and businesses to gain better insights into their data to offer the best customer experience.

How does Tableau work?

The major work of Tableau software is to connect and extract the data stored in various places. It can pull data from any platform. Tableau can extract data from any database, be it Excel, PDF, Oracle, or even Amazon Web Services.

Once Tableau is launched, ready data connectors are available which allow you to connect to any database.

The data extracted can be connected live to the Tableau data engine, Tableau Desktop. This is where a Data Analyst or a Data Engineer works with the data that was pulled up and develop visualization. The created dashboards are shared with users in the form of static files. The users receiving dashboards view the files using Tableau Reader.

The data extracted from Tableau Desktop can be published to Tableau Server, which is an enterprise platform where collaboration, distribution, governance, security model, and automation features are supported. Using Tableau Server, end users can access the files from all locations, be it a desktop or a mobile phone.

How Does Tableau Work How Does Tableau Work

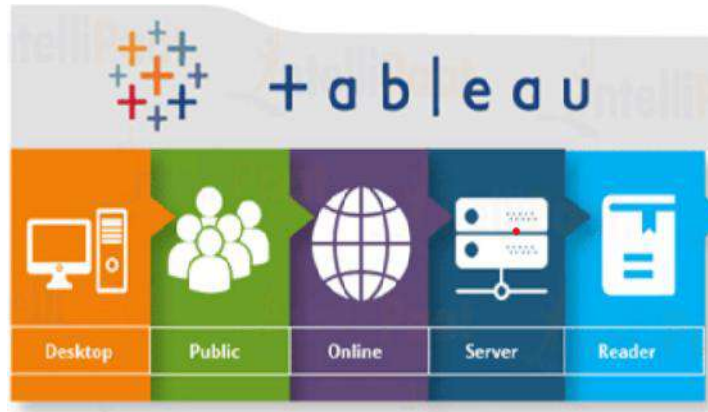
Gartner Magic Quadrant for Business Intelligence and Analytics Platforms

Following are the two ways in which Data Analytics of Tableau can be described:

Developer Tools: Tools used in development, like designing charts, dashboards, reports, and visualizations, come under this category. The major Tableau products in this category are Tableau Public and Tableau Desktop.

Sharing Tools: By the name, you would have understood what these tools do. Well, they are used for sharing reports, visualizations, and dashboards which are created using the developer tools. The main products that fall in this category are Tableau Online, Tableau Reader, and Tableau Server.

2.4 Tableau Product Suite



What is Tableau Desktop?

This product allows one to code and modifies the reports. Starting from creating reports and charts to combining them to form a dashboard, all this work is done in Tableau Desktop.

Tableau Desktop is classified into the following according to connectivity and data sources:

Tableau Desktop Personal

The development features of the Tableau Desktop Personal version are close enough to that of the Tableau Desktop. In this particular version, the workbook is in private mode and the access is limited. That means, these workbooks can't be posted and are for personal use only. Therefore, they have to be divided either on Tableau Public or Offline.

Tableau Desktop Professional

This version is very much like Tableau Desktop, only that the work generated or created in Tableau Desktop is published on the Tableau Server. In this version, there would be full access to all sorts of data types. It is great for people who wish to publish their work on the Tableau Server.

What is Tableau Reader?

It is a tool that allows one to view visualizations and workbooks generated using Tableau Public or Tableau Desktop. This data can easily be filtered, yet modifications are limited. Since anyone getting the workbook can view it using Tableau Reader, there is no security.

What is Tableau Server?

This is mainly used to share visualizations and workbooks which get generated in the Tableau Desktop application throughout the organization. The work will become accessible once it is uploaded to the respective servers.

To increase sharing of dashboards in Tableau Server, you should publish your work beforehand in Tableau Desktop. Though, it's not completely mandatory for licensed users to have an installed Tableau Server. They just need the login credentials using which they can verify these reports.

Tableau Online

As the term 'online' suggests, Tableau Online is a sharing tool. It has a similar usage as Tableau Server, but the data is saved on servers that are provided in the cloud maintained by the Tableau group.

The data that can be published on Tableau Online has no storage limit. Tableau Online and Server, both need workbooks that are created by Tableau Desktop to broadcast the data. Data streamed from web applications, be it Salesforce or Google Analytics, are supported by both, Tableau Online and Tableau Server.

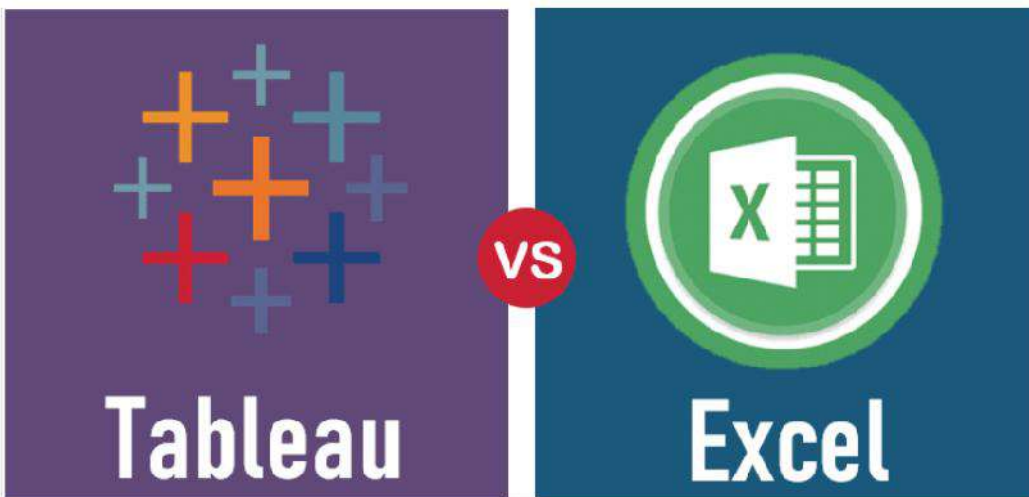
Tableau Public

Tableau Public is specially built for money-saving users. As the word 'public' suggests, the created workbooks can't be locally saved, rather it is sent to Tableau's public cloud which can be accessed by the general public. This is an economical version which is very good for people wanting to learn and share their data with people.

Tableau

vs

Excel



Excel and Tableau, are data analysis tools, but both of them have a unique approach to data exploration. Where Excel works with columns and rows in spreadsheets, Tableau explores the Excel data using its drag-and-drop feature. It formats the data in graphs and pictures that are easy to understand.

Tableau	MS Excel
Tableau is basically a data visualization tool which provides pictorial and graphical representations of data.	Excel is basically a spreadsheet for working with data in rows and columns. You need to first represent your data into a tabular format and then you can apply visualizations on top of it.
In Tableau, you can gain insights that you never thought possible. You can play with interactive	When it comes to Excel, you need to have a prior knowledge of the insight that you

visualizations, deploy data drilling tools, and explore various data that is available, and you don't need to have any specific knowledge of the insight you are looking for.	want and then work with various formulae in order to get there, along with that tabulation is also needed.
With Tableau, it is all about an easy and interactive approach.	In Excel, you need to have some programming in order to come up with real-time data visualization.

Advantages of Tableau

Fantastic Visualizations

You can now work with a lot of data that doesn't have any order to it and create a range of visualizations. Well, thanks to the in-built features of Tableau which help you create visualizations that surely stand out of the crowd. You also have the option of switching between different visualizations to bring about a greater context, ways of drilling down data, and exploring the data at a minute level.

In-depth Insights

Tableau can help enterprises futuristically to analyze data without any specific goals in mind. You can explore visualizations and have a look at the same data from different angles. You can frame 'what if' queries and work with data by hypothetically visualizing it in a different manner and dynamically adding components for comparison and analysis. When you are working with real-time data, then these capabilities are highlighted in a huge manner.

User-friendly Approach

This is the greatest strength of Tableau. It is built from the ground level for people who don't have any technical skills or coding experience. So, everything can be done with this tool by anybody without any prior set of skills. Since most of the features are in a drag-and-drop format, each visualization is so intuitive and self-depicting



.Working with Disparate Data Sources

Tableau has a powerful reason to be included by various organizations in today's data-driven world where data can come from any point and any disparate sources. Tableau has an edge over other Business Intelligence and Analytics tools as it lets you work by connecting to various Tableau data sources, data warehouses, and files that exist in the cloud, big data that exists in spreadsheets, and non-relational data, among other types of data. Tableau effortlessly blends all different types of data to help organizations come up with compelling visualizations.

Adding Datasets

Be it a database or an Excel workbook, with Tableau, one can easily add new datasets which get automatically blended with Tableau using common fields.

Switching Between Visualizations

You also have the option of switching between different visualizations to bring about a greater context, with ways of drilling down data and exploring it at a minute level.

Tableau is one of the top Business Intelligence and Data Visualization tools available today. It is being used by most of the Fortune Global 500 list of companies in order to derive valuable insights from their data.

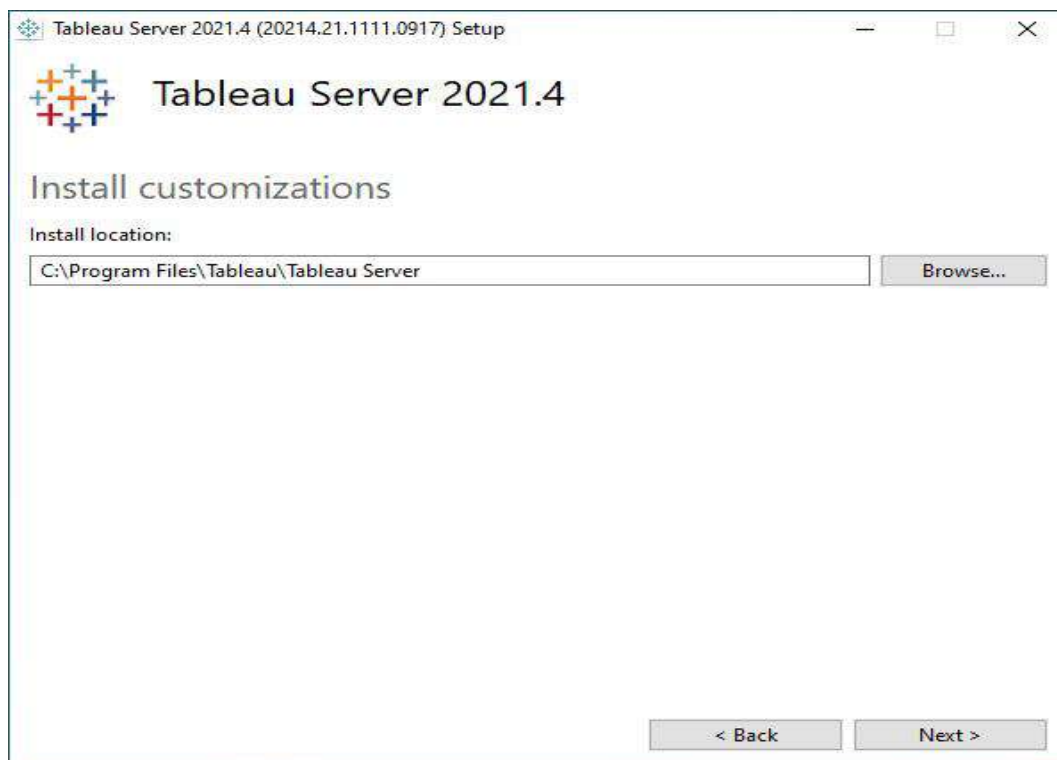
2.5 Installation steps

Running Setup

After you download the Tableau Server installation file, follow the instructions below to install the server.

Important: Do not install a beta version of Tableau Server in your production environment. You should also never restore a production Tableau Server installation using a backup of a beta version.

1. Sign in as a user with administrator access to the computer where you want to install Tableau Server and double-click the installation file.
2. Follow the on-screen instructions to complete Setup and install the application.

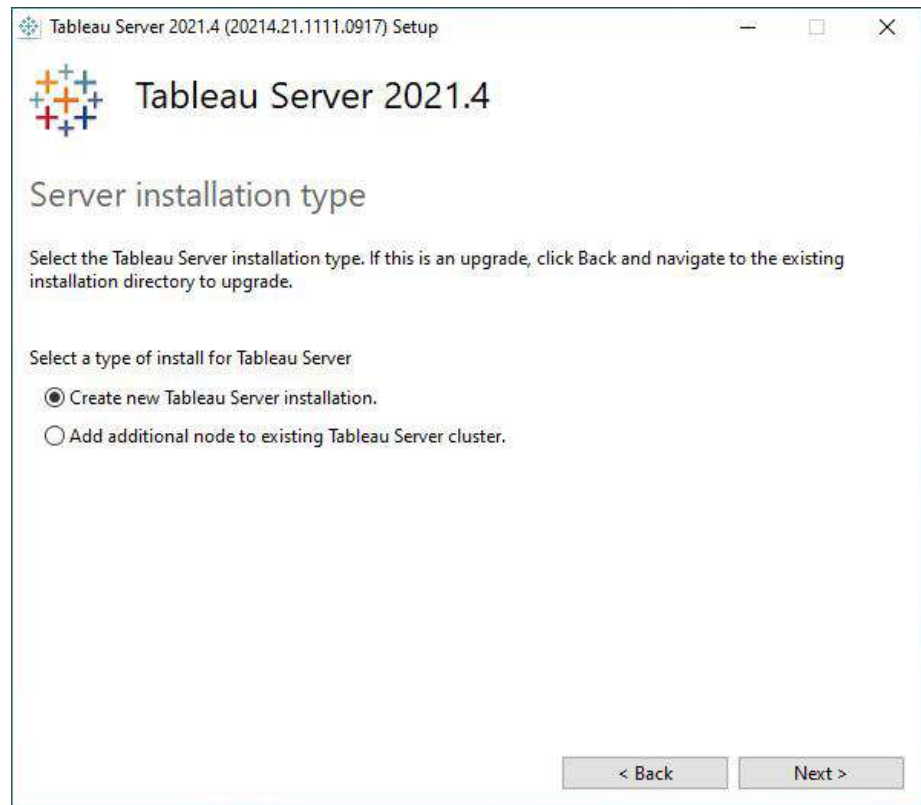


The default installation path is C:\Program Files\Tableau\Tableau Server\<>version>. The Setup program displays the install path without the version, like this: C:\Program Files\Tableau\Tableau Server. You can choose a different location, including a different drive, either by browsing to or typing in a new path. Be aware that if you browse to a location, the Setup program appends \Tableau Server to the end of the path. You can remove this if it is not the location you want.

If you are upgrading from Tableau Server version 2018.1 or earlier and Tableau was installed to a non-default location, you need to specify the location of your existing version. Upgrade steps vary depending on your target version and install location. See [Upgrade Tableau Server Overview](#) for information on how to choose your upgrade steps.

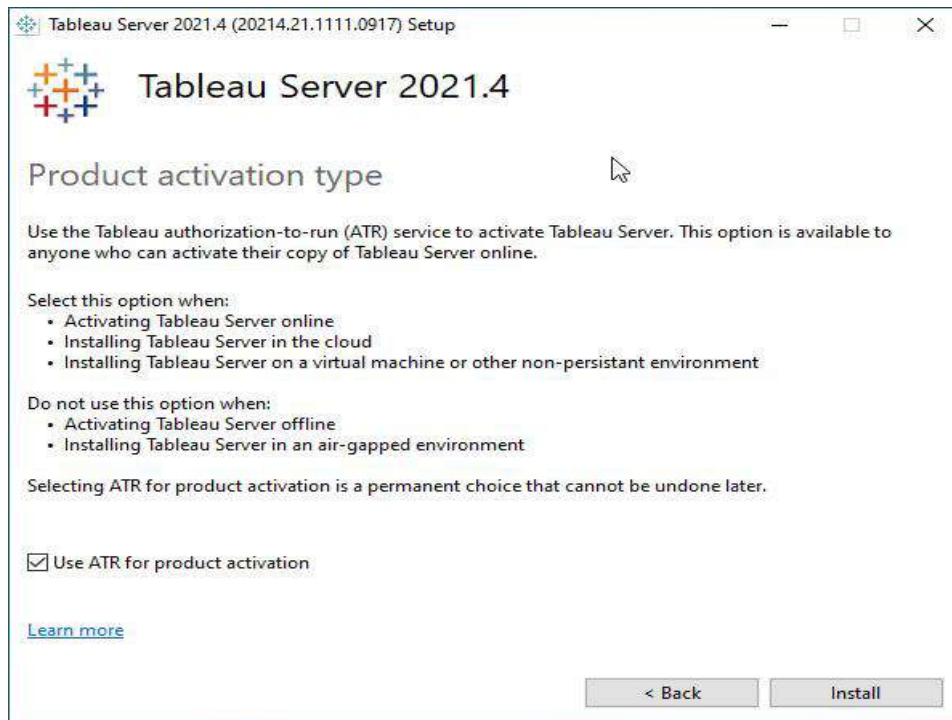
Note: If you are prompted by Windows Defender Firewall, click **Allow access**. You may need to do this multiple times for the installation to complete.

3. Click **Next**.



On the **Server installation type** page, you can specify whether you are installing the first node of a Server installation, or additional nodes in a multi-node installation. You do not need to change this from the default (Create new Tableau Server installation.) unless you are installing a multi-node Tableau Server. If you are installing a multi-node Tableau Server, see [Install and Configure Additional Nodes](#).

4. Click **Next**.



On the **Product activation type** page, select whether you want to use the Tableau authorization-to-run (ATR) service to activate Tableau Server (the default), and then click **Install**. For more information about the Tableau authorization-to-run (ATR) service, see [Activate Tableau Server using the authorization-to-run \(ATR\) service](#) (Link opens in a new window).

5. After the installation completes, click **Finish**. Setup will then open the TSM configuration web page on the computer where you are installing Tableau Server.

If you need to support characters that are not the Latin-1 set, install the Windows Language Packs via **Control Panel > Regional and Language Options**. The language packs will need to be installed on the initial server as well as any additional nodes.

2.6 Configure Tableau Server for a forward proxy

If your organization uses a forward proxy solution to access the internet, then configure Tableau Server to use the proxy server. Tableau Server must access the internet for map data and for default licensing functionality.

We recommend configuring Tableau Server for a forward proxy solution at this point of the installation process. See [Configuring Tableau Server on Windows to work with a forward proxy](#)

Activate and Register Tableau Server

Tableau Server requires at least one product key that both activates the server and specifies the number of license levels you can assign to users. You can access your product keys from the Customer Portal.

If you need to activate Tableau Server on a computer that is offline, see [Activate Tableau Server Offline - Adding a License](#). If you need to activate additional product keys to add capacity to an existing Tableau Server installation, see [Add Capacity to Tableau Server](#).

Prerequisite

Prerequisite

Before proceeding with the procedures in this topic, complete the following prerequisites as outlined in Install and Configure Tableau Server:

Install TSM

TSM uses port 8850. If you are running a local firewall, open port 8850.

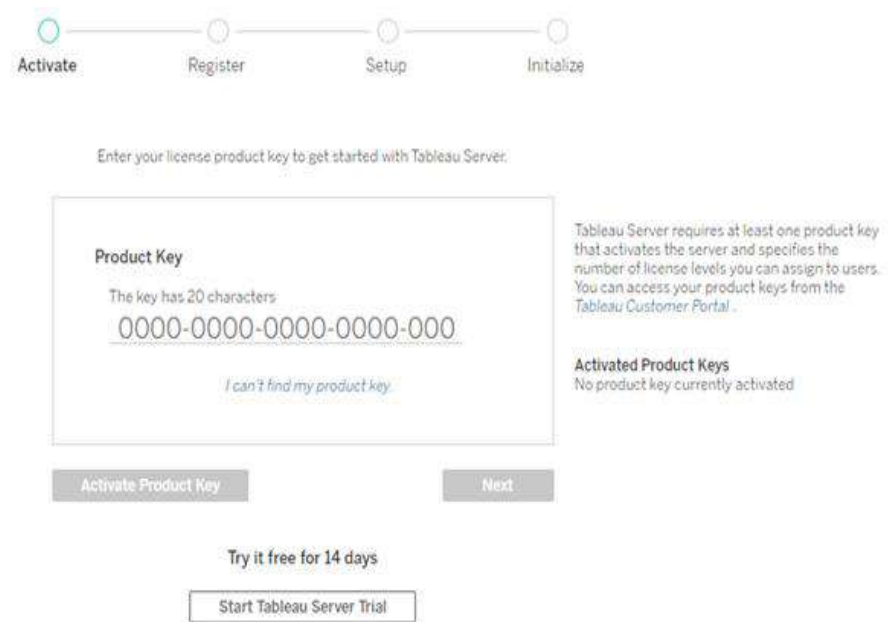
Configure Product Key Operations with Forward Proxy

1. If the computer where you are installing Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.
2. [Sign in to Tableau Services Manager Web UI](#).

The account you use must have administrative privileges on the computer where TSM is installed.

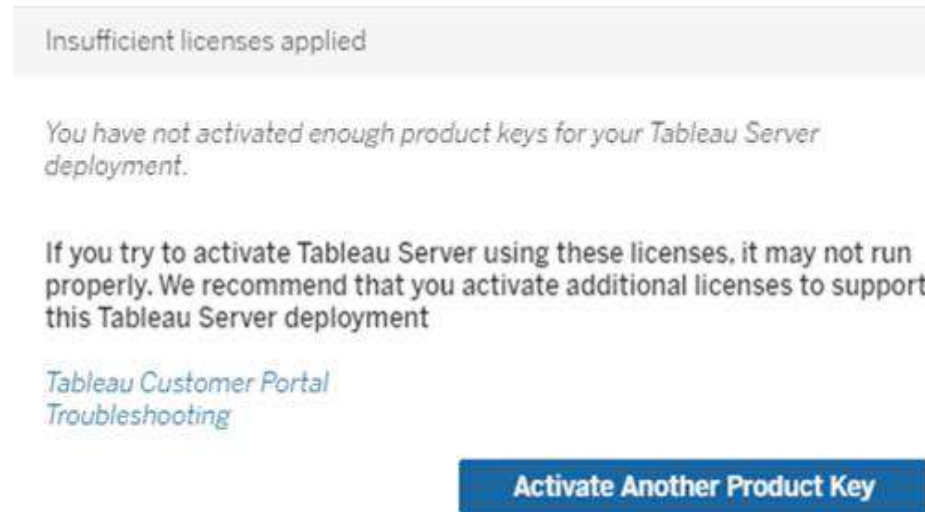
3. On the **Activate** page, Enter or paste your product key and click **Activate Product Key**.

After your product key is activated, it appears under **Activated Product Keys**.



4. To activate another product key, type over they key you just entered to add the new product key, and then click **Activate Product Key**. After your product key is activated, it appears under **Activated Product Keys**. Continue adding product keys in this manner until you're done.
5. When you're finished activating product keys, click **Next**.

Note: If the product keys you have activated don't have the necessary capacity, such as not enough cores or only a Viewer role product key, Tableau Services Manager displays the **Insufficient licenses applied** dialog box. Click **Activate Another Product Key** to add another product key and increase capacity on your Tableau Server installation.



6. On the **Register** page, enter your information into the fields and click **Register**.



Register with Tableau. All fields are required.

Contact Information

First Name	Last Name
<input type="text"/>	<input type="text"/>
Phone Number	Email
<input type="text"/>	<input type="text"/>

Company Information

Organization

Industry	Company Size
<input type="text"/>	<input type="text"/>
Department	Job Role
<input type="text"/>	<input type="text"/>

Region Information

City	Postal Code
<input type="text"/>	<input type="text"/>
Country/Region	State/Province
<input type="text"/>	<input type="text"/>

By registering, you confirm that you agree to the processing of your personal data by Salesforce as described in the [Privacy Statement](#).

Register

If you have a product key for Data Management or Advanced Management, you must activate that key to use the additional functionality. Product keys for these licenses should only be activated after at least one capacity product key has been activated on the server.

- For license information on Tableau Data Management, see [License Data Management](#).
- For license information on Tableau Advanced Management, see [About Tableau Advanced Management on Tableau Server](#).

Summary

- Tableau Desktop has a rich feature set and allows you to code and customize reports. Right from creating the charts, reports, to blending them all together to form a dashboard, all the necessary work is created in Tableau Desktop.
- For live data analysis, Tableau Desktop provides connectivity to Data Warehouse, as well as other various types of files. The workbooks and the dashboards created here can be either shared locally or publicly.
- Based on the connectivity to the data sources and publishing option, Tableau Desktop is classified into
- Tableau Desktop Personal: The development features are similar to Tableau Desktop. Personal version keeps the workbook private, and the access is limited. The workbooks cannot be published online. Therefore, it should be distributed either Offline or in Tableau Public.
- Tableau Desktop Professional: It is pretty much similar to Tableau Desktop. The difference is that the work created in the Tableau Desktop can be published online or in Tableau Server. Also, in Professional version, there is full access to all sorts of the datatype. It is best suitable for those who wish to publish their work in Tableau Server.

Keywords

- Tableau connects and extracts the data stored in various places. It can pull data from any platform imaginable. A simple database such as an excel, pdf, to a complex database like Oracle, a database in the cloud such as Amazon webs services, Microsoft Azure SQL database, Google Cloud SQL and various other data sources can be extracted by Tableau.
- When Tableau is launched, ready data connectors are available which allows you to connect to any database.
- Depending on the version of Tableau that you have purchased the number of data connectors supported by Tableau will vary.
- The pulled data can be either connected live or extracted to the Tableau's data engine, Tableau Desktop. This is where the Data analyst, data engineer work with the data that was pulled up and develop visualizations.
- The created dashboards are shared with the users as a static file. The users who receive the dashboards views the file using Tableau Reader.
- The data from the Tableau Desktop can be published to the Tableau server. This is an enterprise platform where collaboration, distribution, governance, security model, automation features are supported.
- With the Tableau server, the end users have a better experience in accessing the files from all locations be it a desktop, mobile or email.

Self-assessment questions

1. Default aggregation used for tree map_____
 - a. Avg
 - b. Count
 - c. Sum

2. The best feature Tableau are except_____ -
 - a. Collaboration of data
 - b. Data Blending
 - c. Real time analysis
 - d. Data is smaller and more fit

3. How do you find the field is discrete in Tableau ?
 - a. Green color
 - b. # symbol
 - c. Blue color
 - d. None

4. What percent of total profits do the top 10 customer by Sales represent in sample superstore dataset ?
 - a. 5.03%
 - b. 17.54%
 - c. 16.26%
 - d. 3.50%

5. Which of the following is not a Trend Line model ?
 - a. Linear Trend Line
 - b. Binomial Trend Line
 - c. Exponential Trend Line
 - d. Logarithmic Trend Line

6. Where can we apply global filters?
 - a. Dashboards
 - b. Stories
 - c. Sheets
 - d. All of the above

7. The Tableau Product Suite consists of_____ -
- a. Tableau Desktop ,Tableau Public, Tableau Online, Tableau Server, Tableau Measure
 - b. Tableau Desktop, Tableau Public ,Tableau Online ,Tableau Server ,Tableau Reader
 - c. Tableau Desktop ,Tableau Public ,Tableau Dimension ,Tableau Server, Tableau Reader
 - d. Tableau Desktop ,Tableau Public ,Tableau Online, Tableau Server ,Tableau Organic
8. Tableau File Extension is_____
- a. twbx
 - b. twby
 - c. twbw
 - d. twbz
9. What is the possible cause of the data not being updated?
- a. Data Extrac needs an update
 - b. The data source configuration of Data Extract needs to be refreshed
 - c. Services on Data Extrac are not running
 - d. The workers of Data Extrac are taking a timeout
10. What type of join is used in blending?
- a. Left join
 - b. Full join
 - c. Right join
 - d. Inner join
11. A justifiable reason to utilize a projectile chart.
- a. Looking at the genuine against the objective deals
 - b. Examining the pattern for an era
 - c. Showing the business development for a specific year
 - d. Adding information and ascertaining tally measure
12. What insight will the Link Utilization Hourly Trend give you?
- a. This will allow us to identify the specific times during the day the bandwidth utilization is the highest
 - b. This will allow us to identify the critical links that don't need attention
 - c. This will allow us to correlate bandwidth usage to user traffic
 - d. This will allow us to identify and set the optimum bandwidth thresholds in Tableau
13. Data Values available for the visualization_____
- a. Basic Expression
 - b. Table Calculation
 - c. None of the above
 - d. LoD Expression

14. In which Region do all Product Categories fall beneath the overall average profit in sample superstore dataset?

- a. East
- b. West
- c. Central
- d. South

15. Which of these is not a datatype in Tableau?

- a. Integer
- b. Character
- c. Float
- d. String

Answers for Self Assessment

1 c	2 d	3 c	4 a	5 b	6 d	7 b	8 a
9 c	10 a	11 a	12 a	13 b	14 d	15 b	

Review Question

- 1. What Are the Data Types Supported in Tableau?
- 2. How Will You Understand Dimensions and Measures?
- 3. What is Meant by ‘discrete’ and ‘continuous’ in Tableau?
- 4. What Are the Filters? Name the Different Filters in Tableau.
- 5. What Are the Different Joins in Tableau?



Further Readings

"Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few

"Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"



Web Links

<https://www.tableau.com/>

<https://intellipaat.com/blog/what-is-tableau/>

Unit 03: Tableau Data Sources

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3.1 Data Sources in Tableau

3.2 Combining Data Sources

3.3 Tableau Sets & Parameters

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Self-Assessment

Answers for Self-Assessment

Review Questions

Further Readings

Objectives

After studying this unit, you will be able to:

- Understand sets and parameters
- Analyze data using the tableau parameter
- Understand data sources

Introduction

In order to master any Business Intelligence tool, the most basic operation we need to learn is to connect to a data source. Once we establish a successful connection with a data source, we can access all its data, bring some part of it in Tableau's repository (extract) and use it for our analysis. Tableau offers a myriad of data sources such as local text files, MS Excel, PDFs, JSON or databases and servers like Tableau Server, MySQL Server, Microsoft SQL Server, etc.

A data source is made up of fields and groups. In the same way that folders on your hard disk contain and organize your files, fields contain the data that users enter into forms that are based on your form template, and groups contain and organize those fields.

3.1 Data Sources in Tableau

Tableau can connect to all the popular data sources which are widely used. Tableau's native connectors can connect to the following types of data sources.

- File Systems such as CSV, Excel, etc.
- Relational Systems such as Oracle, Sql Server, DB2, etc.
- Cloud Systems such as Windows Azure, Google BigQuery, etc.
- Other Sources using ODBC

The following picture shows most of the data sources available through Tableau's native data connectors.

Connect Live

The Connect Live feature is used for real-time data analysis. In this case, Tableau connects to real-time data source and keeps reading the data. Thus, the result of the analysis is up to the second, and the latest changes are reflected in the result. However, on the downside, it burdens the source system as it has to keep sending the data to Tableau.

In-Memory

Tableau can also process data in-memory by caching them in memory and not being connected to the source anymore while analyzing the data. Of course, there will be a limit to the amount of data cached depending on the availability of memory.

Combine Data Sources

Tableau can connect to different data sources at the same time. For example, in a single workbook you can connect to a flat file and a relational source by defining multiple connections. This is used in data blending, which is a very unique feature in Tableau.

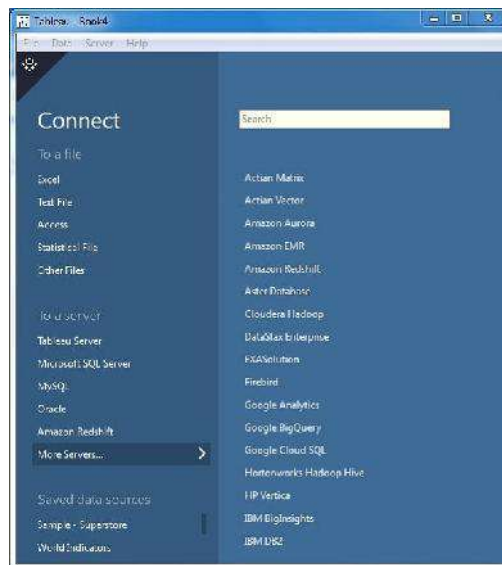
How to Establish a Connection?

Moving on, let us see how do we connect to a data source from Tableau Desktop. We will show you how to establish a connection to an MS Excel file and use its data for analysis in Tableau.

Open Tableau Desktop in your system. As soon as it opens, you will get the Tableau welcome page. On this page, you will find a blue pane on the left with the heading Connect. In this pane, you will find a list of data connectors for file-based and server-based sources. You can click on the data connector name, select a file or establish a connection.



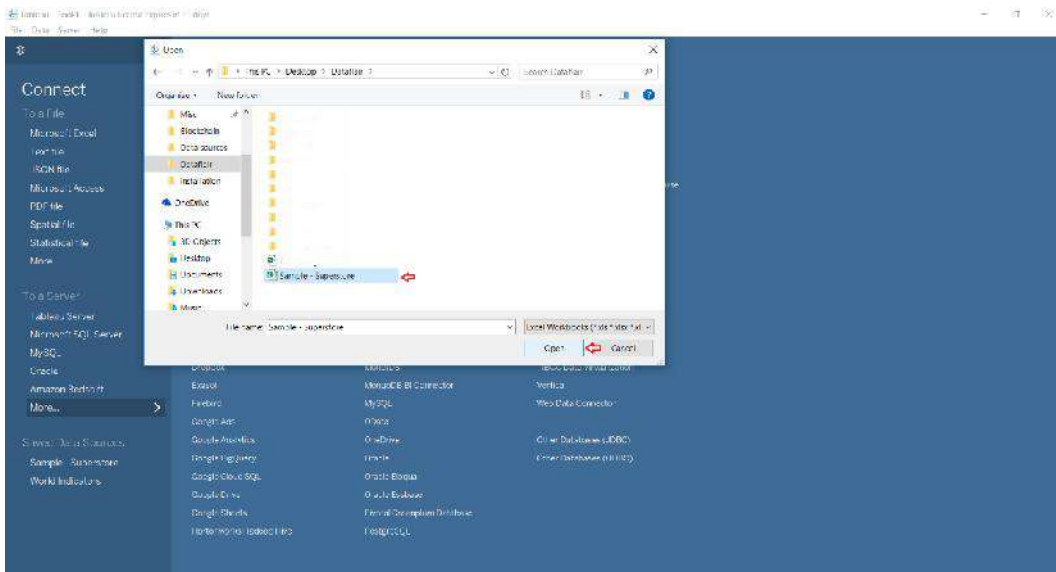
To fetch a Microsoft Excel file, we click on the option Microsoft



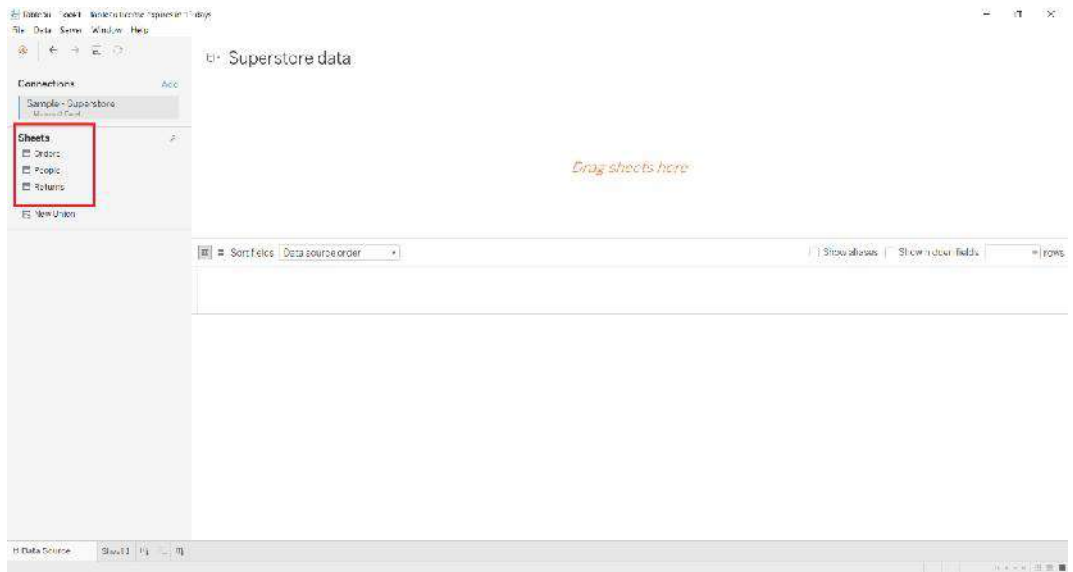
Excel from the list.



It will open a new dialog box from where you can access files from your system. We have a sample Excel file which we are going to select and click Open.

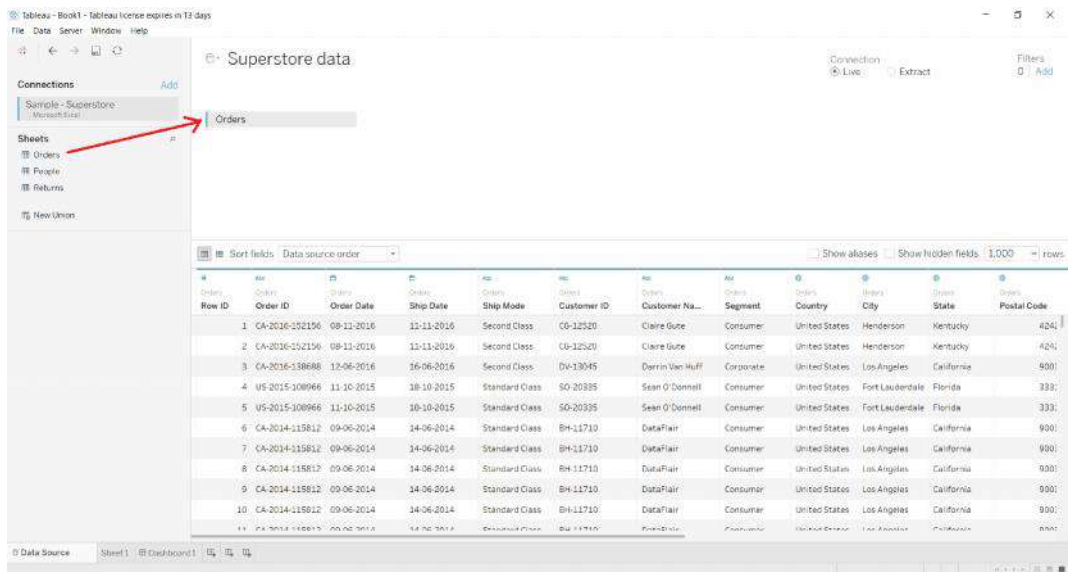


This will open the contents of the Excel file in a Data Source tab in a Tableau workbook.

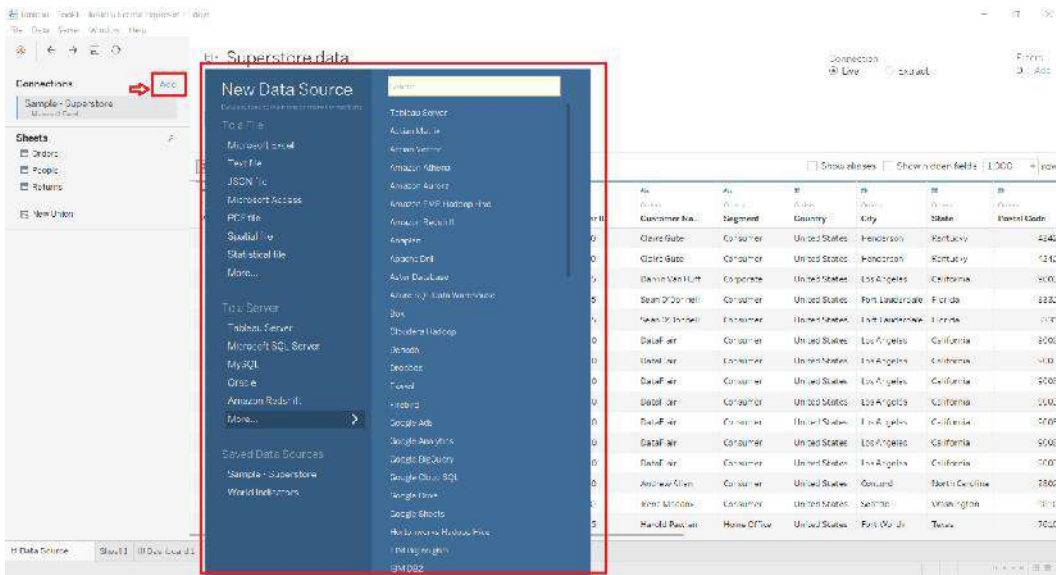


This tab has a Connections pane at its left which shows the name of the data source and its contents; that is, the number of sheets in the case of an Excel file.

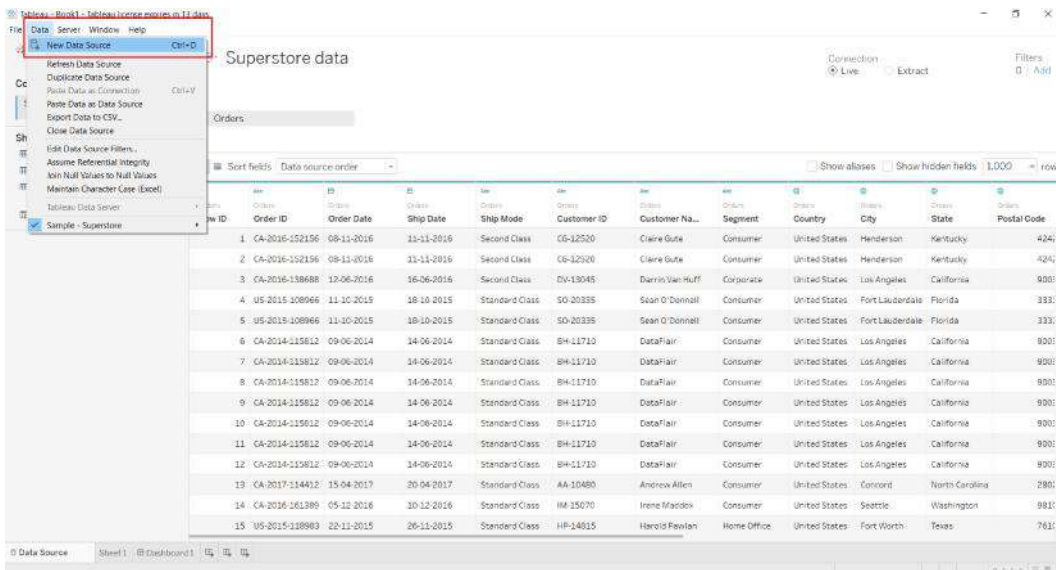
We can manage and view the contents of a data source by dragging and dropping sheets to the central pane. It will display the entire table with proper rows and columns of the respective sheet.



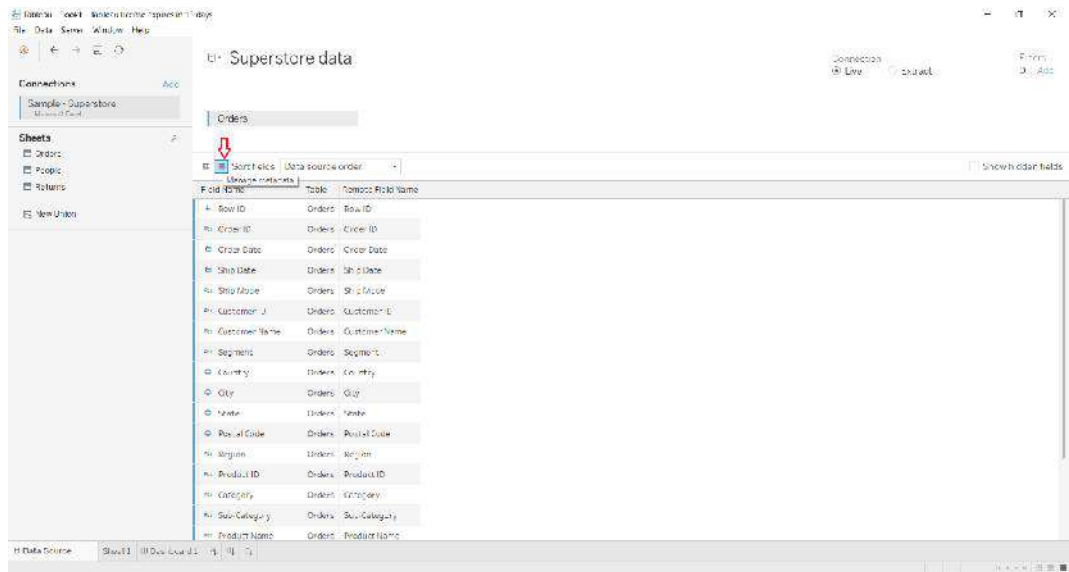
In addition to this, you can also add a new data source here by clicking on the **Add** option and then selecting the data file or connector of your choice.



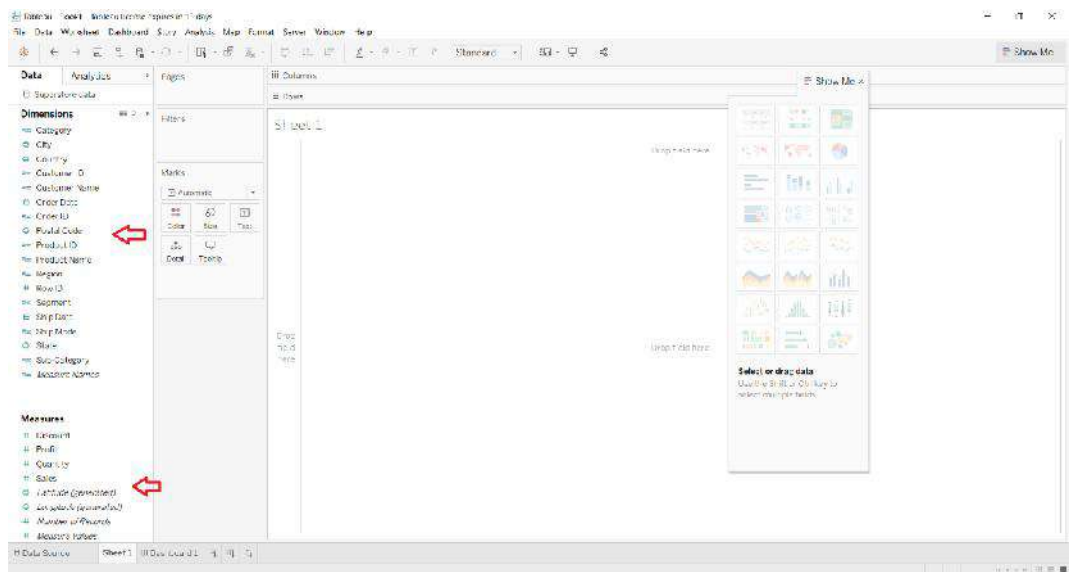
Or, by clicking on the Data tab present on the top-left bar and then selecting **New Data Source** option from there.



From here, we can sort fields and manage metadata where you can see the names of all the columns present in their concerning tables. In this way, we can also manage multiple linked data sources.



Once we load our data source, we can move on to create a worksheet in Tableau. Open the tab called **Sheet1** just next to the **Data Source** tab and you will find a list of available data sources and fields within it. On the left, there is an organized list of available dimensions and measures from where you can select and use them to create charts and graphs. Just drag and drop dimensions and measures to the *Columns* and *Rows* section to start making visualizations.



Every data source, especially server-based sources have different steps to follow in order to establish a connection with. Follow the steps, provide the necessary information and start working with your data in Tableau to carry out the analysis.

3.2 Combining Data Sources

There are several ways to combine data, each with their own strengths and weaknesses.

Relationships are the default method and can be used in most instances, including across tables with different levels of detail. Relationships are flexible and adapt to the structure of the analysis on a sheet by sheet basis. However, you can't create relationships between tables from published data sources.

Joins combine tables by adding more columns of data across similar row structures. This can cause data loss or duplication if tables are at different levels of detail, and joins must be established before analysis can begin. You can't use a published data source in a join.

Blends, unlike relationships or joins, never combine the data directly. Instead, blends query each data source independently, aggregate the results to the appropriate level, then present the results together visually in the view. Because of this, blends can handle different levels of detail and also work with published data sources. Blends don't create a new, blended data source (and therefore can't be published as a "blended data source"). Instead, they are simply blended results visualized per sheet.

3.3 Tableau Sets & Parameters

Sets

You can use sets to compare and ask questions about a subset of data. Sets are custom fields that define a subset of data based on some conditions.

You can make sets more dynamic and interactive by using them in Set Actions. Set actions let your audience interact directly with a viz or dashboard to control aspects of their analysis. When someone selects marks in the view, set actions can change the values in a set.

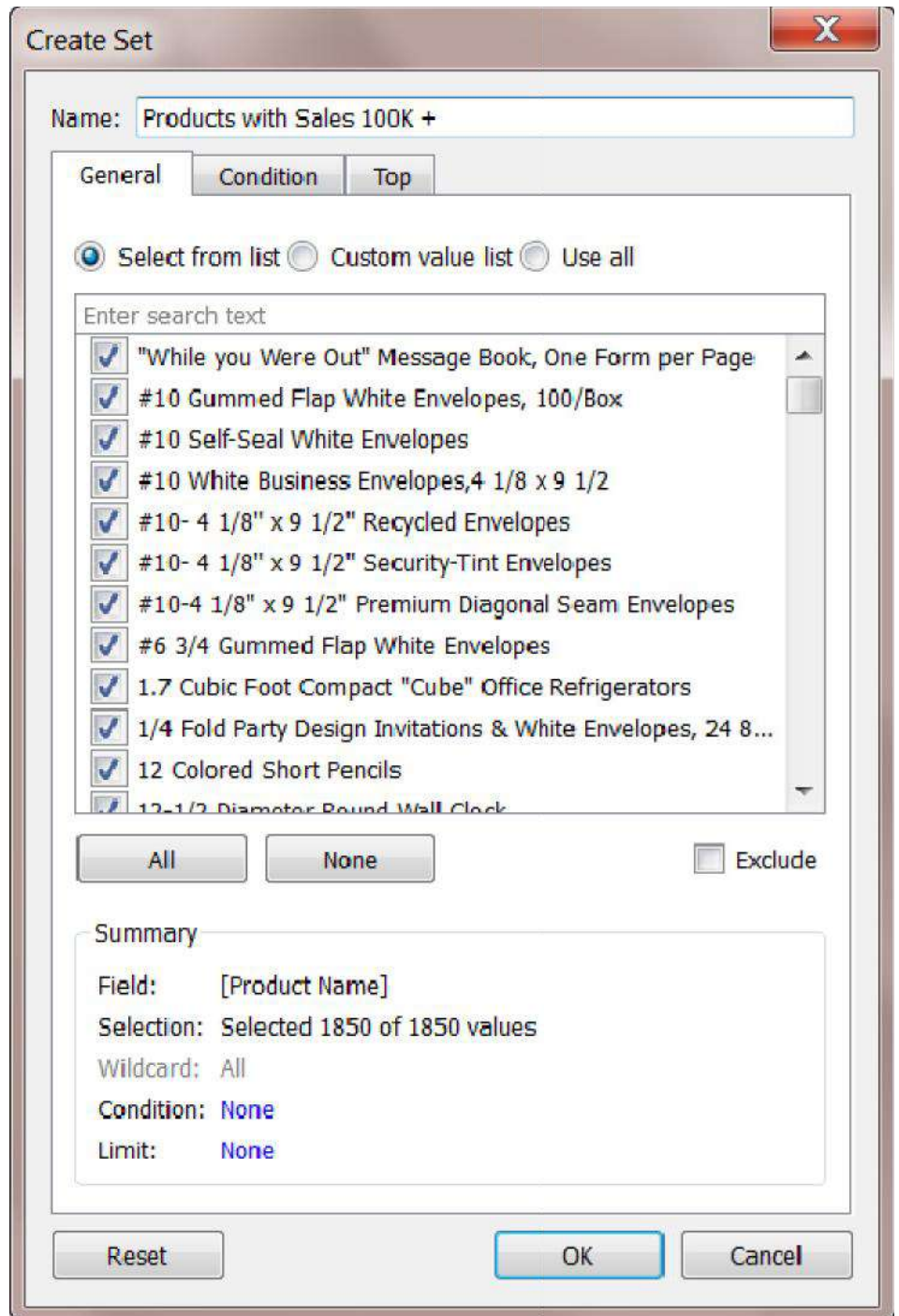
Create a dynamic set

There are two types of sets: dynamic sets and fixed sets. The members of a dynamic set change when the underlying data changes. Dynamic sets can only be based on a single dimension.

To create a dynamic set:

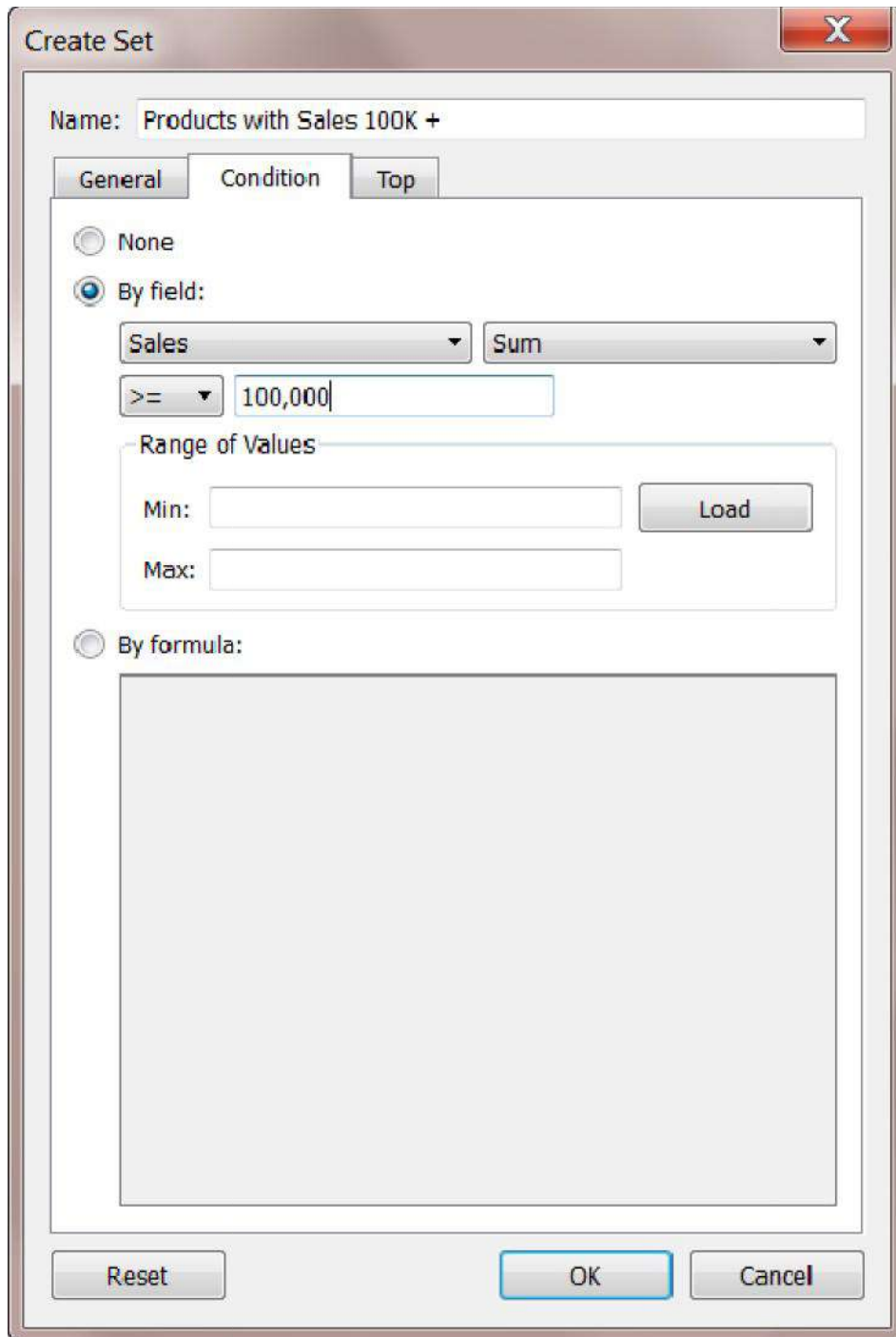
1. In the Data pane, right-click a dimension and select **Create > Set**.
2. In the Create Set dialog box, configure your set. You can configure your set using the following tabs:
 - **General:** Use the General tab to select one or more values that will be considered when computing the set.

You can alternatively select the **Use all** option to always consider all members even when new members are added or removed.



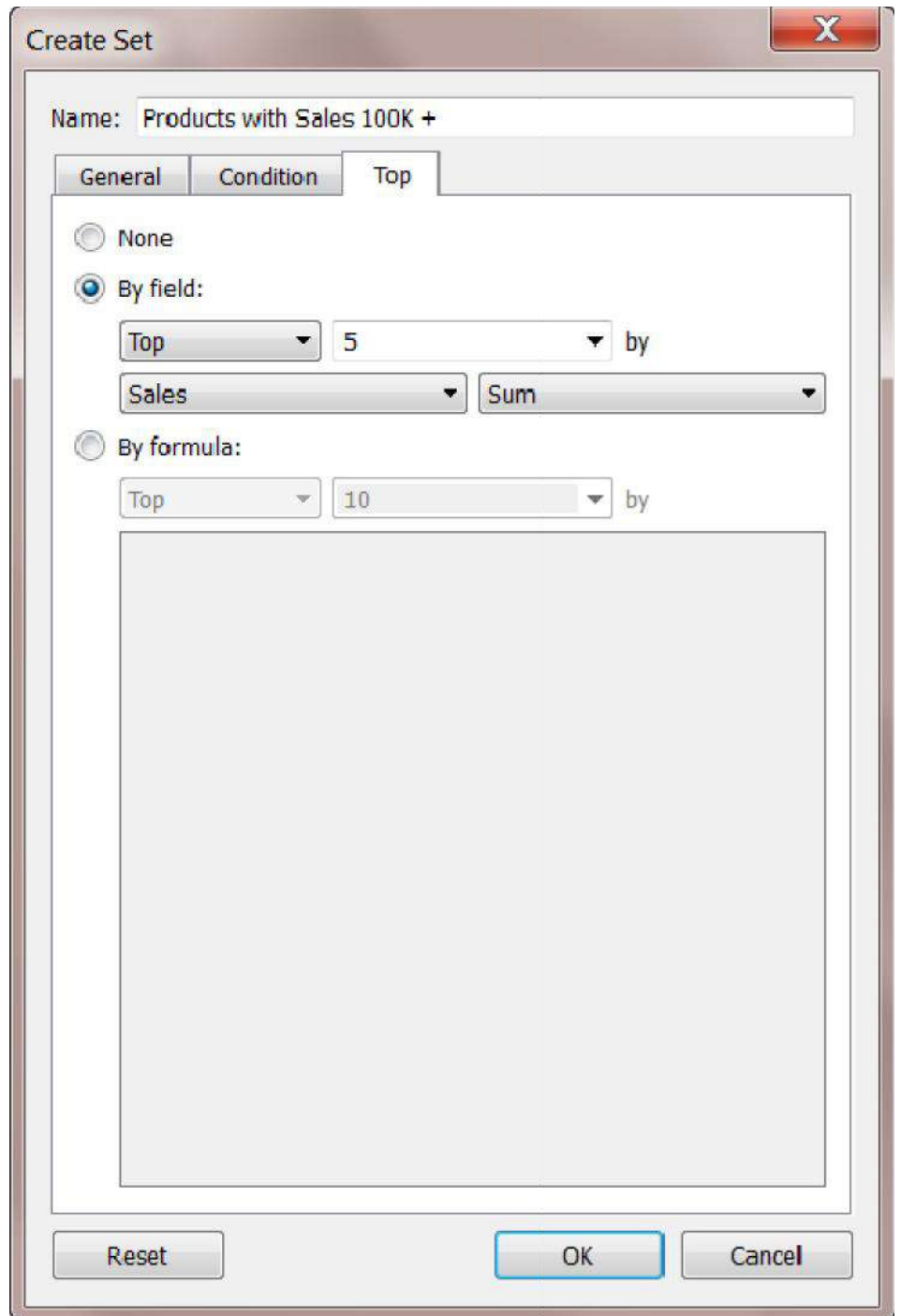
- **Condition:** Use the Condition tab to define rules that determine which members to include in the set.

For example, you might specify a condition that is based on total sales that only includes products with sales over \$100,000.



- **Top:** Use the Top tab to define limits on what members to include in the set.

For example, you might specify a limit that is based on total sales that only includes the top 5 products based on their sales.



3. When finished, click **OK**.

The new set is added to the bottom of the Data pane, under the Sets section. A set icon  indicates the field is a set.

Sets

- ④ State - High Sales & Profit
- ④ Top Customers by Profit

Parameters

A parameter is a workbook variable such as a number, date, or string that can replace a constant value in a calculation, filter, or reference line.



Example you may create a calculated field that returns True if Sales is greater than \$500,000 and otherwise returns False. You can replace the constant value of "500000" in the formula with a parameter. Then, using the parameter control, you can dynamically change the threshold in your calculation.

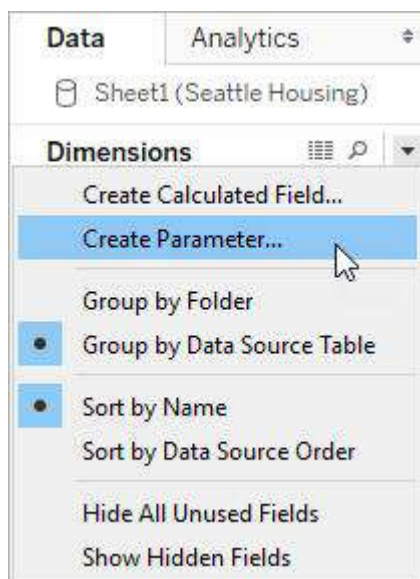
You can even create a dynamic parameter that's set to automatically refresh its current value (to the result of a single-value, view-independent calculation), list of values (based on a data source column), or range of values. This will happen each time the workbook is opened and Tableau connects to the data source referenced by the parameter, or whenever you select Refresh from the data source's context menu..

You can make your parameters more dynamic and interactive by using them in Parameter Actions. Parameter actions let your audience change a parameter value through direct interaction with a viz, such as clicking or selecting a mark.

Create a parameter

Follow the instructions below to create a new parameter from the Data pane.

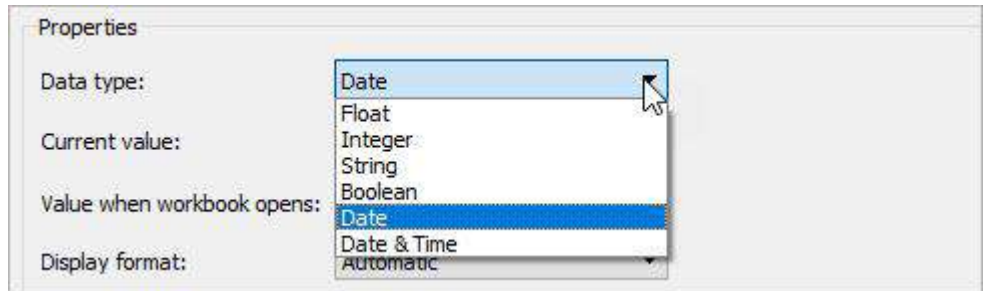
1. In the Data pane, click the drop-down arrow in the upper right corner and select **Create Parameter**.



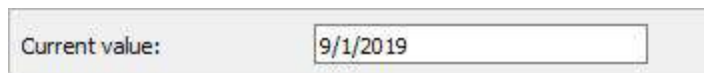
2. In the Create Parameter dialog box, give the field a **Name**.



- Specify the data type for the values it will accept:



- Specify a current value. This is the default value for the parameter. In this case, let's leave the field as is because we'll be using the latest data, which we'll configure in the next step.

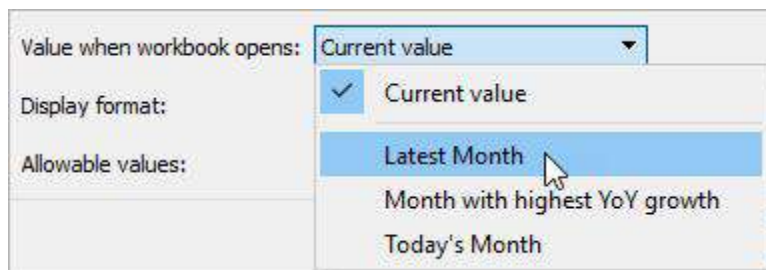


- Specify a value when the workbook opens. In this case, let's create a dynamic parameter by setting the parameter's default value to the result of a single-value, view-independent calculation.

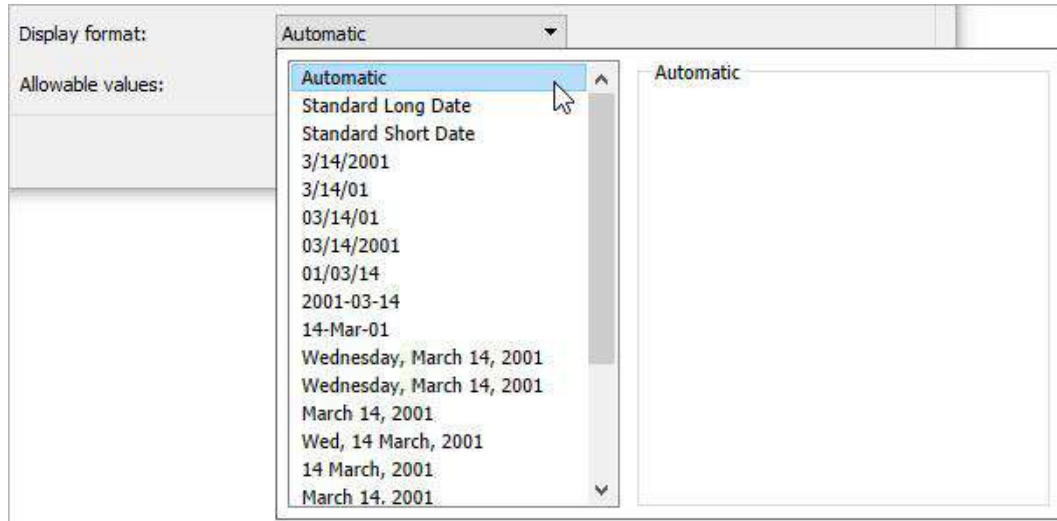
Notes

If there is more than one value, the workbook would not be able to choose a default value. The calculation must also be view-independent so that the value won't change as the viz changes. To do this, you can use a FIXED level of detail (LOD) expression that is not dependent on the structure of the viz. All parts of the calculation must be inside the FIXED LOD expression. If you use a FIXED LOD expression as the default value and are using context filters, the dynamic parameter will not reflect any context filters. For more information on LOD expressions, see [Create Level of Detail Expressions in Tableau](#).

For this dynamic parameter, let's use **Latest Month**. This means that if the connected data source is updated and the workbook is opened, the parameter will automatically update when the workbook is opened.



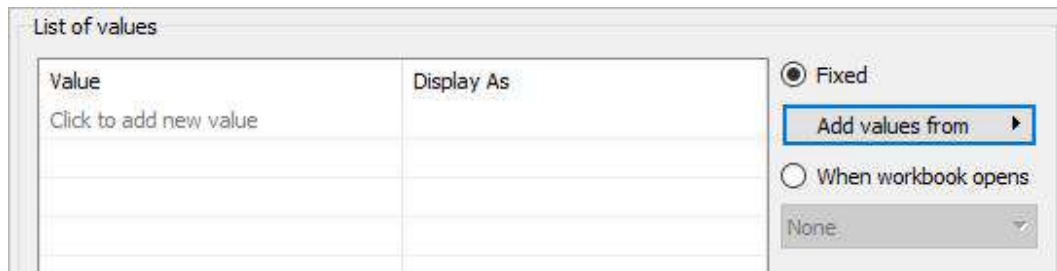
- Specify the display format to use in the parameter control (Tableau Desktop only).



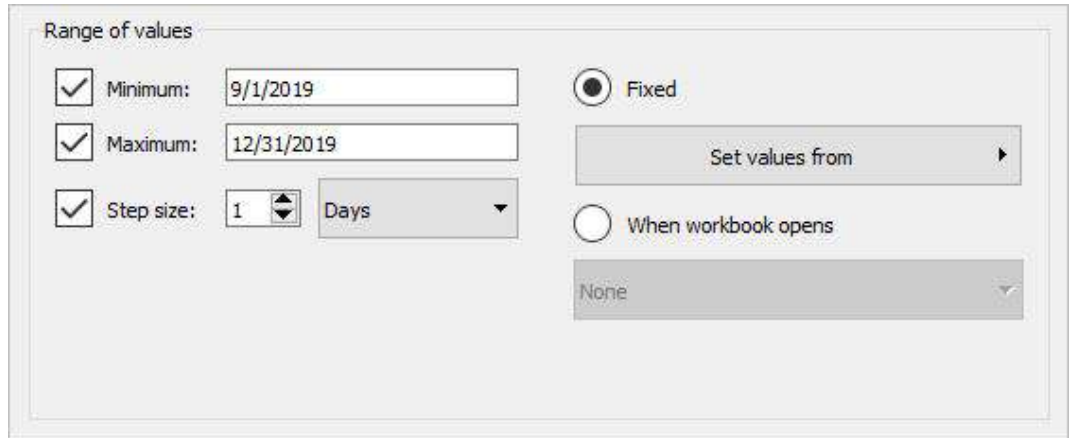
7. Specify how the parameter will accept values. You can select from the following options:
 - **All** - The parameter control is a simple text field.
 - **List** - The parameter control provides a list of possible values for you to select from.
 - **Range** - The parameter control lets you select values within a specified range.

The availability of these options is determined by the data type. For example, a string parameter can only accept all values or a list. It does not support a range.

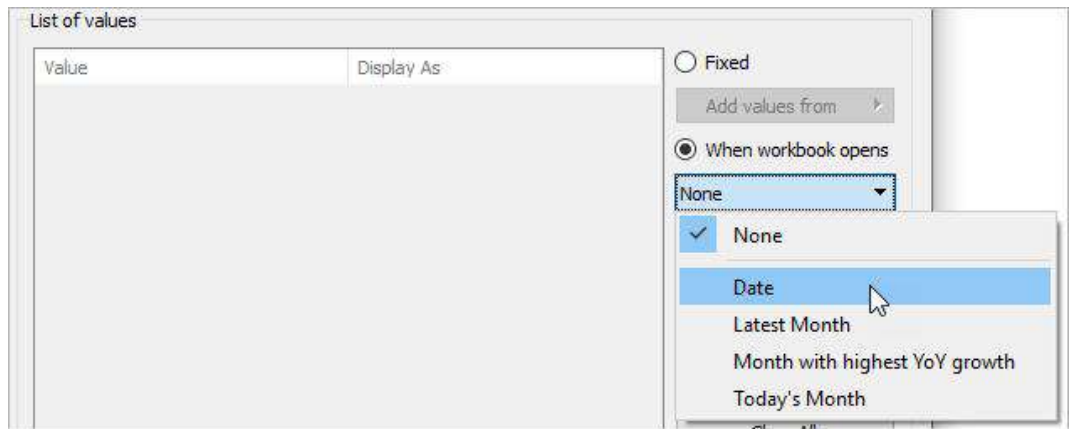
If you select List, you must specify the list of values. Click in the left column to type your list of values, or you can add members of a field by selecting **Add values from**.



If you select Range, you must specify a minimum, maximum, and step size. For example, you can define a date range between January 1, 2019 and December 31, 2019, with the step size set to 1 month to create a parameter control that lets you select each month in 2019.

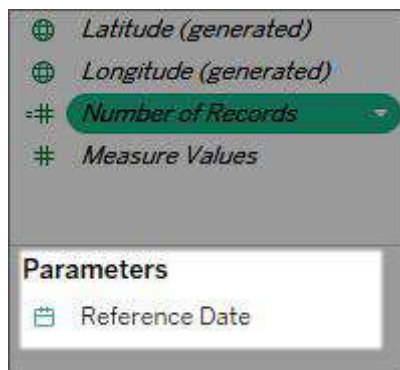


In this case, to refresh the parameter’s list of values (or domain) whenever the workbook opens, select **List**, and then select **When workbook opens**. Notice that the list of values on the left is grayed out because the workbook is dynamically pulling values from the data source.



8. When finished, click **OK**.

The parameter is now listed in the Parameters section at the bottom of the **Data** pane.



The parameter is also available everywhere else you can use a parameter – for example, on the Top tab in the Filter dialog box, or in the Reference Line dialog box. Parameters are global across the workbook and can be used in any worksheet.

Summary

- Tableau is a popular Business Intelligence tool used by thousands of companies around the world. It helps businesses generate valuable insights by connecting and analyzing the raw data from different sources. It offers various tools and techniques that a business can use to establish relationships between different data sources.
- Parameters in Tableau are the container of values used to calculate and dynamically enter the values that are otherwise not present in the original dataset. You can add conditions and select the range of the values for which you want to create a parameter. After that, you can incorporate these values into reports and dashboards and see their effect on different visualizations.
- Parameters are a method that transfers the control on datasets from the author of the report to the user.
- Parameters or container values in Tableau are mainly used to dynamically enter the values in the dataset that would otherwise not be present in it. With tableau parameters, you can set the range for any dataset and only focus on specific data variables/dimensions for performing data analysis.

Keywords

Parameters: Parameters are useful when you want to add interactivity and flexibility to a report, or to experiment with what-if scenarios. Suppose you are unsure which fields to include in your view or which layout would work best for your viewers.

Data Source: DataSource is a name given to the connection set up to a database from a server. The name is commonly used when creating a query to the database. The data source name need not be the same as the filename for the database.

Sets: Sets are custom fields that define a subset of data based on some conditions. A set can be based on a computed condition, for example, a set may contain customers with sales over a certain threshold. Computed sets update as your data changes. Alternatively, a set can be based on specific data point in your view.

Self-Assessment

1. What are the different Tableau files?
 - A. Workbooks
 - B. Bookmarks
 - C. Packaged Workbooks
 - D. All of these
2. What are the characteristics to distinguish data source?
 - A. Icon/Name
 - B. Connection Type

- C. Connects to
 - D. All of these
3. Tableau was founded by
- A. Chris Stoltecorrect
 - B. Chris Jordan
 - C. Alexander Fleming
 - D. None
4. How do you identify a continuous field in Tableau?
- A. It is identified by a blue pill in the visualizationwrong
 - B. It is identified by a green pill in a visualizationcorrect
 - C. It is preceded by a # symbol in the data window
 - D. When added to the visualization, it produces distinct values
5. The icon associated with the field that has been grouped is a _____
- A. Paper Clipcorrect
 - B. Set
 - C. Hashwrong
 - D. Equal To
6. What are the file extensions in Tableau?
- A. Tableau Bookmark (.tdm)
 - B. Tableau Map Source (.tms)
 - C. Tableau Preferences (.tps)

D. All of the above correct

7. How do you identify a discrete field in Tableau?

- A. It is identified by a blue pill in the visualization
- B. It is identified by a green pill in a visualization
- C. It is preceded by a # symbol in the data window
- D. When added to the visualization, it produces distinct values

8. It contains qualitative values.....

- A. Dimensions
- B. Measures
- C. Show me
- D. Calculated fields

9. It contains quantitative values.....

- A. Dimensions
- B. Measures
- C. Show me
- D. Calculated fields

10. It contains options to create graphs

- A. Dimensions
- B. Measures
- C. Show me
- D. Calculated fields

11. It contains option to apply all formulas

- A. Dimensions
- B. Measures
- C. Show me
- D. Calculated fields

12. It can be used to define the level of detail to perform an aggregation on

- A. Dimensions
- B. Measures
- C. Show me
- D. Calculated fields

13. In which type of graph geographical role is defined

- A. Bar graph
- B. Map charts
- C. Scatter plot
- D. Dimensions

14. In which type of graph spatial data is required

- A. Bar graph
- B. Map charts
- C. Scatter plot
- D. Dimensions

15. Tableau takes at least one measure in the Rows shelf and one measure in the Columns shelf to create a _____

- A. Bar graph
- B. Map charts
- C. Scatter plot
- D. Dimensions

Answers for Self-Assessment

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. D | 2. D | 3. A | 4. A | 5. C |
| 6. D | 7. A | 8. A | 9. B | 10. C |
| 11. D | 12. A | 13. B | 14. B | 15. C |

Review Questions

1. Why Tableau is preferred by the business community?
2. What do you mean by data source? How it is important for tableau.
3. What is a parameter? Write the steps to implement parameters using tableau.
4. What are the different responsibilities of a Tableau professional?
5. What are sets?



Further Readings

1. Communication Data With Tablue, Ben Jones, O' Reilly Publications



Web Links

<https://www.tableau.com/>

<https://www.datacamp.com/tutorial/data-visualisation-tableau>

Unit 04: Basic Visualizations

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Objectives

After studying this unit, you will be able to:

- Understand concept of different graphs.
- install software for data visualization.
- Understand dimensions and measures.
- Understand continuous and discrete data.

Introduction

Data Visualization with tableau is the process of presenting information through visual rendering. From centuries back, people have used to visualizations such as charts and maps to understand information more quickly and easily. As far as the human brain is concerned, it recognizes visual data more quickly than text data.

4.1 What is Tableau?

Tableau is a Data Visualisation tool that is widely used for Business Intelligence but is not limited to it. It helps create interactive graphs and charts in the form of dashboards and worksheets to gain business insights. And all of this is made possible with gestures as simple as drag and drop!

What Products does Tableau offer?

	Key Features	Other Features	Operating System	License
Tableau Desktop	Creating Dashboards and Stories locally	Tableau Personal - limited data sources, non connectivity to Tableau Server Tableau Professional - Full enterprise capabilities	Windows, Mac	Personal - \$999 Professional - \$1999
Tableau Public	A Massive, public, non commercial Tableau Server	All data published in public	-	Free
Tableau Online	Creating Dashboards and Stories on the Cloud	Live Connections	-	\$500 per year per
Tableau Reader	View Dashboards and Sheets locally	Cannot modify workbooks or connect to the server	Windows, Mac	Free
Tableau Server	Connect to Data sources and share Dashboards	Users can directly interact with Dashboards via browser	Windows	Core Licensing

4.2 Installation:

To work on Tableau, you **need** Tableau, right?

Out of the five above mentioned products, Tableau Desktop, Public and Online offer Data Visual Creation.

Tableau Desktop

It is available in the following three formats:

1. [Free trial for 14 days](#)
2. If you are a student or a teacher, you get free access to the [Desktop](#) for a full year.
3. [Purchase Tableau](#)

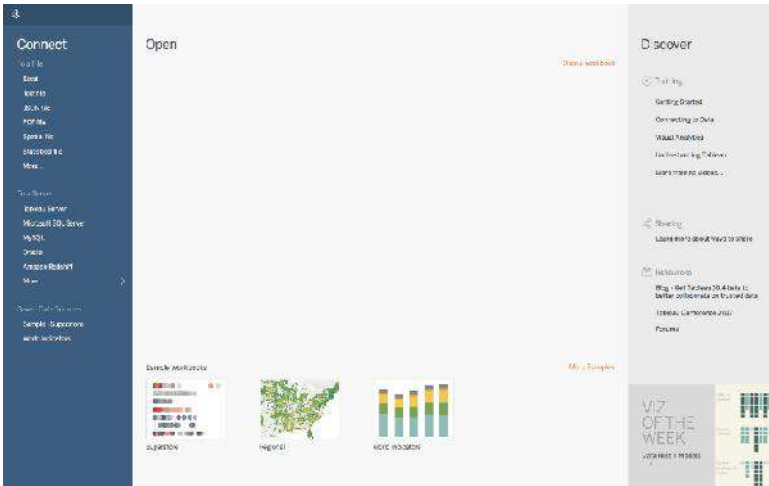
Tableau Public

[Tableau Public](#) is purely free of all costs and does not require any license. But it comes with a limitation that all of your data and workbooks are made public to all Tableau users.

Tableau Online

[Tableau Online](#) is the best option for you, if you wish to make your Workbooks on the Cloud and be able to access them from anywhere.

Connect to the Data



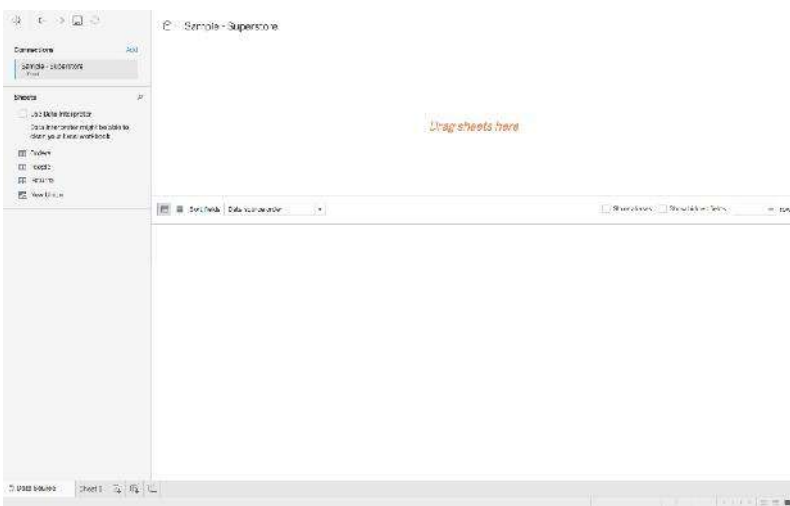
You should see a screen similar to the one above. This is where you import your data. As is visible, there are multiple formats that your data can be in. It can be in a flat-file such as Excel, CSV or you can directly load it from data servers too.

You can see that Tableau itself offers some Sample Workbooks, with pre-drawn charts, graphs, and other visuals. I would suggest going through these later for further exploration.

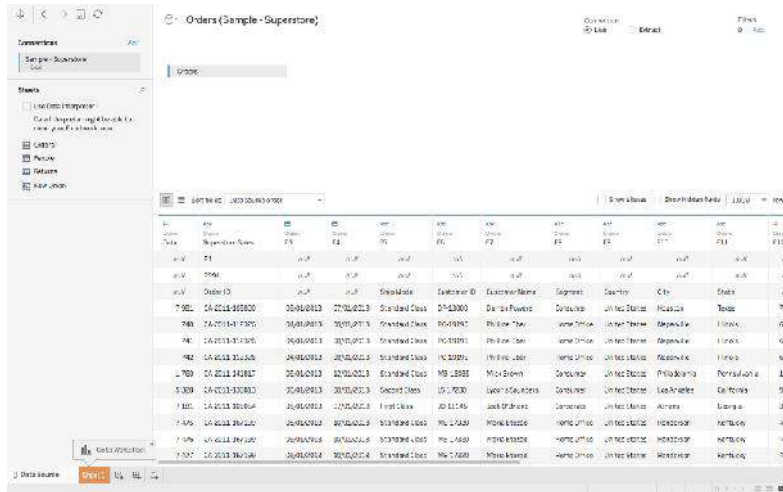
The best way to learn is to get your hands dirty. Let us start with our Data, which can be found [here](#). The data is that of a United States’ Superstore which is deliberating over its expansion. It wishes to know the prospective regions of the country where it could and hence requires your help.

The first thing that you will obviously need to do is import the data onto Tableau. So quickly follow the below steps:

1. Since the data is in an Excel File, click on **Excel** and choose the Sample – Superstore.xls file to get :



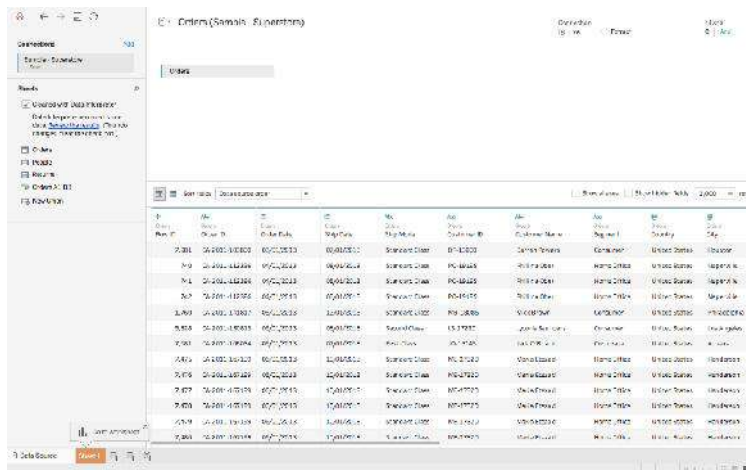
2. You can see three sheets on the screen, but we are only going to be dealing with Orders here, so go ahead and drag the same on *Drag sheets here* :



Uh oh, the imported data looks a bit different for the first few rows. Don't worry, the solution lies right ahead.

Data Interpreter

3. You see the option of Use Data Interpreter? Click on it to get the following clean view :



All that messy data magically disappeared!

If you open the Excel data file, you will see some metadata in it, i.e. information about data :

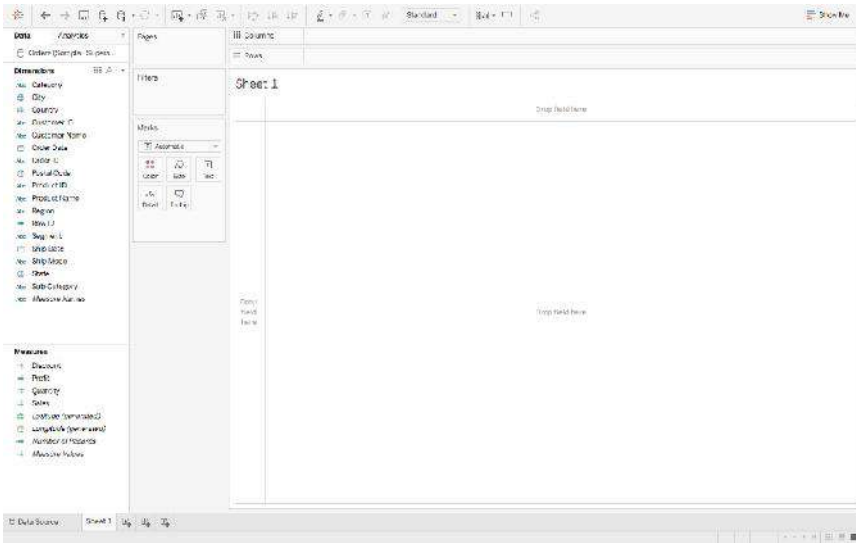
	A	B
1	Data	Superstore Sales
2	Fields	21
3	Rows	9994

Tableau imports the entire data file as is, but anticipating such discrepancies, explicitly provides a solution in the form of a Data Interpreter. If you wish to view the exact changes that it made, click on **Review the results**, and choose the **Orders** tab in the opened Excel sheet.

As it will show, it simply removed the erroneous data.

4.3 Data Visualizations

As soon as you had imported your dataset, next to the Data Source tab near the bottom of the screen, you immediately must have seen **Go to Worksheet**. A Worksheet is where you make all of your graphs, so click on that tab to reach the following screen:



Don't get overwhelmed by the various elements that you see here, we will cover them all one by one.

Dimensions and Measures:

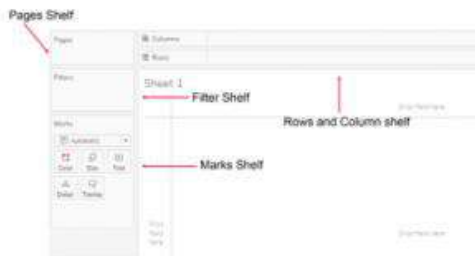
Dimension

Dimensions are the fields that you cannot aggregate. They are generally string values, or Discrete values, and are mostly used as column or row headings. E.g. CountryName, ProductName etc

Measure

Measures, as the name suggests are the fields that you can measure or aggregate. They are generally numerical values, or Continuous and are mostly used as plotting values. E.g. CountryPopulation, ProductSales etc

Moving onto **Shelves** :



Visualization in Tableau is possible through dragging and dropping Measures and Dimensions onto these different Shelves.

Rows and Columns : Represent the x and y-axis of your graphs / charts.
Filter: Filters help you view a strained version of your data. For example, instead of seeing the combined Sales of all the Categories, you can look at a specific one, such as just Furniture.

Pages: Pages work on the same principle as Filters, with the difference that you can actually see the changes as you shift between the Paged values. Remember that Rosling chart? You can easily make one of your own using Pages.
Marks: The Marks property is used to control the mark types of your data. You may choose to represent your data using different shapes, sizes or text.

And finally, there is **Show Me**, the brain of Tableau!



When you drag and drop fields onto the visualization area, Tableau makes default graphs for you, as we shall see soon, but you can change these by referring to the **Show Me** option.

Note: Not every graph can be made with any combination of Dimensions or Measures. Each graph has its own conditions for the number and types of fields that can be used, which we shall discuss next.

4.4 Various Graphs and Charts

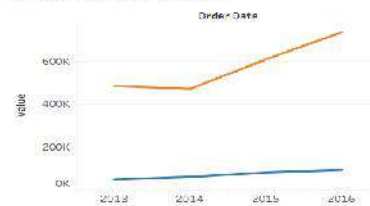
Using Superstore Sales and Profit Statistics. That would include the Net Sales, the Net Profit and the growth of the two measures, to name a few. Here is a gist of what we will be making:

Overview of the Superstore

Net Statistics

Profit	Quantity	Sales
286,397	37,873	2,297,201

Sales and Profit Growth



Peak Sales and Profit Months



Year of Order Date	Sales	Profit
2013	504,257,4082	47,544
2014	470,553,509070001	61,619
2015	508,473,03	81,727
2016	738,947,028199999	97,508

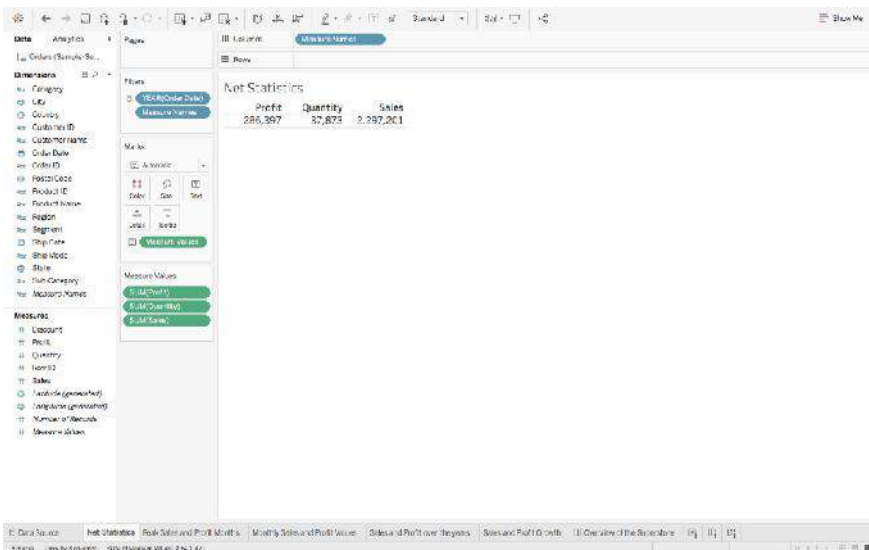
Month of Order Date	Sales	Profit
January	96,856,6226	9,709
February	59,840,1474	10,286
March	70,475,8508	28,508
April	139,260,8826	11,267
May	154,750,1607	22,277
June	153,804,8888	21,035
July	145,416,889	18,894
August	161,194,283	22,143
September	207,148,8897	26,329
October	197,698,5897	31,304
November	253,240,428	55,833
December	325,531,5775	48,897

From what can be observed, the net sales are on the rise, but the Profit is creeping up slowly. We can also quite clearly see the peak Sales Months, which could be attributed to various reasons. We can only know more as we explore more.

Before we start, there is one thing that I would like to recommend and that is you name your Worksheets as being done here.

Let's begin with the simplest visualization, and that is displaying the **Net Statistics** numbers. Tableau, being as smart as it is, automatically computes such values under **Measure Names** and **Measure Values**. Follow these steps to make what is called a **Text Table** :

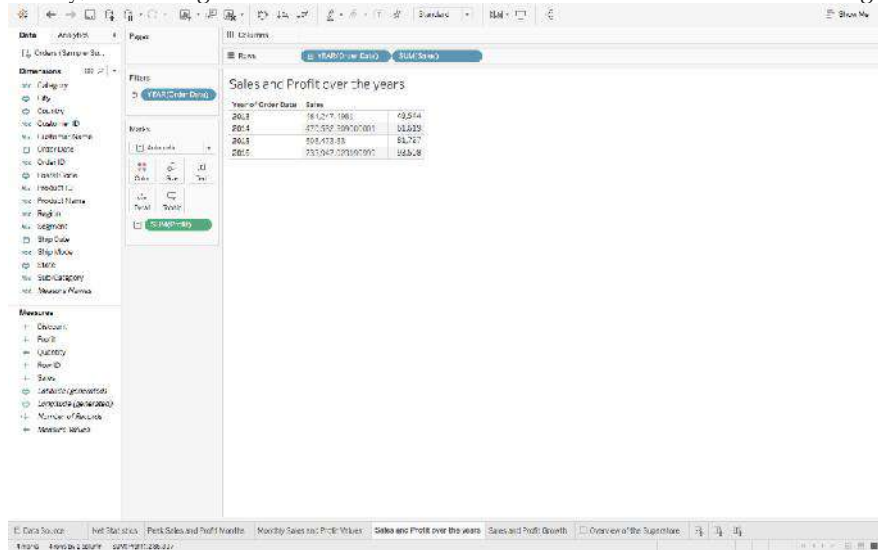
1. Drag **Measure Names** from Dimensions onto the central empty area so that you see a Text Table.
2. **Measure Names** will be displayed automatically onto Rows, so drag it from Rows to Columns.
3. Since we don't really need Measures like the Row ID, Discount, etc, you can drag them off from below the Marks Pane, to get something like this :



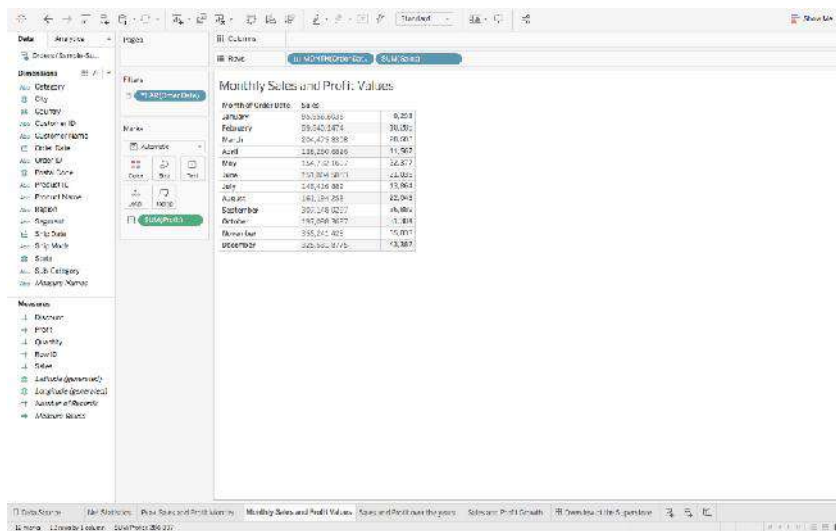
Note: Don't get confused by the different colors of the fields that you see. Just remember one small **trick: Blue means Discrete and Green, Continuous.**

So we have the net Sales and Profit values, let's delve a little deeper by getting the **Sales and Profit Values over the years**. Let's make another, but a more detailed, Text Table :

1. Drag **Order Date** from Dimensions and **Sales** from Measures to Rows.
2. Right-click on the green **Sales Pill**, and select **Discrete**, in place of **Continuous**, since we want the explicit values and not the bar graphs.
3. Finally, drag **Profit** on the 'abc' column to get :



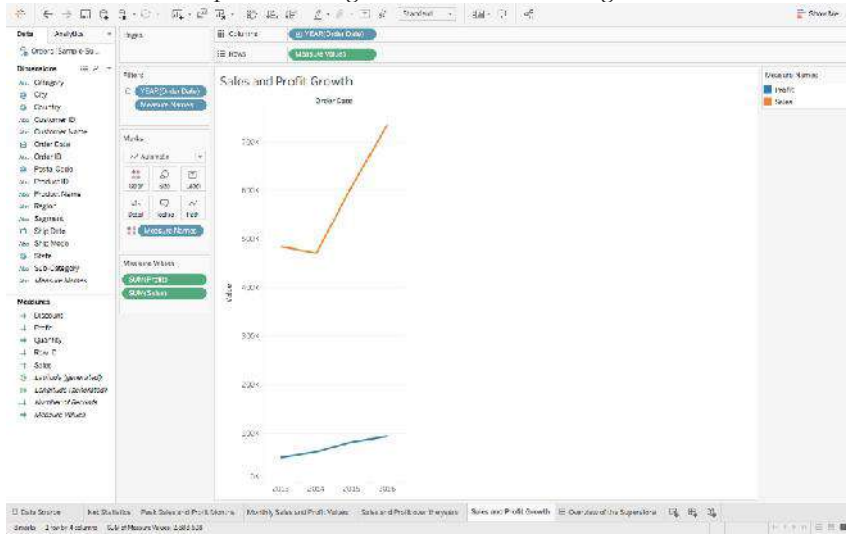
4. Do the same thing for **Monthly Sales and Profit Values**, but this time changes the format of **Order Date**, from **Year to Month**, by right-clicking on **Order Date** in the **Rows**, and choosing **Month**, to get something like this :



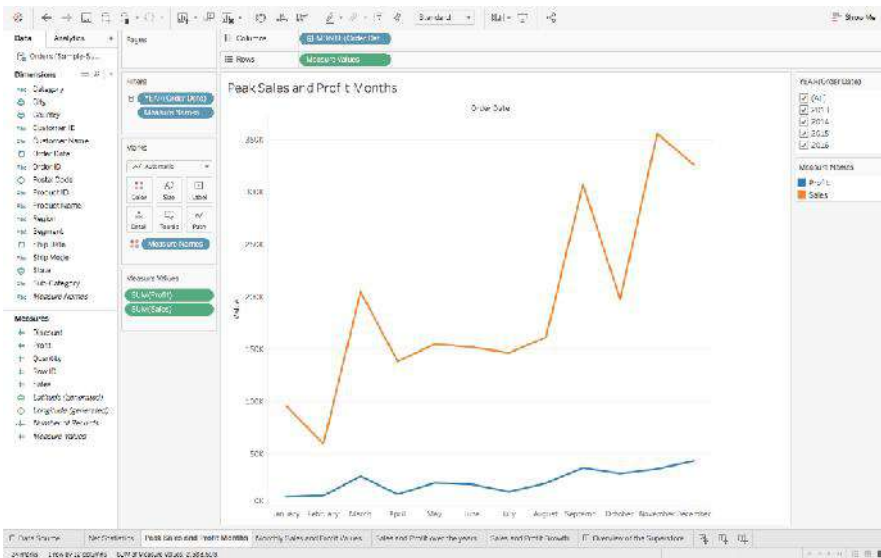
We have just covered the numeric part of the Dashboard, but that is not its selling point. It's the **Line Charts**. Lets quickly learn how to make one :

1. To create the chart of **Sales and Profit Growth**, drag **Order Date** over the **Columns**, **Sales** over **Rows** and then **Profit** over the formed **Sales** axis – so that you

see an equals sign - to get the following :

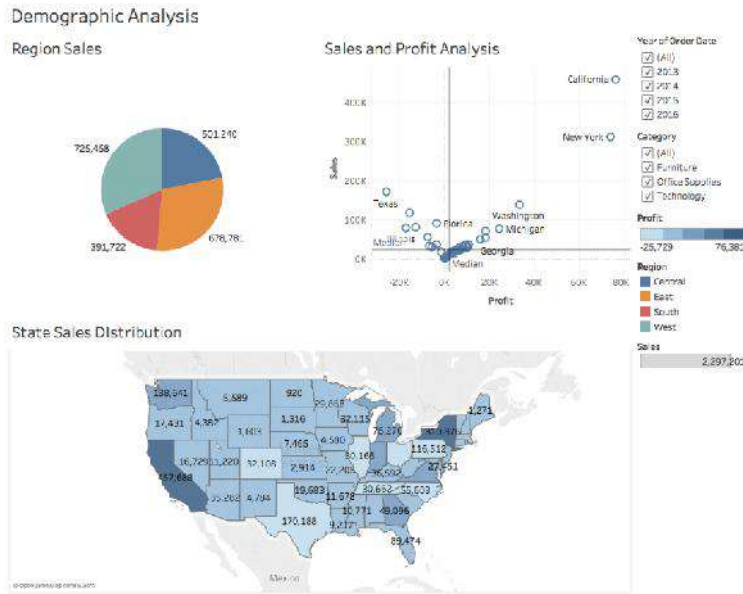


2. Repeat the same to find the **Peak Sales and Profit Months**, but again change the format of **Order Date**, from **Year to Month**, and get :



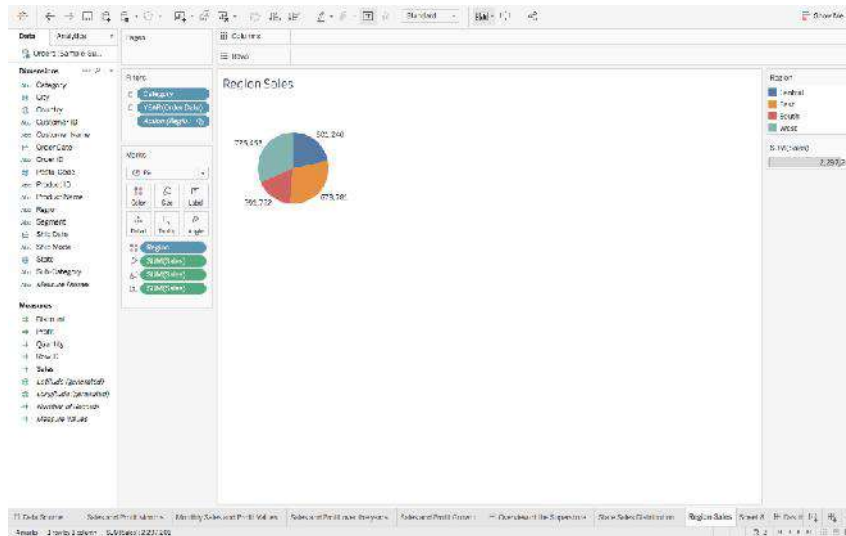
If you were to click on **Show Me**, you will see the different types of Line Charts that you can make, and if you were to hover over each of them, you will get to see their Dimension and Measure requirements too. In case you ever feel lost, I recommend referring to Show Me.

With the previous visualizations, we had gotten a brief overview of the Superstore. Let's dig a little deeper now. The next thing that I can think of exploring is the demographic of the Sales and Profit. What are the States that have the highest Sales Revenue, which ones are generating the maximum Profits:



Before discussing the inferences, let's first create the **Pie Chart of Region Sales** :

1. Drag **Regions** onto Rows and **Sales** onto Columns.
2. Go to **Show Me**, and select the **Pie Chart**.
3. And finally, drag **Sales** over the **Label** in the **Marks Pane** to get :



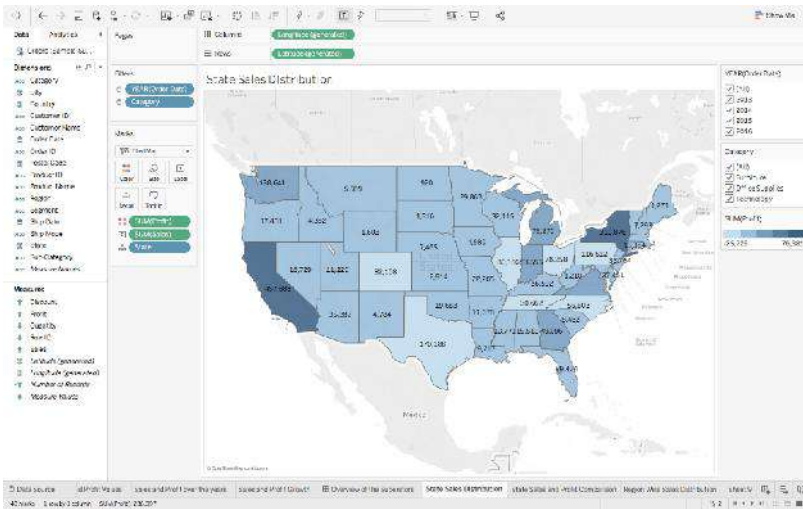
From the visual, it's pretty evident that the two opposite ends, East and West are leading in the Sales game. Let's dissect this a bit more.

Note : Whenever you have some geographical data, it is always advisable to plot and see it on a Map to gain better insights.

So, we are now going to make the **Map Chart of State Sales Distribution** :

1. Since its the States that we wish to analyze, drag **States** onto the empty area, so that you automatically see a Map, with small Circles. Follow this step by dragging **Profits** next. You will notice the size of these circles changing to represent the varying values of Profits. This is called a **Symbol Map**. But we are going to convert this into a **Filled** one, by going to Show Me, and selecting the **Filled Map**.

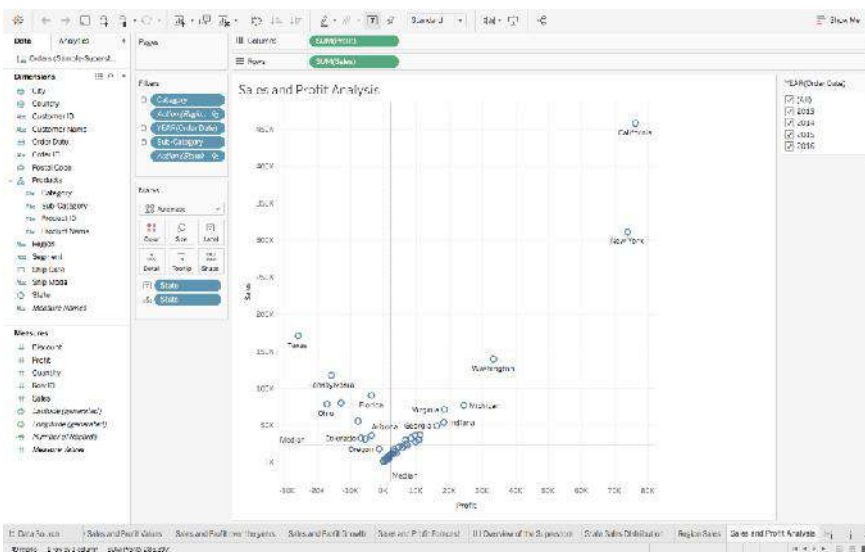
2. Drag **Profits** again, but this time onto **Label** in the **Marks Pane**, to view the Profit Values mapped as well, like so :



California and New York are the top most sellers from the West and East region, but unfortunately, there are other states such as Texas, Colorado which even after having good Sales, have negative Profits! This is certainly not good news for the Superstore. You can perceive a good analysis for the other States as well.

And lastly, here are the steps for making the **Scatter Plot of Sales and Profit Analysis** :

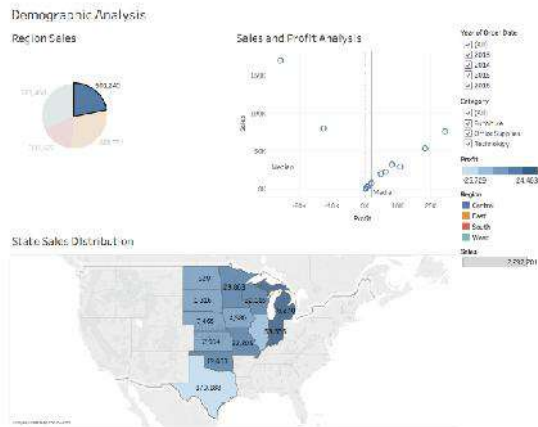
1. Drag **Sales** onto Rows, and **Profit** onto Columns. You will see one tiny circle, which actually represents the Total Sales and Profit Values.
2. To get more information, drag **States** onto the graph created, so that these circles/bubbles scatter to represent the individual States.
3. To better understand the central tendency of the data, we have also added a **Median axis** as Reference Line. This can be easily done by right-clicking on the **Sales / Profit Axis** - > **Adding Reference Line** and choosing **Median** over the default Average Reference.
4. Finally, for some more insight, drag **States** again, but this time onto **Label** in the Marks Pane, and get:



The findings from the **Map chart** become more prominent with the following **Scatter plot inferences** :

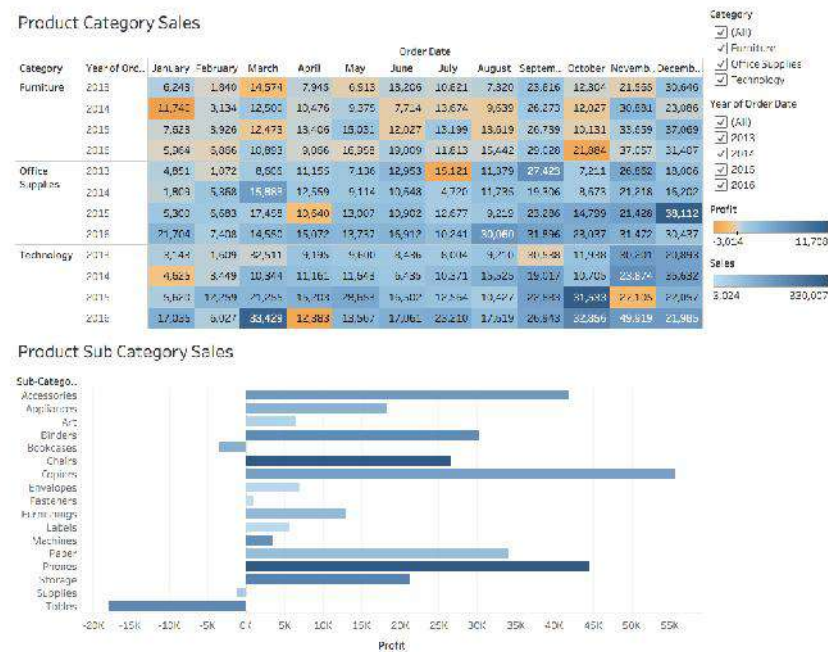
- The states in the top right, with high Sales and high Profits, mean good business for the organization.
- States with positive Sales and Profits, but near the two respective axis are the ones where there is some scope of improvement.
- Whereas the states that belong to the 2nd or 3rd quarter are the ones which are not generating much revenue.

One of the great things about Tableau is that it lets you interact with the visuals. Have a look at an example :



When we clicked on the Central Region, it highlighted and showed the Central States of the US, along with their respective Sales and Profit scatter. Here we used the chart as a Filter itself which is a feature of a Dashboard. We shall learn how to make one at a later stage.

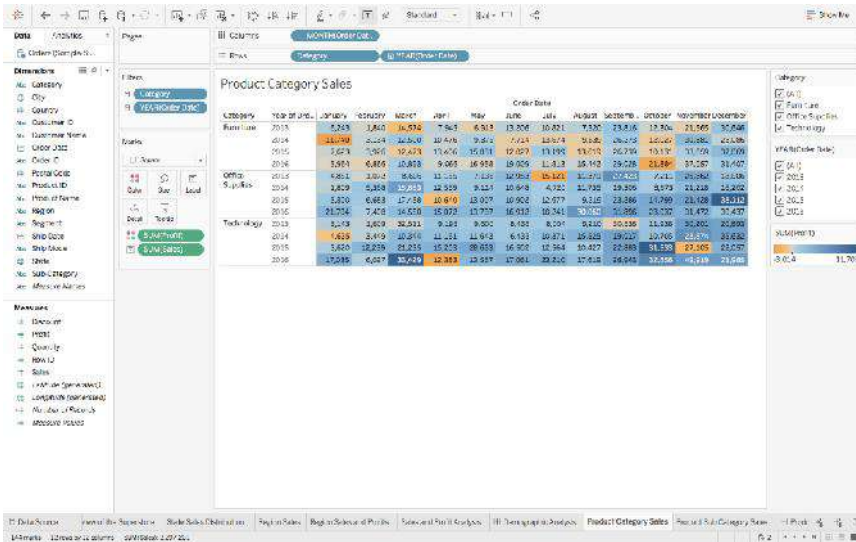
There is one pretty important analysis that we have yet to touch, and that is Product Statistics. High Sales could be easily attributed to the high cost of the products being sold. Also, when you are considering expansion, you will want to know the Sales distribution of the Products too:



Here we have visualized not just the Sales but also the Profits.

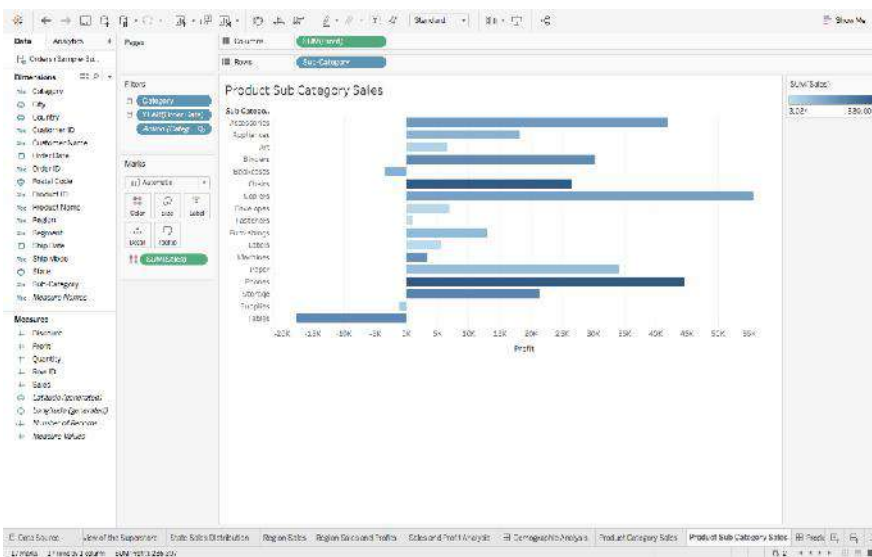
It's quite surprising to see Categories that have high Sales, generating negative profits, like Technology in November 2015, or Furniture in October 2016 and this is inferred from the first chart, which is also called a **Highlight Table**. As the name suggests, it highlights the relative proportion of the Measure Values of our data. So let's learn how to make one :

1. Drag **Category** and **Order Date (Year)** in Rows.
2. Drag **Order Date (Month)** over Columns, and **Sales** over the empty 'abc' fields
3. Select **Highlight Table** from Show Me, and drag **Order Date (Year)** back to Rows, in case it got re-shuffled.
4. Finally drag **Profits** over **Colour** in the Marks Pane, to get :



The **Product Sub Category Sales** is a **Bar Chart**, which is also quite easy to make :

1. Just drag **Sub - Category** over to the Rows
2. Drag **Profit** onto the Columns.
3. Go to Show Me and choose the **Horizontal Bars**
4. For some customization, drag **Sales** over **Colour** in the Marks Pane to attain this final visualization:



From the above graph, we are getting a good idea of the Net Sales and Profit margins of the various products. Notice that even though Tables' Sales are quite high on the scale, it's the only product with the least profit.

Now, just like before, consider interaction with the visualization:



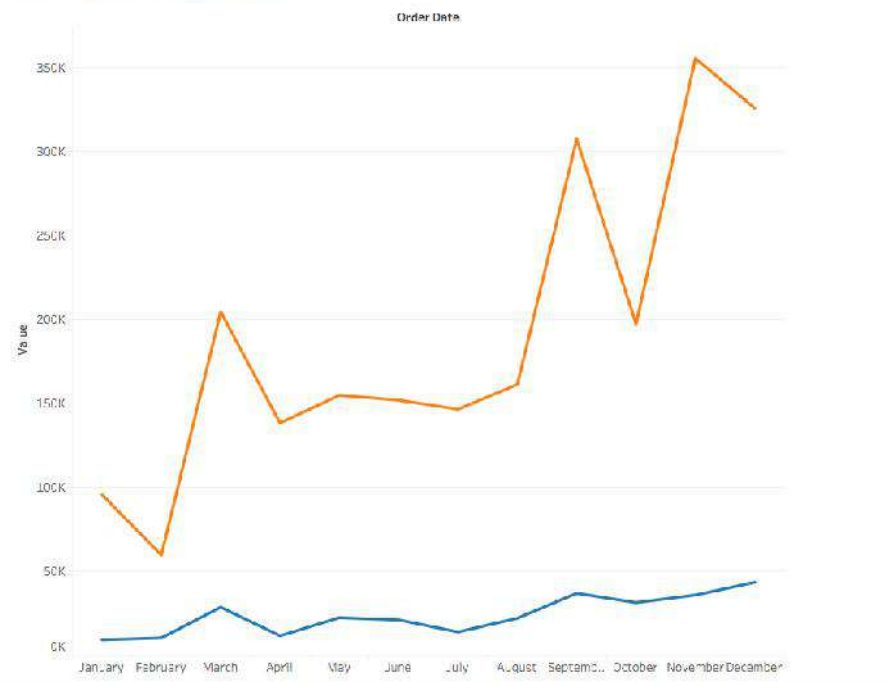
We are now able to view each Category’s Products’ Sales and Profits, at a low-level granularity of Year and Month!

4.5 Filters

Till now we have only made simple charts, that actually provide cumulative data, which is combined data over the lifetime of the Superstore. To look at Sales of a particular Year, a Month, for a certain Product, or to basically view the distinct aspects of the data, **Filters** are the way to go.

Let’s head back to the first-ever Chart that we had made, of **Peak Sales and Profit Months** :

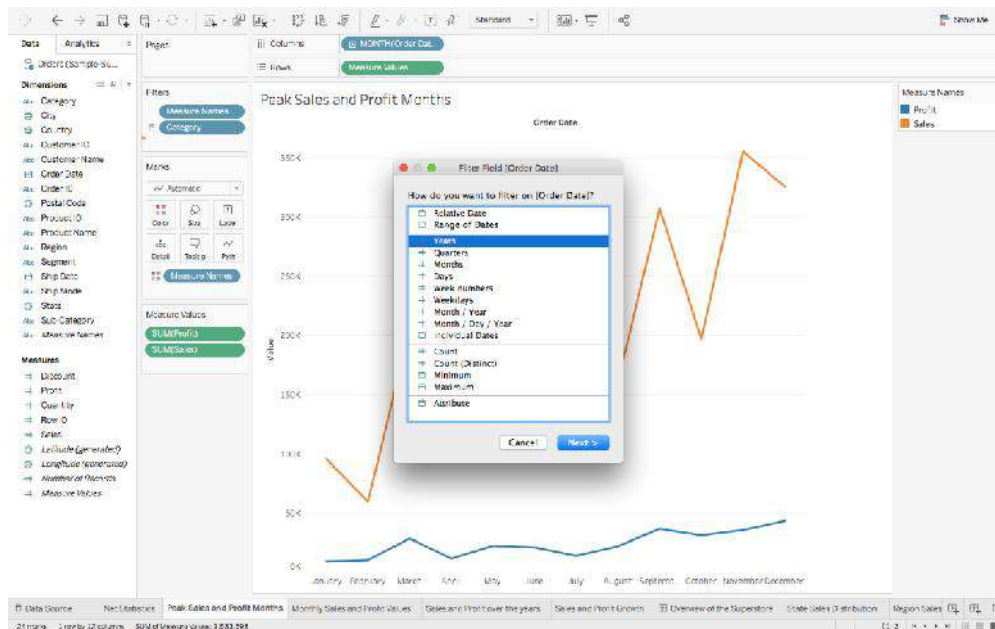
Peak Sales and Profit Months



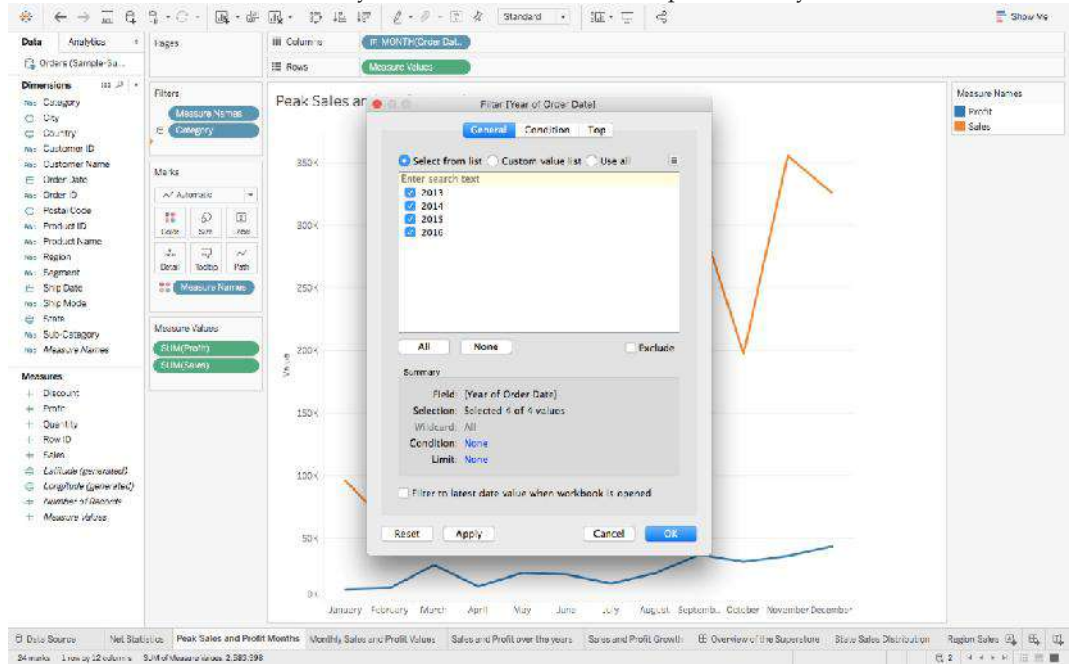
The visual here is an accumulation of all 4 years of data, for all Regions, States, Categories and Sub Categories.

The steps of turning any Dimension into a Filter are the same. Let's first experiment with the Order Date (formatted to Year) :

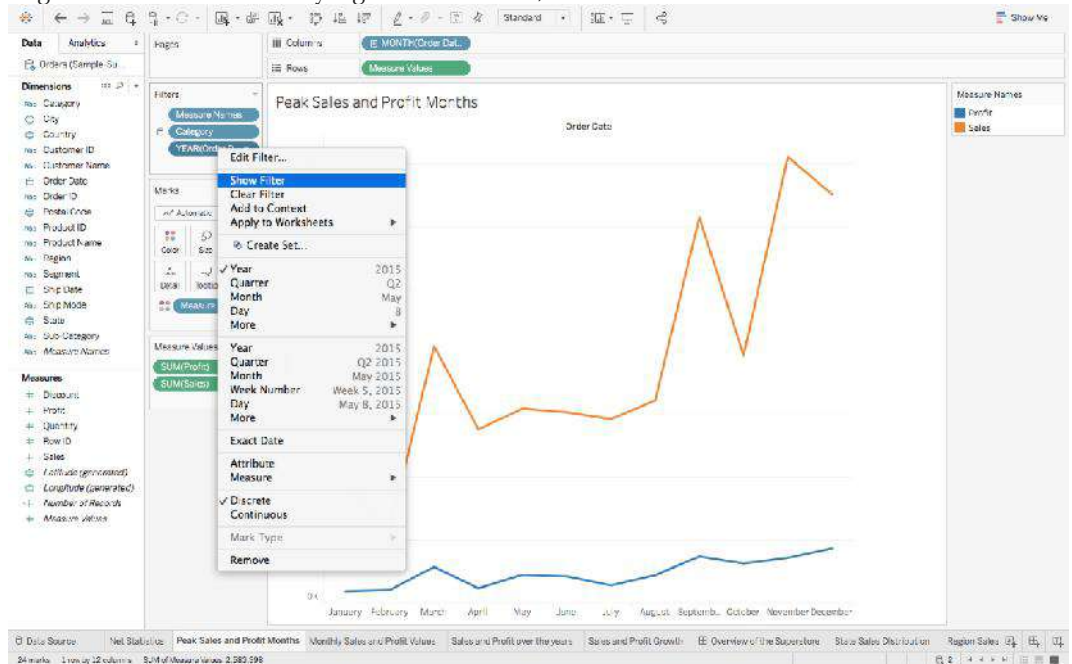
1. Drag the Dimension to the **Filters' Shelf**, to see the following pop up. Here we will be choosing Years :



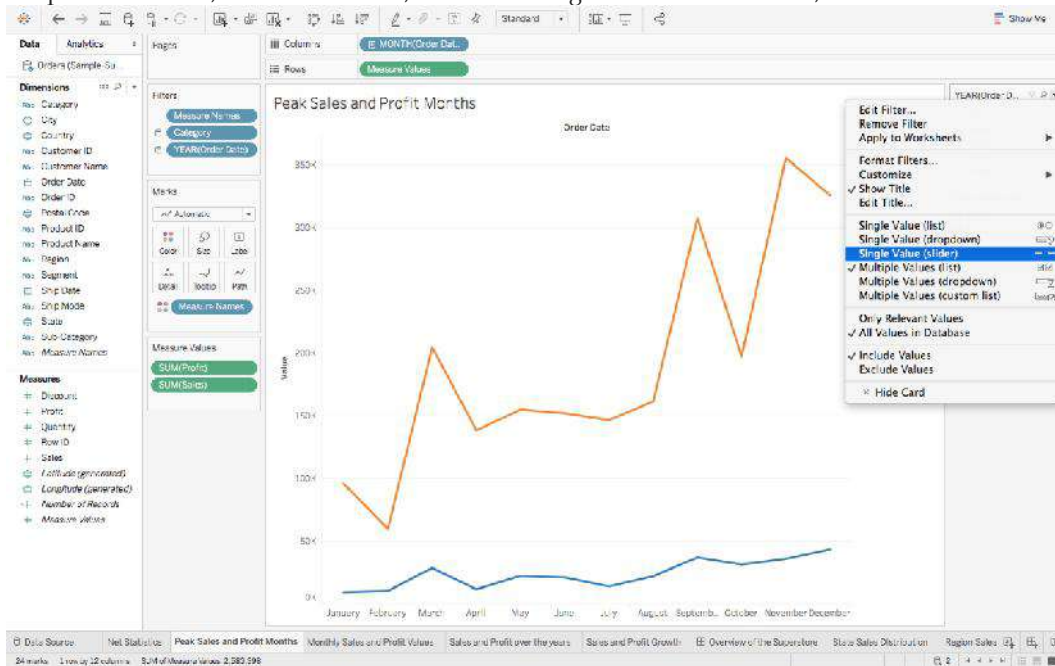
- Choose the values that you want to be a part of your Filter :



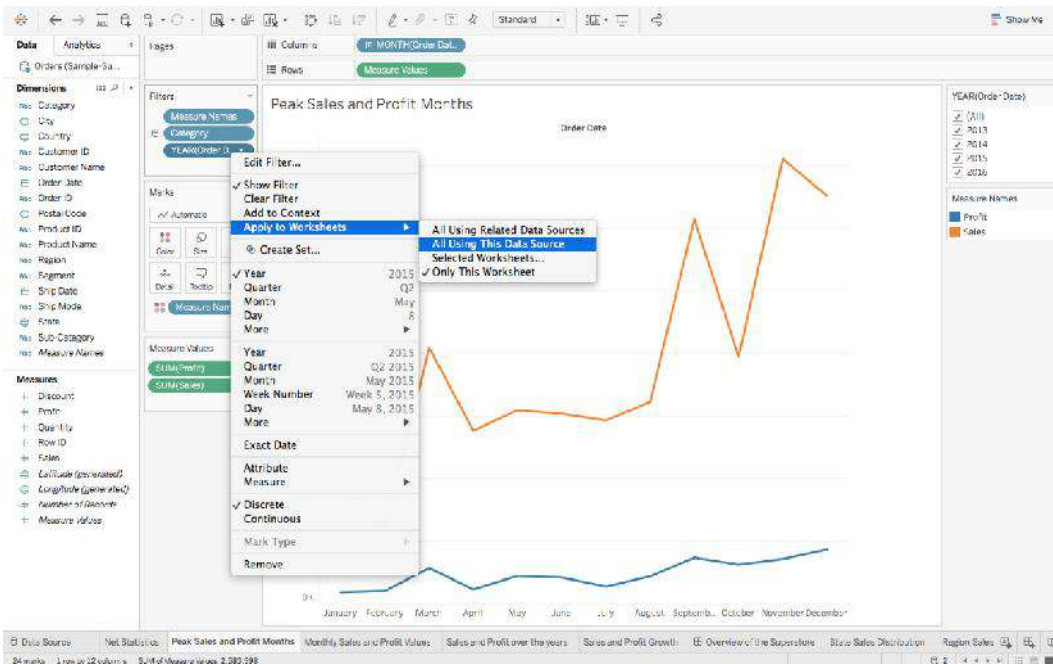
- Right-click on the newly generated Filter, and then choose Show Filter :



4. You can also change the format of your Filter, for example, whether you wish for a Dropdown list, a Slider, a Single Value List, etc :



5. If you feel that some of your filters can be applied to other sheets as well, then rather than repeating the steps, you can simply **Apply the Filter** to all other relevant Worksheets :



Summary

- Tableau Public Server. Tableau Public server is a free server in the internet. ...
- Tableau Public Desktop. Tableau Public Desktop is a free desktop application. ...
- Tableau Mobile. Tableau mobile is a mobile application.

- Tableau can handle millions of rows of data with ease. Different types of visualization can be created with a large amount of data without impacting the performance of the dashboards.
- Also, there is an option in Tableau where the user can make “live” to connections to different data sources like SQL etc.

Keywords

- Visualization helps people to understand things clearly and have a better insight into the topic.
- Visualization helps to predict the future easily and take better decisions
- Data of large volumes can also be spotted easily and quickly
- Data visualization conveys the information in a universal manner
- It makes it simple to share ideas with others

Self Assessment

1. How do you identify a continuous field in Tableau?
 - A. It is identified by a blue pill in the visualization
 - B. It is identified by a green pill in a visualization
 - C. It is preceded by a # symbol in the data window
 - D. When added to the visualization, it produces distinct values

2. How do you identify a discrete field in Tableau?
 - A. It is identified by a blue pill in the visualization
 - B. It is identified by a green pill in a visualization
 - C. It is preceded by a # symbol in the data window
 - D. When added to the visualization, it produces distinct values

3. The icon associated with the field that has been grouped is a _____
 - A. Paper Clip
 - B. Set
 - C. Hash
 - D. Equal To

4. What are the file extensions in Tableau?
 - A. Tableau Bookmark (.tdm)
 - B. Tableau Map Source (.tms)
 - C. Tableau Preferences (.tps)
 - D. All of the above

5. How to view underlying SQL Queries in Tableau?
 - A. Create a Performance Recording

B. Reviewing the Tableau Desktop Logs

C. Both A and B

D. None

6. Tableau was introduced in the year of

A. 2000

B. 2002

C. 2003

D. 2005

7. What different products Tableau provide?

A. Tableau Server

B. Tableau Desktop

C. Tableau Reader

D. All of these

8. _____ is an online platform that allows you to host and manage Tableau data sources.

A. Tableau Server

B. Tableau Desktop

C. Tableau Reader

D. All of these

9. _____ helps to create reports, dashboards, and stories using different charts and graphs.

A. Tableau Server

B. Tableau Desktop

C. Tableau Reader

D. All of these

10. _____ does not need to connect to any source, but it can read reports built on top of any and all of the listed data sources that Tableau Supports.

A. Tableau Server

B. Tableau Desktop

C. Tableau Reader

D. All of these

11. Your data is out in the public once your report is published on to the _____.

- A. Tableau Public Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

12. _____ is for somebody that only needs to monitor the analytics

- A. Tableau Public Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

13. For creating variable size bins we use _____

- A. Sets
- B. Groups
- C. Calculated fields
- D. Table Calculations

14. For writing own calculation we use _____

- A. Sets
- B. Groups
- C. Calculated fields
- D. Table Calculations

15. For writing separation of two categories we use _____

- A. Sets
- B. Dimensions
- C. Show me
- D. Table Calculations

Answers for Self Assessment

1 b	2 a	3 a	4 d	5 c	6 c	7 d	8 a
-----	-----	-----	-----	-----	-----	-----	-----

9 b	10 c	11 a	12 c	13 c	14 c	15 a	
-----	------	------	------	------	------	------	--

Review Questions

- What makes data visualization good?
- How can you visualize more than three dimensions in a single chart?
- Is Tableau good for data visualization?
- What are the strengths and limitations of Tableau when it comes to data visualization?
- What Are the Data Types Supported in Tableau?
- How Will You Understand Dimensions and Measures?
- What is Meant by 'discrete' and 'continuous' in Tableau?



Further Readings

"Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few

"Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"



Web Links

<https://www.tableau.com/>

<https://intellipaat.com/blog/what-is-tableau/>

Unit 05: Creation of Hierarchies

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Objectives

After studying this unit, you will be able to:

- Understand data visualization
- Analyze tools of data visualization
- Analyze data using tablu

Introduction

In our increasingly data-driven world, it's more important than ever to have accessible ways to view and understand data. After all, the demand for data skills in employees is steadily increasing each year. Employees and business owners at every level need to have an understanding of data and of its impact.

That's where data visualization comes in handy. With the goal of making data more accessible and understandable, data visualization in the form of dashboards is the go-to tool for many businesses to analyze and share information.

5.1 Data Visualization

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data. Additionally, it provides an excellent way for employees or business owners to present data to non-technical audiences without confusion.

Data visualization is the practice of translating information into a visual context, such as a map or graph, to make data easier for the human brain to understand and pull insights from. The main goal of data visualization is to make it easier to identify patterns, trends and outliers in large data

sets. The term is often used interchangeably with others, including information graphics, information visualization and statistical graphics.

Data visualization is one of the steps of the data science process, which states that after data has been collected, processed and modeled, it must be visualized for conclusions to be made. Data visualization is also an element of the broader data presentation architecture (DPA) discipline, which aims to identify, locate, manipulate, format and deliver data in the most efficient way possible.

Data visualization is important for almost every career. It can be used by teachers to display student test results, by computer scientists exploring advancements in artificial intelligence (AI) or by executives looking to share information with stakeholders. It also plays an important role in big data projects. As businesses accumulated massive collections of data during the early years of the big data trend, they needed a way to get an overview of their data quickly and easily. Visualization tools were a natural fit.

Visualization is central to advanced analytics for similar reasons. When a data scientist is writing advanced predictive analytics or machine learning (ML) algorithms, it becomes important to visualize the outputs to monitor results and ensure that models are performing as intended. This is because visualizations of complex algorithms are generally easier to interpret than numerical outputs.

Why is data visualization important?

Data visualization provides a quick and effective way to communicate information in a universal manner using visual information. The practice can also help businesses identify which factors affect customer behavior; pinpoint areas that need to be improved or need more attention; make data more memorable for stakeholders; understand when and where to place specific products; and predict sales volumes.

Other benefits of data visualization include the following:

- ✓ the ability to absorb information quickly, improve insights and make faster decisions;
- ✓ an increased understanding of the next steps that must be taken to improve the organization;
- ✓ an improved ability to maintain the audience's interest with information they can understand;
- ✓ an easy distribution of information that increases the opportunity to share insights with everyone involved;
- ✓ eliminate the need for data scientists since data is more accessible and understandable; and
- ✓ an increased ability to act on findings quickly and, therefore, achieve success with greater speed and less mistakes.

5.2 Keys Factors of Data Visualization

Data visualization is a crucial part of data analytics that helps you visualize your data and uncover significant trends and patterns that would otherwise have been lost. Effective data visualization depends on your software as nobody has the time to code the visualizations themselves with loads of data involved in the process.

Several data visualization tools, such as Oracle Visual Builder Cloud Service (VBCS), Tableau, Power BI, etc., have comparable features and capabilities, making selecting the right tool for your needs even more challenging. So, what are the factors to be considered in choosing the right data visualization solution for your use case?

Let us talk deep on it. Here are the main specifics.

1. Dashboard Design

It is important to check on the right balance between the simplicity and complexity of a dashboard when it comes to enterprise reporting. While simpler designs may be easy to use, they may not be able to pack in much helpful information. However, complex dashboards could clutter your screen and make it difficult to understand the data right in front of your eyes. If you're not an expert and don't know much about dashboard design, know that the dashboard must have balanced colors naturally appealing to the eye. It is intuitive to have colorful highlights between appropriate white spaces. Too much white space could over-simplify the design, while too much color could affect usability. Modern tools like Oracle Visual Builder Cloud Service strike a balance between simplicity and complexity and avoid highly complex designs even if they could deliver much more information in a compact setting.

2. Use Case

Different use cases demand different types of dashboards. For example, a simple use-case like the real-time analytics of a store will be very different from a more complex use-case like viewing stock market reports. It's a great way to personalize your data visualization, and several modern Analytics & BI Applications like Oracle Visual Builder Cloud Service offer this feature. Not only is the solution tailored to your needs, but it also provides an enhanced user experience.

3. Data Connectivity

Data is key to your visualization; poor data integration or missing data can have a considerable impact. Business data is the primary input for a data visualization tool, so ensuring that the right data sources are connected to the tool is of paramount importance. Data is often pulled from multiple dynamic sources, so it needs to be up-to-date for your visualizations to stay relevant. The ability to connect and integrate with other data sources is a critical factor in enabling effective data visualization.

4. Target Audience

Data visualizations often convey information to users who don't fully understand the application or the process. They could include line-of-business users, external users, and other stakeholders. They only need access to the data relevant to their role in the organization. The ability of data visualization tools like Oracle VBCS to adapt according to the audience plays a key role. So, ensure the tool is specific to the target audience and provides role-based user access.

5. Functionality

Keeping the data visualization tool's functionality aligned with your organization's needs is crucial. Business leaders often consider going for the software packed with the most number of features or with greater functionality, when in reality, they only require a fraction of these capabilities. Not only does it increase complexity, but it also drives up costs and impacts your ability to use it for its true purpose. Ultimately, you're left with too many features you don't need and will never use. Focus on acquiring the functionality your organization truly needs instead of fancy features, and you can keep adding more functionality as your business grows. Oracle VBCS allows you to add features based on your evolving needs.

5.3 Data Visualization Tools and type of data

Data visualization tools are cloud-based applications that help you to represent raw data in easy to understand graphical formats. You can use these programs to produce customizable bar charts, pie charts, column charts, and more.

Following is a handpicked list of Top Data Visualization Tool with their popular features and website links. The list contains both open-source(free) and commercial(paid) software.

Followings are some popular data visualization tools

1) Zoho Analytics

Zoho Analytics is a robust and versatile data visualization tool. It allows users to create insightful reports and dashboards, and visually analyze any data in minutes. It features an AI powered assistant that enables users to ask questions and get intelligent answers in the form of meaningful reports.



2) Power BI

Power BI is a Business Intelligence and Data Visualization tool which helps you to convert data from various data sources into interactive dashboards and reports. It provides multiple software connectors and services.



3) Whatagraph

Whatagraph is a data visualization tool that enables you to monitor and compare the performance of multiple campaigns. This application allows you to transfer custom data from Google sheet and API.



4) Tableau

Tableau is a robust tool for visualizing data in a better way. You can connect any database to create understandable visuals. It is one of the best visualization tools that enables you to share visualization with other people.



5) Qlik

Qlik is a data visualization software which is used for converting raw data into knowledge. This software acts like a human brain which works on “association” and can go into any direction to search the answers.



6) Adaptive Insights

Adaptive Insights is a data visualization tool built to boost your business. It is one of the best data visualisation tools that helps you to plan, budget, as well as forecast to make better decisions.



7) Dundas BI

Dundas BI is an enterprise-ready Business Intelligence platform. You can deploy it as the central data portal for your company or integrate into any website.



8) Domo

Domo is a cloud platform that helps you to conduct analysis and create interactive visualization. It enables you to examine important data using graphs and pie charts. This app helps you to simplify administration data.



9) Cluvio

Cluvio is a platform that enables you to run SQL queries for your database. It allows you to visualize the result in a better and understandable way.



10) Datawrapper

Datawrapper is an open-source tool that enables you to create interactive charts. You can load CSV (Comma-separated Values data files into this app and embed maps onto your website.

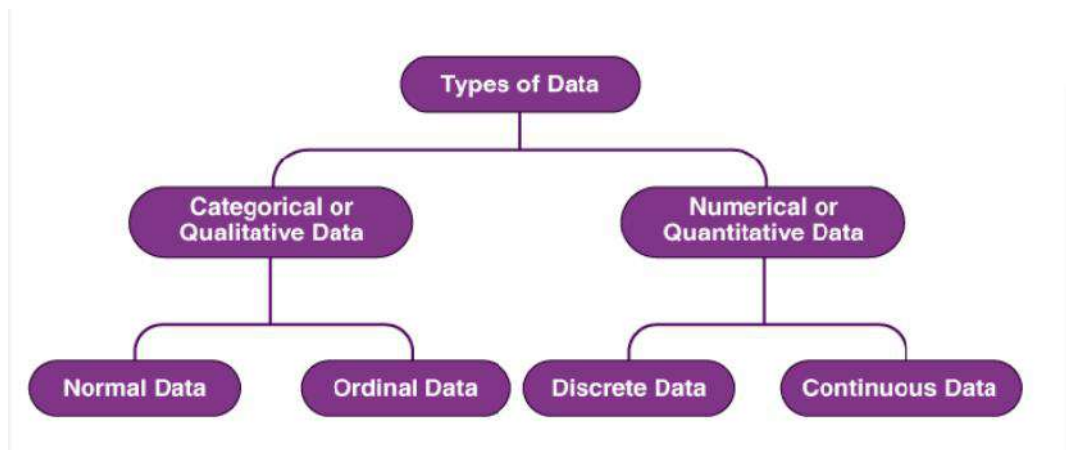


Types of data

The data is classified into majorly four categories:

1. Nominal data
2. Ordinal data
3. Discrete data
4. Continuous data

Further, we can classify these data as follows:



Qualitative or Categorical Data

Qualitative data, also known as the categorical data, describes the data that fits into the categories. Qualitative data are not numerical. The categorical information involves categorical variables that describe the features such as a person's gender, home town etc. Categorical measures are defined in terms of natural language specifications, but not in terms of numbers.

Sometimes categorical data can hold numerical values (quantitative value), but those values do not have a mathematical sense. Examples of the categorical data are birthdate, favourite sport, school

postcode. Here, the birthdate and school postcode hold the quantitative value, but it does not give numerical meaning.

Nominal Data

Nominal data is one of the types of qualitative information which helps to label the variables without providing the numerical value. Nominal data is also called the nominal scale. It cannot be ordered and measured. But sometimes, the data can be qualitative and quantitative. Examples of nominal data are letters, symbols, words, gender etc.

The nominal data are examined using the grouping method. In this method, the data are grouped into categories, and then the frequency or the percentage of the data can be calculated. These data are visually represented using the pie charts.

Ordinal Data

Ordinal data/variable is a type of data that follows a natural order. The significant feature of the nominal data is that the difference between the data values is not determined. This variable is mostly found in surveys, finance, economics, questionnaires, and so on.

The ordinal data is commonly represented using a bar chart. These data are investigated and interpreted through many visualisation tools. The information may be expressed using tables in which each row in the table shows a distinct category.

Quantitative or Numerical Data

Quantitative data is also known as numerical data which represents the numerical value (i.e., how much, how often, how many). Numerical data gives information about the quantities of a specific thing. Some examples of numerical data are height, length, size, weight, and so on. Quantitative data can be classified into two different types based on the data sets. The two different classifications of numerical data are discrete data and continuous data.

Discrete Data

Discrete data can take only discrete values. Discrete information contains only a finite number of possible values. Those values cannot be subdivided meaningfully. Here, things can be counted in whole numbers.

Example: Number of students in the class

Continuous Data

Continuous data is data that can be calculated. It has an infinite number of probable values that can be selected within a given specific range.

Example: Temperature range

Summary

- Data visualization is the representation of data through use of common graphics, such as charts, plots, infographics, and even animations. These visual displays of information

communicate complex data relationships and data-driven insights in a way that is easy to understand.

- Data visualizations are used to discover unknown facts and trends. You can see visualizations in the form of line charts to display change over time. Bar and column charts are useful for observing relationships and making comparisons. A pie chart is a great way to show parts of a whole. And maps are the best way to share geographical data visually.
- To craft an effective data visualization, you need to start with clean data that is well-sourced and complete. After the data is ready to visualize, you need to pick the right chart.

Keywords

Data: In computing, data is information that has been translated into a form that is efficient for movement or processing.

Data Visualization: Data and information visualization is an interdisciplinary field that deals with the graphic representation of data and information.

Charts: A data chart is a type of diagram or graph, that organizes and represents a set of numerical or qualitative data. Maps that are adorned with extra information (map surround) for a specific purpose are often known as charts, such as a nautical chart or aeronautical chart, typically spread over several map sheets.

Data analysis: Data Analysis. Data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data.

Self-Assessment

1. What is true about Data Visualization?

- A. Data Visualization is used to communicate information clearly and efficiently to users by the usage of information graphics such as tables and charts.
- B. Data Visualization helps users in analyzing a large amount of data in a simpler way.
- C. Data Visualization makes complex data more accessible, understandable, and usable.
- D. All of the above

2. Which are pros of data visualization?

- A. It can be accessed quickly by a wider audience.
- B. It can misrepresent information
- C. It can be distracting
- D. None Of the above

3. Data can be visualized using?

- A. graphs
- B. charts
- C. maps
- D. All of the above

4. Which are cons of data visualization?

- A. It conveys a lot of information in a small space.
- B. It makes your report more visually appealing.
- C. visual data is distorted or excessively used.
- D. None Of the above

5. Which of the following is not a data visualization tool?

- A. Tableau
- B. Cluvio
- C. Microsoft Word
- D. Domo

6. Data visualization is also an element of the broader _____.

- A. deliver presentation architecture
- B. data presentation architecture
- C. dataset presentation architecture
- D. data process architecture

7. Which of the intricate techniques is not used for data visualization?

- A. Bullet Graphs
- B. Bubble Clouds
- C. Fever Maps
- D. Heat Maps

8. Which method shows hierarchical data in a nested format?

- A. Treemaps
- B. Scatter plots
- C. Population pyramids
- D. Area charts

9. Which one of the following is most basic and commonly used techniques?

- A. Line charts
- B. Scatter plots
- C. Population pyramids
- D. Area charts

10. The best feature Tableau are except _____ -

- A. Collaboration of data
- B. Data Blending
- C. Real time analysis
- D. Data is more small and fit

11. Where can we apply global filters?

- A. Dashboards
- B. Stories
- C. Sheets
- D. All of the above

12. _____ is the representation of data through use of common graphics, such as charts, plots, infographics, and even animations.

- A. Data visualization
- B. Data
- C. Tablue
- D. None of above

13. Who is the parent company of Tableau?

- A. Salesforce
- B. Workday
- C. Microsoft
- D. Google

14. What are the file extensions in Tableau ?

- A. Tableau Packaged Workbook (.twbx)
- B. Tableau Data Source(.tds)
- C. Tableau Workbook (.twb)
- D. All of the above

15. Power BI is a product of _____

- A. Facebook
- B. Oracle
- C. Microsoft
- D. SAP

Answers for Self-Assessment

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. D | 2. A | 3. D | 4. C | 5. A |
| 6. B | 7. C | 8. A | 9. A | 10. D |
| 11. D | 12. A | 13. A | 14. D | 15. C |

Review Questions

1. What do you mean by data visualization?
2. Explain the need for data visualization tools in now's industry.

3. What is the difference between data and data visualization?
4. Explain Types of Data Visualizations Elements.
5. What do you mean by data visualization tools? Explain with an example.



Further Readings

1. Communication Data With Tableau, Ben Jones, O' Reilly Publications



Web Links

<https://www.tableau.com/>

<https://www.datacamp.com/tutorial/data-visualisation-tableau>

Unit 05: Advance Data Visualization/Graph

Objectives

After studying this unit, you will be able to:

- Understand concept of Advance tableau graphs.
- install software for data visualization.
- Understand Show me tab of tableau.
- Understand concept of green and yellow pills (discrete data and continuous data).

Introduction

Tableau Desktop is a part of the tableau suite for Business Intelligence used for data analytics and visualization. It's a visual analytics solution that allows the user to explore complex datasets from varied sources and perform various operations to drive valuable insights out of them.

On Tableau Desktop, even a non-programmer can connect with a myriad of data sources and transform the data into dashboards. These dashboards can then be shared with multiple users through Tableau Server to make data-driven decisions.

Advanced Charts in Tableau

Tableau is a powerful Business Intelligence tool and thus, provides a number of visualizations to represent different business scenarios. It also features the Visualization Query Language or VIZQL that enables you to run queries and interact with the SQL database

Tableau features more than 25 different types of visualizations in terms of charts, maps, and graphs. From a simple bar chart to advanced stacked bar and gauge charts, tableau has it all.

6.1 What is Data Visualization?

It uses charts and graphs to visualize large amounts of complex data. Visualization provides a quick, easy way to convey concepts and summarize and present large data in easy-to-understand and straightforward displays, which enables readers insightful information. With the help of its techniques, enterprises are able to see the overview of their unstructured enterprise data in a better way.

What are its key features?

- Identify areas that need attention or improvement.
- Clarify which factors influence customer behavior.
- Decision-making Ability.
- Integration Capability.
- Predict sales volumes.

What are the best techniques?

For growing companies, it is the essential part of the business to make business strategies. They follow various visualization techniques listed below:

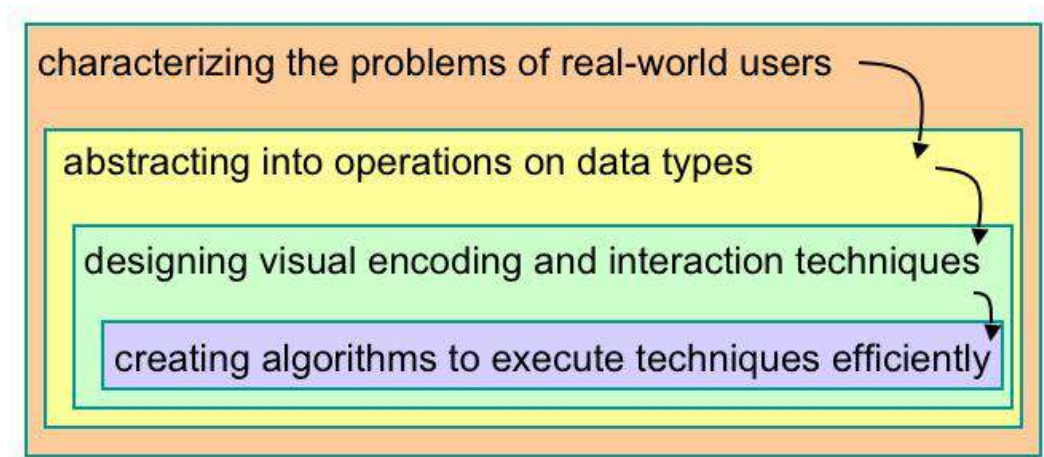
Understanding the motive of the Visualization

- Know your data.
- Getting to know the structure of your data.
- Which Variables are we trying to plot?

- How x-axis and y-axis will be used for the representation.
- How different colors symbolize visualization.

6.2 Identify the Purpose of the Visualization

1. Identifying the purpose of creating a chart is necessary as this helps define the structure of the process.
2. Select the right chart type.
3. Selecting the right type of chart is very crucial as this defines the overall functionality of the chart.
4. Attention to Detail using colors, shapes, and sizes.
5. Choosing the correct type of color, shape, and size is essential for representing the chart.



6.3 What are the common challenges?

Big Data is a large volume, complex dataset. So, such data cannot visualize with the traditional method as the traditional method has many limitations.

- **Perceptual Scalability:** Human eyes cannot extract all relevant information from a large volume of data. Even sometimes desktop screen has its limitations if the dataset is large. Too many visualizations are not always possible to fit on a single screen.
- **Real-time Scalability:** It is always expected that all information should be real-time information, but it is hardly possible as processing the dataset needs time.
- **Interactive scalability:** Interactive help to understand what is inside the datasets, but as big data volume increases exponentially, visualizing the datasets take a long time. But the challenge is that sometimes the system may freeze or crash while trying to visualize the datasets.

What are the Data Visualization techniques and strategies?

It strategy is another on the rundown. You may have the information scrubbed and the bits of knowledge removed, yet you ought to likewise make sense of how to manage all the fortune.

Better Preparation and Investigation

Information system guesses numerous means, from examining the business sector and industry, picking and organizing information streams – constant or heritage, inner or outer, or both, and so on., to choosing apparatuses and hotspots for information preparing and investigation – manual information researcher examination, front line AI calculations.

Identify Areas that need Attention.

As indicated by an Experian report, 95% of U.S. associations state that they use the data to control business openings. Another 84 percent accept information is an essential piece of shaping a business system. With an exponentially developing volume of data, chiefs might appear wealthy and ought to get ready to receive liberal rewards from their increasing resources. Nonetheless, more isn't, in every case, better.

Quick Action

Managing much information can be overpowering and bring about "suffocating" if the organizations don't settle specific difficulties before venturing into an information-driven period.

6.4 Interactive Representation of Data

The way we presented information significantly impacts information investigation and deciphers a large amount of information in a continuous structure by using complex arrangements of numerical or verifiable figures. With the vast surges of information promptly accessible to the present organizations across ventures, the test lies in information understanding, essential to the individual association, just as its points, objectives, and long-term targets. Best use of Data The information is essential for the accompanied performance of your business and to help you get the most imaginable incentive. From this, I attempted and tried methods for dissecting and introducing crucial data.

What are the key components?

Its component helps to give more details and alternative views to look after the data. Listed below are the components of it.

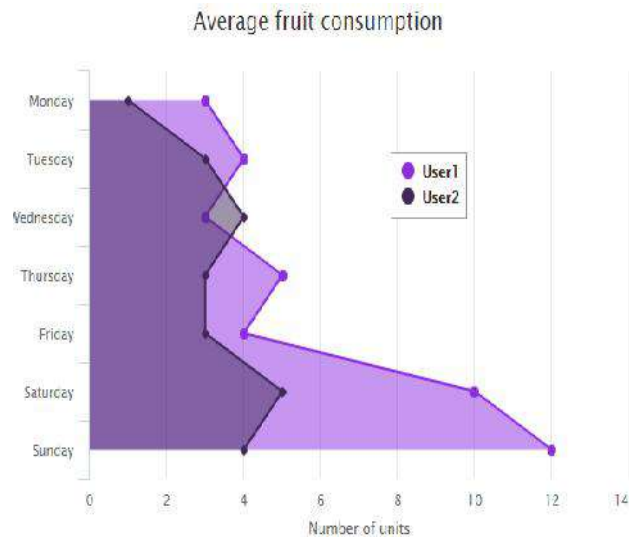
Line Charts

Line Charts involves Creating a graph in which data is represented as a line or a set of data points joined by a line.



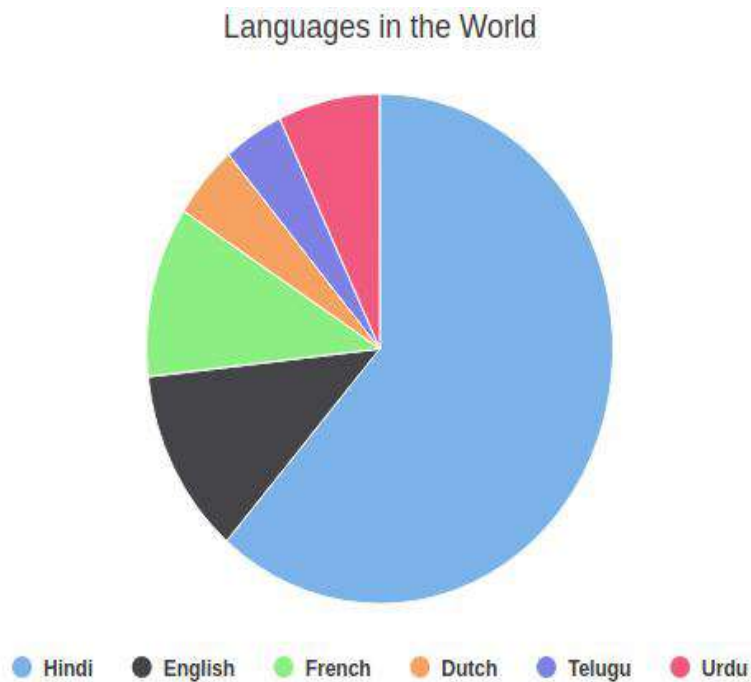
Area chart

Area chart structure is a filled-in area that requires at least two groups of data along an axis.



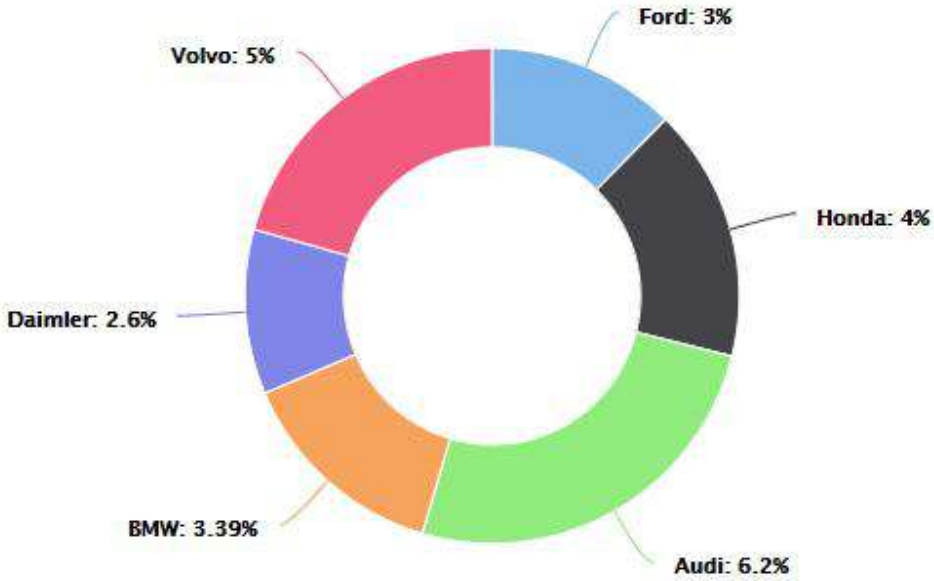
Pie Charts

Pie charts represent a graph in the shape of a circle. The whole chart is divided into subparts, which look like a sliced pie.



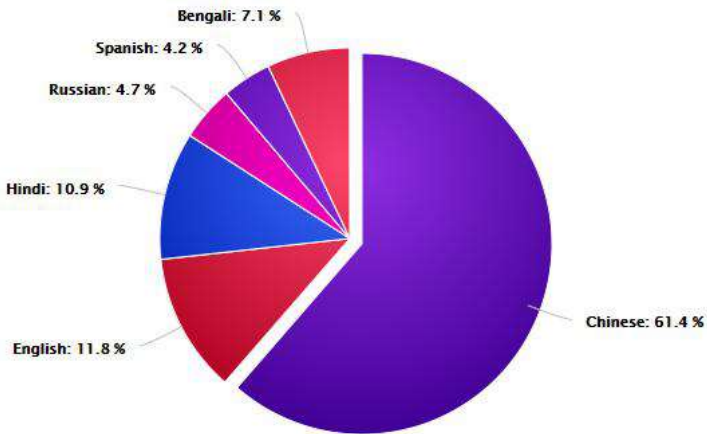
Donut Chart

Doughnut Charts are pie charts that do not contain any data inside the circle.



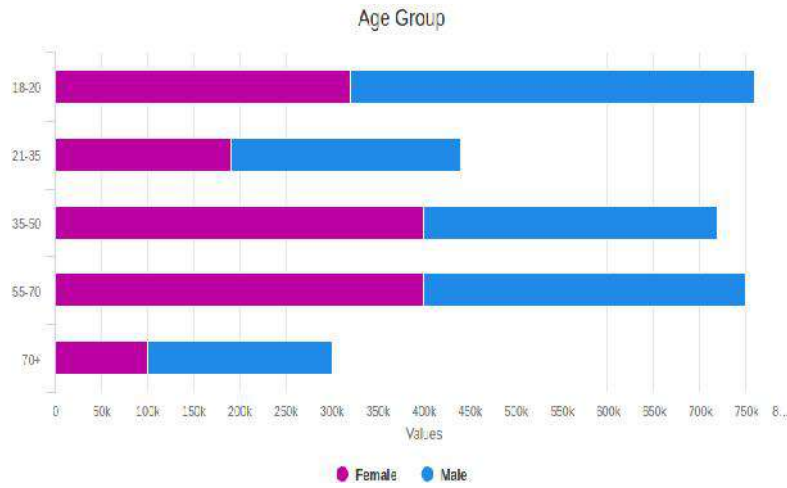
Drill Down Pie charts

Drill down Pie charts are used for representing detailed description for a particular category.
Languages in the World



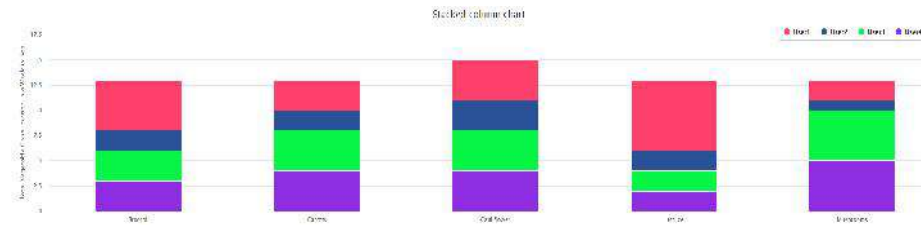
Bar Charts

A bar chart is the type of chart in which data is represented in vertical series and used to compare trends over time.



Stacked Bar

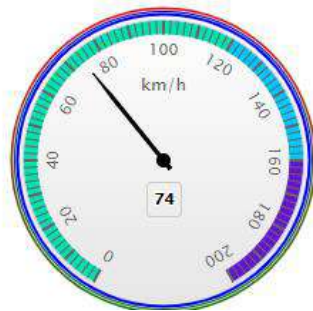
In a stacked bar chart, parts of the data are adjacent to each bar and display a total amount, broken down into sub-amounts.



Gauges

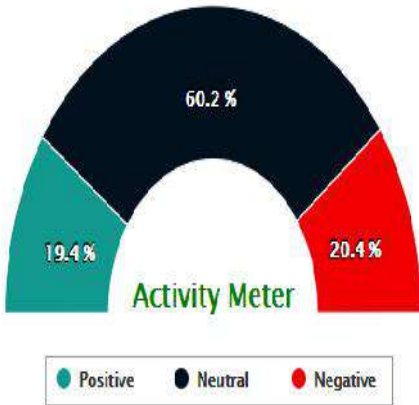
The gauge (gauge) component renders graphical representations of data.

Gauge Speedometer



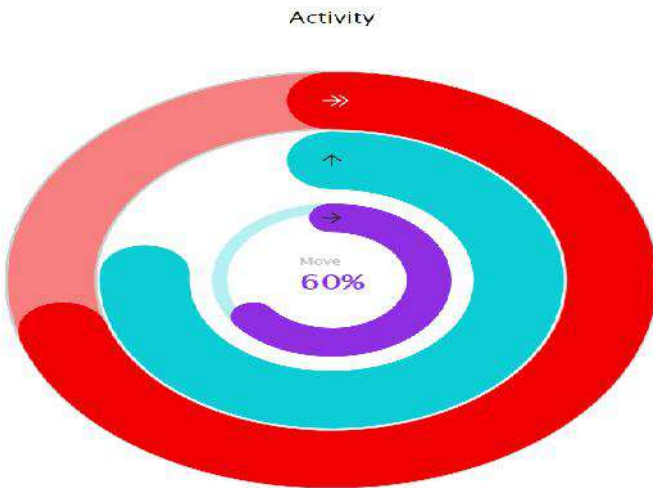
Solid Gauge

Creates a gauge that indicates its metric value along a 180-degree arc.



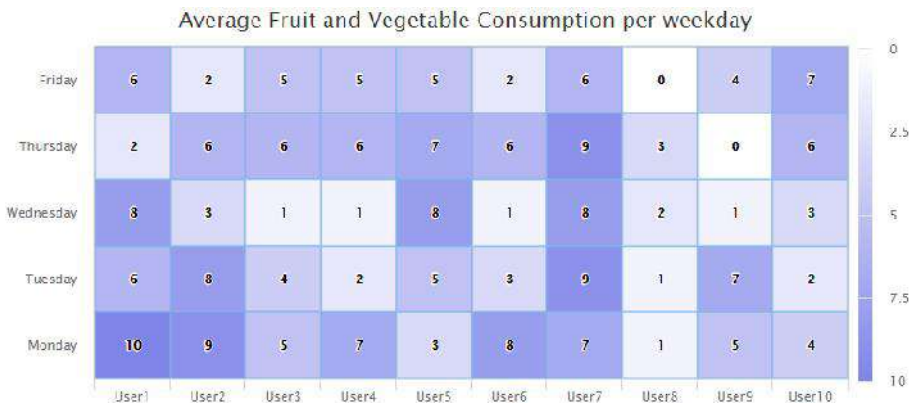
Activity Gauge

Creates a gauge that shows the development of a task. The inner rectangle shows the current level of a measure against the ranges marked on an outer rectangle.



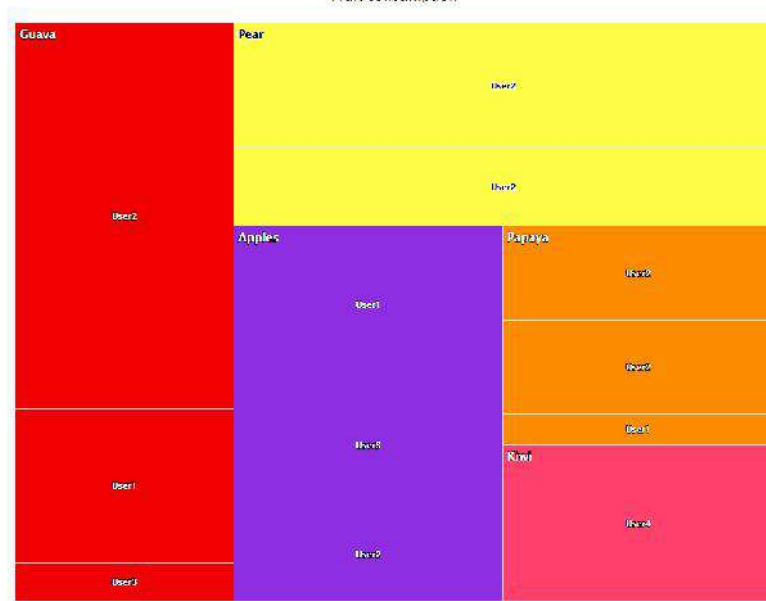
Heat and Treemaps

Heatmaps are useful for presenting variation across different variables, revealing any patterns, displaying whether any variables are related to each other, and identifying if any associations exist in-between them



Treemap with Levels

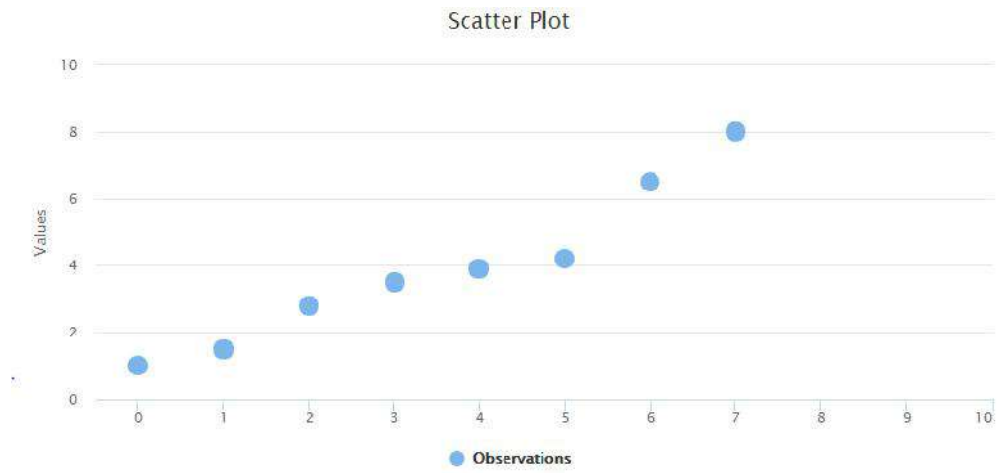
The treemap component displays quantitative hierarchical data across two dimensions, represented visually by size and color. Treemaps use a shape called a node to reference the data in the



hierarchy.

Scatter and Bubble Charts

Creates a chart in which the position and size of bubbles represent data. Use to show similarities among types of values, mainly when you have multiple data objects, and you require to see the general relations.



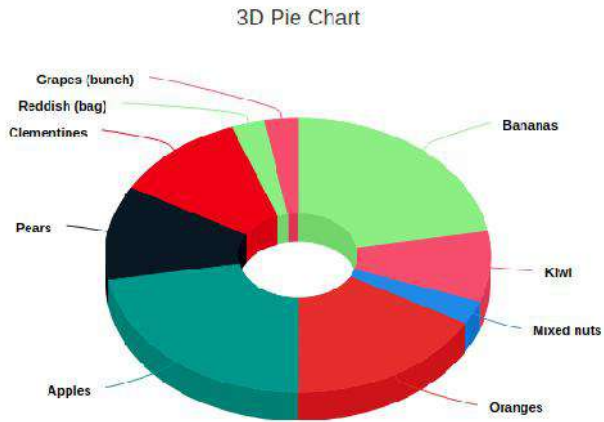
Combinations

Creates a graph that uses various kinds of data labels (bars, lines, or areas) to represent different sets of data items.



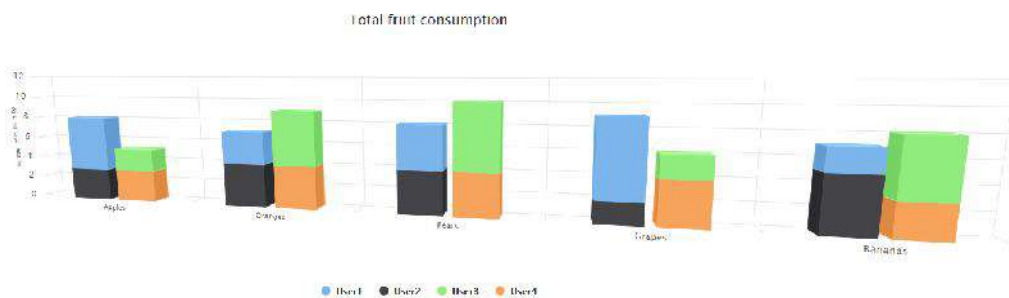
3D Charts

Creating a 3D chart helps rotate and view a chart from different angles, which supports in representing data.



3D Column

A 3D chart of type columns will draw each column as a cuboid and create a 3D effect



6.5 What are its major processes?

Each and every data has its particular need to illustrate data. Listed below are the stages and process flow for it.

Acquire

Obtaining the correct data type is a crucial part as the data can be collected from various sources and can be unstructured.

Parse

Provide some structure for the data's meaning by restructuring the received data into different categories, which helps better visualize and understand data.

Filter

Filtering out the data that cannot serve the purpose is essential as filtering out will remove the unnecessary data, further enhancing the chart visualization.

Mining

Building charts from statistics in a way that scientific context is discrete. It helps viewers seek insights that cannot be gained from raw data or statistics.

Represent

One of the most significant challenges for users is deciding which chart suites best and represents the right information. The data exploration capability is necessary to statisticians as this reduces the need for duplicated sampling to determine which data is relevant for each model.

Refine

Refining and Improving the essential representation helps in user engagement.

Interact

Add methods for handling the data or managing what features are visible.

6.6 What are the best tools?

Nowadays, there are many tools. Some of them are:

- **Google Chart:** Google Chart is one of the easiest tools for visualization. With the help of google charts, you can analyze small datasets to complex unstructured datasets. We can implement simple charts as well as complex tree diagrams. Google Chart is available cross-platform as well.
- **Tableau:** The tableau desktop is a very easy-to-use its tool. Two more versions are available of Tableau. One is "Tableau Server," and the other is cloud-based "Tableau Online." Here we can perform visualization operations by applying drag and drop methods for creating visual diagrams. In Tableau, we can create dashboards very efficiently.
- **Microsoft Power BI:** This tool is mainly used for business analysis. Microsoft Power BI can be run from desktops, smartphones, and even tablets. This tool also provides analysis results very quickly.
- **D3:** D3 is one of the best tools. D3.js is an open-source visualization tool.
- **Datawrapper:** Data wrapper is a simple tool. Even non-technical persons can use the Datawrapper tool. Data representation in a table format or responsive graphs like a bar chart, line chart, or map draws quickly in the Datawrapper.
- **Databox:** Databox is another visualization tool. It is an open-source tool. The whole data set can store in one location in the Databox tool. Then discover the insight data and perform visualization operations. In dashboard can view or match data from different datasets.

Many more tools are available per requirements and based on datasets, and visualization tools are chosen.

6.7 What is the purpose of Big-Data Visualization tools?

Its tools' purpose is to read complex unstructured data with the help of visual diagrams to benefit our business. One relevant example is the covid 19 affected report. That is a large dataset. Only data scientists can read and find out the pattern and predict the percentage of affected patients.

Approach to Visualize Big Data

Big data is unstructured, and such data can be very easily stored on a NoSql database like MongoDB or relevant information needed to extract from the data and stored on a SQL database. Then from that dataset, with the help of its tools, some charts like bar charts, pie charts, etc., need to plot. Then from those visual chart analyses can be performed.

6.8 Top 5 Data Visualization Techniques and Strategies

This section will list 5 basic techniques and strategies you should know to manage and analyze a large amount of data in a simple manner. So, let's get started!

Design your Visualization keeping the Audience in Mind

When it's all said and done, the World Wide Web and Information Technology as an idea are in their early stages – and information perception is a significantly more active part of advanced development. So, the absolute most cultivated business people and officials think that it is hard to process more than a pie diagram, bar chart, or a neatly introduced visual, nor do they have the opportunity to dig profound into information. Hence, guaranteeing that your substance is both moving and custom-fitted to your crowd is one of the most basic information perception methods possible. A few partners inside your association or customers and accomplices content with a straightforward pie diagram. However, others are looking to you to dig further into the bits of knowledge you've assembled, and this is one of the [best strategies](#). For the most significant effect and achievement, you ought to consistently examine those you're introducing. Before a gathering, and ordering your report to guarantee your visuals and level of detail address their issues precisely.

Have Clear Goals for the Visualization Strategy

- Like any business-based interest, from the brand narrating directly through to computerized selling in the past – with the representation of your information, your endeavors are convincing as the methodology behind them.
- To structure your perception endeavors, make a legitimate story, and drill down into the bits of knowledge that issue the most. It's critical to set a distinct arrangement of points, targets, and objectives preceding the structure of your administration reports, diagrams, outlines, and extra visuals.
- By building up your focuses on a particular crusade of interest. You ought to plunk down in a synergistic situation with others. Put resources into the extend and Define your endpoints regardless of the type of information that helps you reach them.
- One of the [advanced Data Visualization techniques](#) to direct your endeavors is by utilizing a foreordained arrangement of applicable KPIs for your undertaking, efforts, or continuous business endeavors and utilizing these bits of knowledge to create your perceptions.

Number charts

- Real-time number diagrams are exceptionally viable when you're looking to grandstand a quick and intuitive review of a specific key presentation marker, regardless of whether it's a business [KPI](#), site appearances, commitment levels, or a level of advancement.

Maps

- Most importantly, maps look incredible, which implies they move commitment in an executive gathering or introduction. Besides, a guide is a snappy, simple, and

absorbable approach to introducing vast or complex geological data arrangements for various purposes.

Pie charts

- While pie graphs have received a terrible rep lately, we feel that they structure a valuable perception device. That presents essential measurements in a simple-to-follow group. Pie diagrams are especially useful while showing the relative arrangement of a specific variable over a static period. What's more, pie diagrams make an essential thing of your representation.

Gauge Charts

- This model shows the working cost proportion, firmly identified with the benefit and misfortune territory of your fund division's critical exercises, and this shading-coded wellbeing measure causes you to access the data you need, even at a quick look.
- Gauge charts can be successfully utilized with a solitary worth or information point. Regardless of whether they're being used in money-related or official dashboard reports to show progress against key execution markers. Check outlines are an astounding guide to feature a quick pattern sign.

Colors Matter

- The clearest of our chose information representation procedures. Selecting the right shading plan for your presentational resources is one of the best Techniques and Strategies. That will help improve your endeavors fundamentally.
- The standards of shading hypothesis will notably affect the general accomplishment of your perception model. You ought to consistently attempt to keep your shading plan steady through your information perceptions, utilizing clear differentiation. To recognize components (for example, positive patterns in green and negative trends in red).
- As a guide, individuals utilize yellow as it can be perceived and deciphered easily.

Keep visualizations dashboards Simple and appropriate

- To assist you with taking care of your enormous information and separate it. For the most engaged, legitimate, and absorbable representations conceivable, here are some essential hints:
- Find which information is accessible to you and your association, conclude which is the most significant, and mark each part of data obviously. To make it simple to isolate, break down, and interpret.
- Guarantee that the entirety of your partners, staff, and colleagues comprehend where your information originates from and how to get to it. To guarantee the smooth treatment of bits of knowledge across offices.
- Keep your information ensured and your information taking care of frameworks basic, absorbable, and refreshed. To make the representation procedure as direct and natural as humanly conceivable.
- Guarantee that you use business dashboards that present your most significant bits of knowledge in a straightforward. To-get to deep space – quickening the perception procedure while likewise crushing the most considerable incentive from your data.

Tell a Data Story

- Like substance showcasing, when you're introducing your information in a visual configuration. With the point of conveying an important message or objective, recounting your story draws. In your crowd and make it simple for individuals to comprehend with negligible exertion.
- Scientific studies affirm that people, in huge, react better to an all-around recounted story and by adopting this strategy. To your representation interests, you won't just astonish your associates, accomplices, and customers with your reports and introductions. However, you build your odds of passing on your most basic messages, getting the upfront investment and reaction. As per best techniques and Strategies, you have to make the sort of changes. That brings about long-haul development, advancement, and achievement.

- To do as such, you ought to order your data, thinking as far as an essayist. Setting up an obvious start, center, and end, just as contention and goals. Building pressure during your account to add the most extreme effect on your different representations.

What are the common use cases?

- Sports Analysis:** Based on previous datasets with the help of visualization tools, a winning percentage prediction is possible. Graph plotting for both teams or players is possible, and analysis can be performed.
- Fraud Detection:** Fraud detection is a famous use case of big data. With the help of visualization tools after analyzing data, a message can be generated to others, and they will be careful about such fraud incidents.
- Price Optimization:** In any business product, price set is a significant issue with visualizing tools and all the components used; price can be analyzed and finally compared with market price, and then a relevant price can be set.
- Security Intelligence:** Visualizing criminals' records can predict how much threat they are to society. Each country has its security intelligence, and its task is to visualize information and inform others about a security threat.

6.9 Tableau Pareto Chart

Named after Vilfredo Pareto, it's a type of chart that contains both a line graph and a bar chart. Here, the cumulative total is represented by the line graph and other data values with a bar chart in descending order.

There is a principle developed in the year 1906 called Pareto or 80-20 rule used to check the efficiency of your business plans. Below is a step-by-step guide for creating a Pareto chart in tableau:

Load the Sample_Superstore or any other dataset on the Tableau Desktop software.

Add the Sub-Category and Sales dimension from the Data panels to the Columns and Rows sections.

Select the sort option from the drop-down menu of the Sub-Category column.

A dialog box will appear where you have to select the sort order to Descending and other options as mentioned below screenshot.

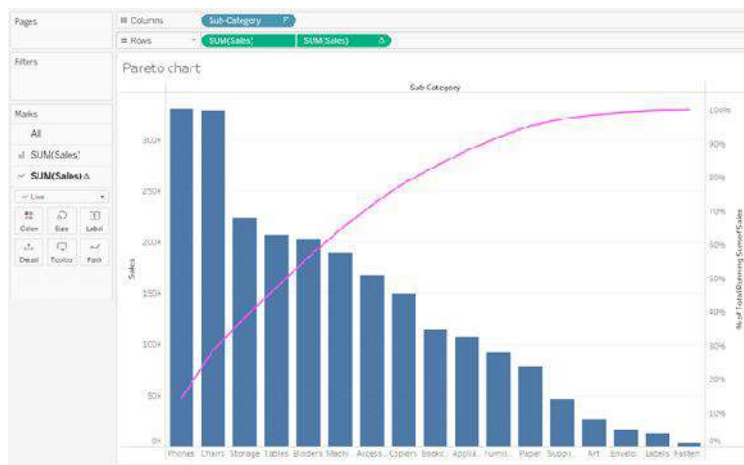


Tableau Maps

Maps have a long history and remain a staple in our daily lives—to navigate on road trips or understand proximity of one location to another. Until recently, maps were static and printed, which limited the potential for business use cases. With technology advancements, content on maps and the maps themselves became digital, interactive, and more appealing as they're incorporated in data analysis and reporting. Seeing location data mapped and included in visualizations has both enhanced understanding by more audiences and offered a valuable, new context. Several best-in-class interactive maps exist, but these ten notable examples cover different topics, span the globe, and demonstrate the power of location data when paired with business intelligence.

Here in tableau, we have different types of maps, which are:

- Tableau Proportional symbol maps
- Tableau Choropleth maps (filled maps)
- Tableau Point distribution maps
- Tableau Heatmaps (density maps)
- Tableau Flow maps (path maps)
- Tableau Spider maps (origin-destination maps)

6.10 Mapping Concepts in Tableau:

It is very difficult to understand the insights of data even though the data is clearly processed and arranged in tables. To tackle this issue or to have a clear understanding of data you must use "Maps" which have occupied an important role in [data visualization](#). We have multiple maps available in the table which plays a unique role in visualizing the data.

There may be several reasons to use maps or plot your data on the map. Maybe you have some location data or do you think plotting data on a map could help you in making your data pop? These two reasons are good enough to create a map visualization. In Tableau each type of map comes with unique features to cater to the specific needs of data mapping requirements.

Tableau maps answer your spatial questions and need to understand the trends in the data.

But you may have popped up with the question "**what is the spatial question**"?

The below-mentioned list is some of the spatial questions:

- Which state has the highest literacy rate in India?
- Which regions in the U.S. have the highest obesity rates?
- Where did storms move over a period of time?
- Which metro station is highly crowded with people in my city?
- Which state has more farmer's markets in the U.S?

These are some of the Spatial questions, and the map is the best possible way to answer all your questions.

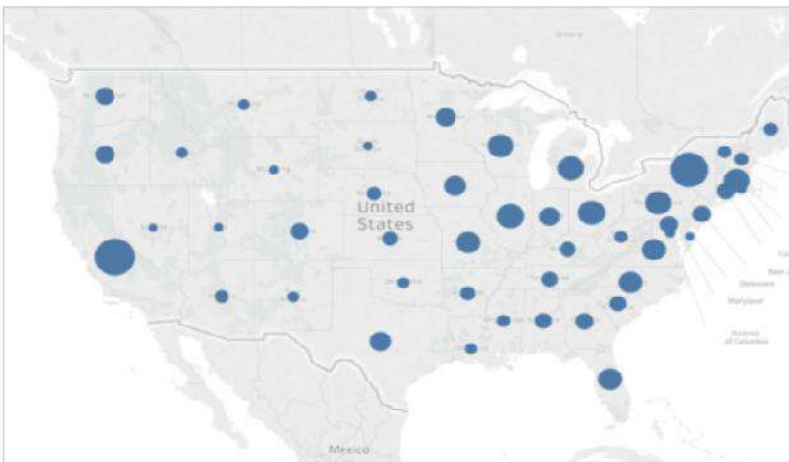
Circumstances to use maps:

Till now we have come to know that if you have spatial question maps would be the perfect way to answer your questions but there may be some exceptions in which you can answer the spatial questions better with other types of charts instead of maps.

Let's consider one of the spatial questions we have asked above.

Take, for example, the last question from the list above: Which state has more farmers markets in the U.S?

Let us assume that you have entire data about the number of farmers markets across the U.S and you wish to know which state has the highest number of farmer markets. The obvious thing that would come to your mind is "Maps" to visualize this data. If you plot the given data related to the US farmers market you will get an image like below.



Summary

- While data visualization often conjures thoughts of business intelligence with button-down analysts, it's usually a lot more creative and colorful than you might think.
- There are many wide-ranging applications from business dashboards to public health visualizations to pop culture trend breakdowns.
- Great and beautiful data visualization requires graphic design and storytelling skills in addition to great analysis skills.
- Data visualization is the graphical representation of different pieces of information or data, using visual elements such as charts, graphs, or maps

Keywords

- Tableau is a powerful data visualization tool that helps you in simplifying the data visualization process.
- Tableau uses a different type of charts which includes Bar Chart, Line Chart, Pie Chart, Maps, Scatter Plot, Gantt Chart, Bubble Chart, etc. Each Chart is unique and preferable for specific purposes.
- Maps are among the few frequently used charts in Tableau. Let's get to know more about Maps.

Self-assessment questions

1. 1 dimension and 1 measure required in which type of graph

- A. Heat map
- B. Scatter plot
- C. Maps
- D. Text chart

2. Geo dimension required in which type of graph

- A. Heat map
- B. Scatter plot
- C. Maps
- D. Text chart

3. Geo dimension required in which type of graph

- A. Symbol maps
- B. Scatter plot
- C. Maps
- D. Both A and C

4. 2 to 4 measures s required in which type of graph

- A. Heat map
- B. Scatter plot
- C. Maps
- D. Text chart

5. Dimensions contain _____ values

- A. Qualitative
- B. Quantitative
- C. Both
- D. None of these

6. Measures contain _____ values

- A. Qualitative
- B. Quantitative
- C. Both
- D. None of these

7. Individually separate and distinct is

- A. Continuous data
- B. Discrete data
- C. Random Data
- D. None of these

8. _____ data means "forming an unbroken whole, without interruption"

- A. Continuous data
- B. Discrete data
- C. Random Data
- D. None of these

9. Green pills in tableau means

- A. Continuous data
- B. Discrete data
- C. Random Data
- D. None of these

10. Blue pills in tableau means

- A. Continuous data
- B. Discrete data
- C. Random Data
- D. None of these

11. Creating graph options are available in

- A. Measures
- B. Dimensions
- C. Show me
- D. All of these

12. _____ helps to create reports, dashboards, and stories using different charts and graphs.

- A. Tableau Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

13. _____ does not need to connect to any source, but it can read reports built on top of any and all of the listed data sources that Tableau Supports.

- A. Tableau Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

14. Your data is out in the public once your report is published on to the _____.

- A. Tableau Public Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

15. _____ is for somebody that only needs to monitor the analytics

- A. Tableau Public Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

1 d	2 c	3 d	4 b	5 a	6 b	7 b	8 a
9 a	10 b	11 c	12 b	13 c	14 a	15 c	

Review Questions

- Explain any 5 types of charts available in Tableau?
- What is the difference between dual axis and blended axis in Tableau?
- What is process to create scatter plot in Tableau?

- Explain process to create maps in tableau using geographical data?
- Explain difference between green and blue pills description?



Further Readings

"Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few

"Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"



Web Links

<https://www.tableau.com/>

<https://intellipaat.com/blog/what-is-tableau/>

Unit 07: Building View Advance Map Option

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7.2 Building a Simple Tableau Custom Map

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Answers for Self Assessment

Review Questions

Further Readings

Objectives

After studying this unit, you will be able to:

- Understand concept of Tableau Maps.
- define geographical role.
- Understand Show me tab of tableau.
- Understand concept of different symbol maps.

Introduction

Understanding the Key Features of Tableau

Some of the key features of Tableau are as follows:

Data Sources: Tableau offers seamless integration with a large number of widely used platforms for data storage such as File Systems like Microsoft Excel, CSV, etc., Relational Databases like Microsoft SQL Server, Oracle, IBM DB2, etc., Cloud-based Systems such as Google Big Query, Windows Azure, etc., or other sources such as ODBC/JDBC.

Attractive Visualizations: Tableau gives users the ability to create different types of data visualizations. For example, users can easily create the simplest visualizations such as a Pie Chart or Bar Chart or some of the most complex visualizations such as Bullet Chart, Gantt Chart, Boxplot, etc. Tableau also comes with information on geographical data such as Countries, Cities, Postal Codes, etc. that allows users to build visualizations using informative maps.

Wildcard Union and Cross-Data Join: Users have the ability to perform Cross-Data Join and Union in Tableau. This helps in removing the barriers and time-consuming workarounds that were required due to the massive use of numerous data sources.

Cross-Data Source Filtering: For data with common dimensions, Tableau gives users the ability to perform the filter operation across multiple data sources at the same time. This also results in all necessary edits or changes being made to all worksheets with the same data sources using the same set of filters automatically.

Mobile Dashboards: Tableau allows users to format all their Reports and Dashboards in such a manner that it is compatible with mobile devices as well. It lets users create custom mobile layouts for their Reports or Dashboard specific to their device.

Maps are one of the best ways to represent the data in Tableau. Data visualizations using maps look very attractive and appealing. Map charts suites better when you want to show the demographic data such as Population census, income, housing, household rates, etc. Maps give an easy-to-infer advantage over the other charts available in Tableau and are highly interactive when you want to plot demographic or geographical data on a plot.

7.1 Different types of maps.

- Tableau Proportional symbol maps
- Tableau Choropleth maps (filled maps)
- Tableau Point distribution maps
- Tableau Heatmaps (density maps)
- Tableau Flow maps (path maps)
- Tableau Spider maps (origin-destination maps)

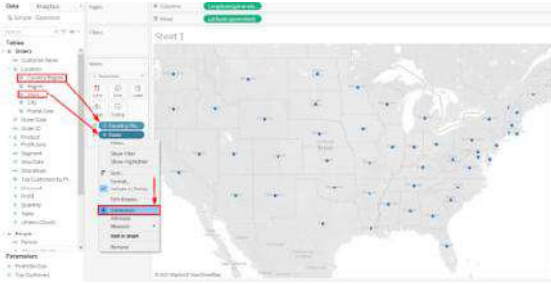
7.2 Building a Simple Tableau Custom Map

To build a Simple Tableau Custom Map, you need a data source, like Sample-Superstore data, consisting of location data, location names, latitude, longitude coordinates. Without geographical coordinates, you can't prepare map visualization in Tableau. A simple Tableau Custom Map can be created by implementing the following steps:

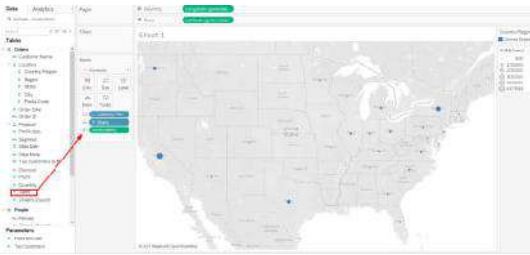
- **Step 1:** Open Tableau Desktop, connect to the Sample-Superstore data source, and the worksheet will open in front of your screen.



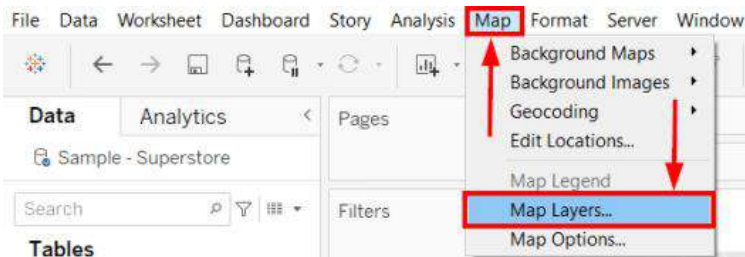
- **Step 2:** Move your cursor to the **Location** option, select the **Country & State** parameter under it, drag both of them to the **worksheet**.
- **Step 3:** Right-click over the **State** and select the **Dimension** from the drop-down list.



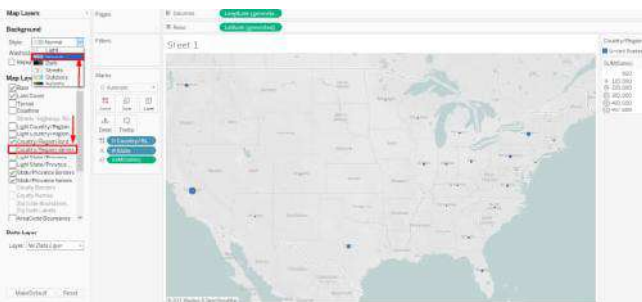
- **Step 4:** Drag the **Sales** table to the **Mark** sheet as shown below.



Step 5: Move your cursor to the **Maps** tab and choose **Map Layers** from the drop-down list.



- **Step 6:** On the Map Layers pane, unselect the **Country/Region Names** and select **Normal** from the drop-down list of style.

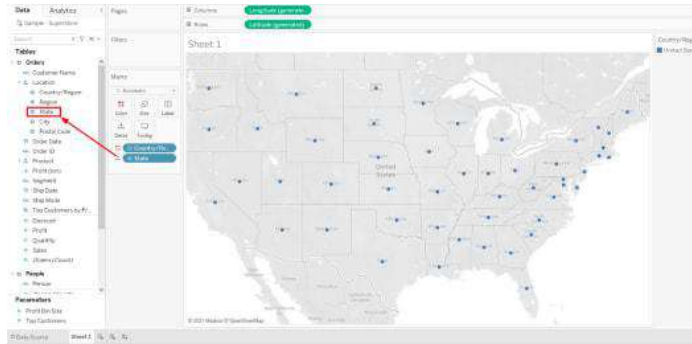


This is how you can design simple Tableau Custom Maps to perform a basic geographical analysis of your data.

Creating a Polygon Tableau Custom Map

A simple Polygon or Filled Tableau Custom Map helps you understand the basic mapping concepts in Tableau. The following steps can be implemented to create a Polygon Tableau Custom Map:

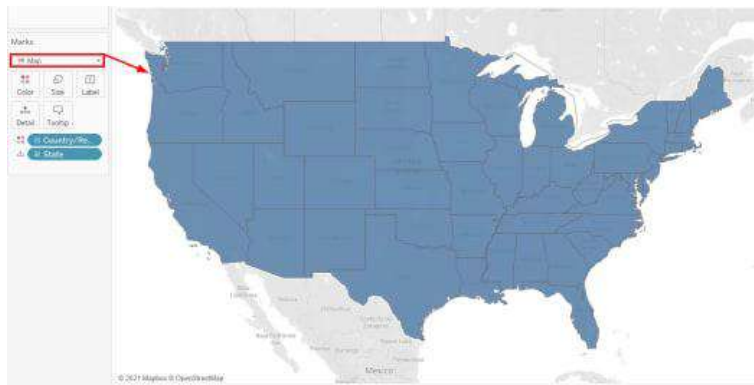
- **Step 1:** Drag the **State** parameter from the **Data** pane to the worksheet.



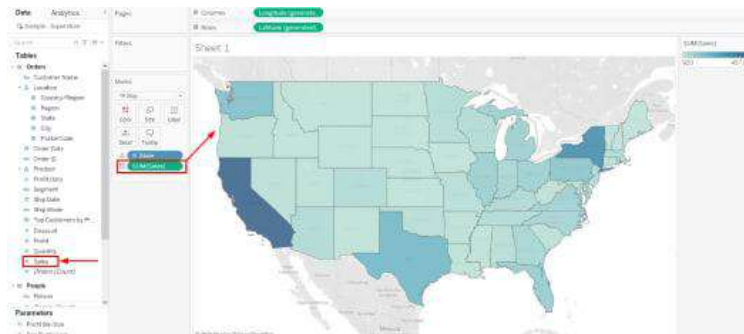
- **Step 2:** Move your cursor to the **Marks** pane, choose the **Map** option from the drop-down list.



- **Step 3:** The worksheet will show the following visualization of the map.



- **Step 4:** Select the **Sales** parameter from the **Data** pane and place it over the map.



You can see the **Number of Sales** from the polygons in the updated map.

7.3 Building Different Types of Tableau Custom Maps

Tableau Desktop enables you to design the following types of maps depending upon your business needs and visualization requirements. The different kind of custom maps that can be created on Tableau are as follows:

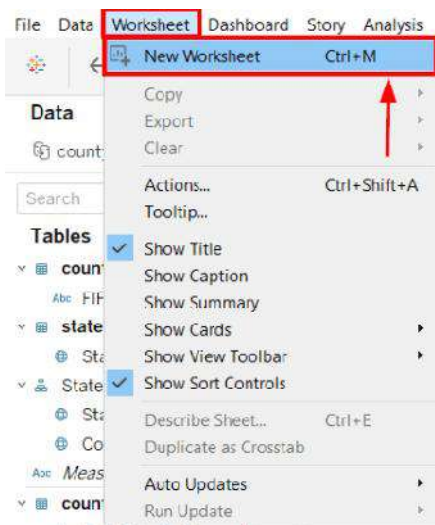
- Choropleth or Filled Tableau Custom Maps
- Flow or Path Tableau Custom Maps
- Proportional Symbol Tableau Custom Maps
- Point Distribution Tableau Custom Maps
- Heat or Density Tableau Custom Maps
- Spider or Origin-Destination Tableau Custom Maps

1) Choropleth or Filled Tableau Custom Maps

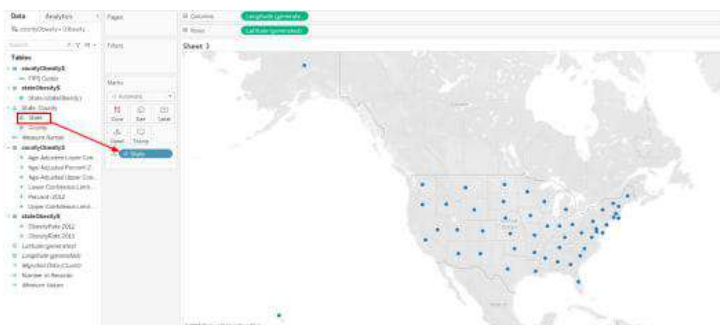
Choropleth Maps, also known as Filled Maps, are perfect to represent ratio and aggregated data. Users can use ratio or aggregated data for polygons that can be related to locations, such as countries, regions, states, or any area.

For simplicity, download Tableau [Example Workbook](#) and implement the following steps to show ratio or combined data in Tableau Desktop:

- **Step 1:** Go to **Worksheet Tab** and select the **New Worksheet** from the drop-down list or press CTRL+M. A New Sheet will open.



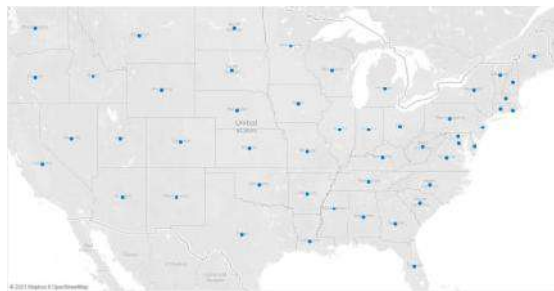
- **Step 2:** Under the State, Country dimension, select the **State** option and move to the sheet.



- **Step 3:** Now select the **Datapoint** of **Alaska, United States**.
- **Step 4:** Click over it and choose the **Exclude** option.
- **Step 5:** Repeat the same steps for **Hawaii**.



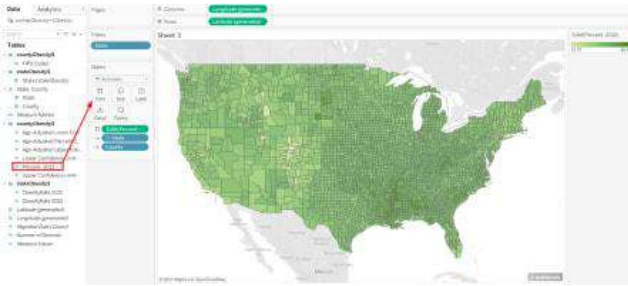
You'll see a better version of the map.



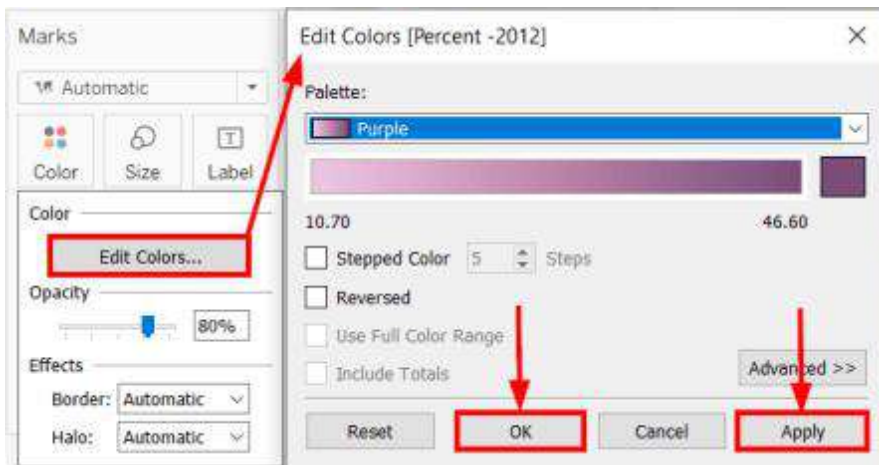
- **Step 6:** Click on the plus symbol of **State** to get details of all countries, as shown below.



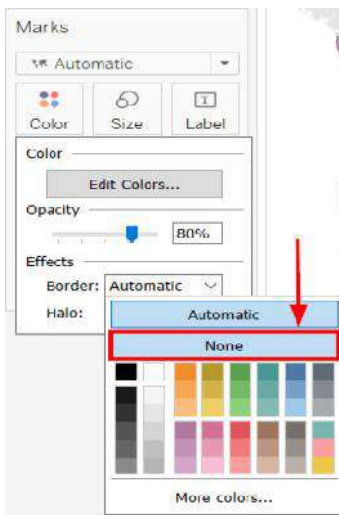
- **Step 7:** Place your cursor over **Percent- 2012** and drop it over the color option.



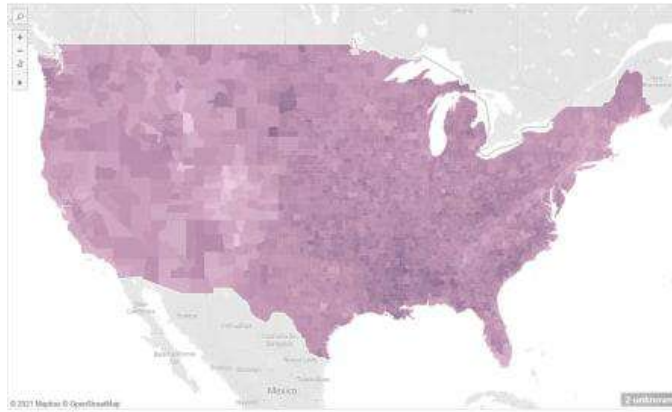
- **Step 8:** To get the obesity percentage range, select the **Edit Colors** option from the **Color** icon.
- **Step 9:** Select the **Purple** color and click **Apply**.



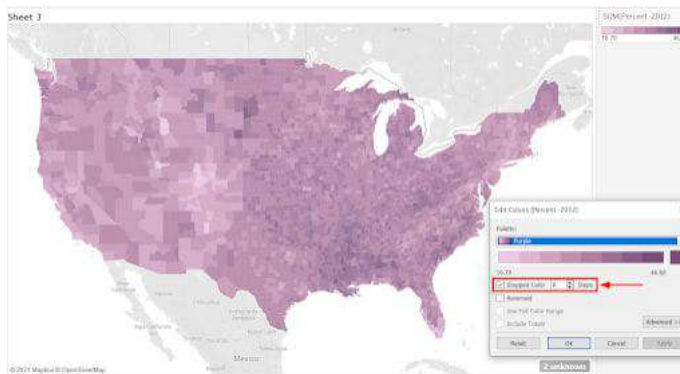
- **Step 10:** Open the **Effect** option from the **Color** icon.
- **Step 11:** Select the **None** option from the **Border** list.



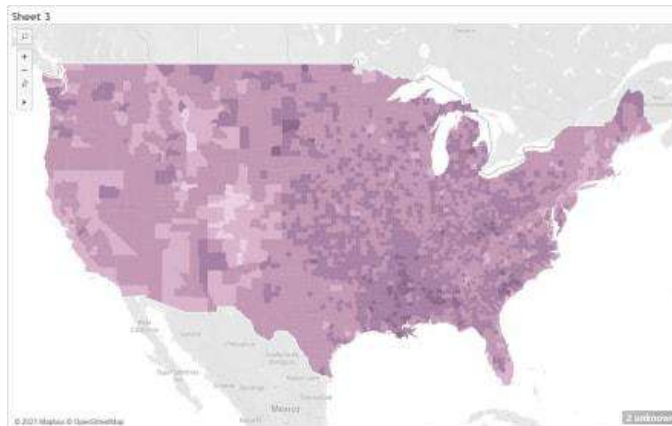
The output of the Choropleth will appear in front of your screen.



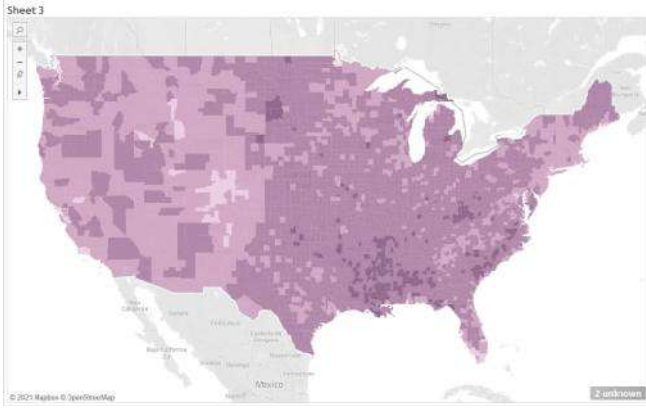
- **Step 12:** In the above map, Tableau selected the default color distribution. However, if you want to change it, go to the **Edit Color** menu again. Mark the **Stepped** color and enter 8. Click on the **Apply** button and close it.



- **Step 13:** Repeat the same steps, but this time select 5.

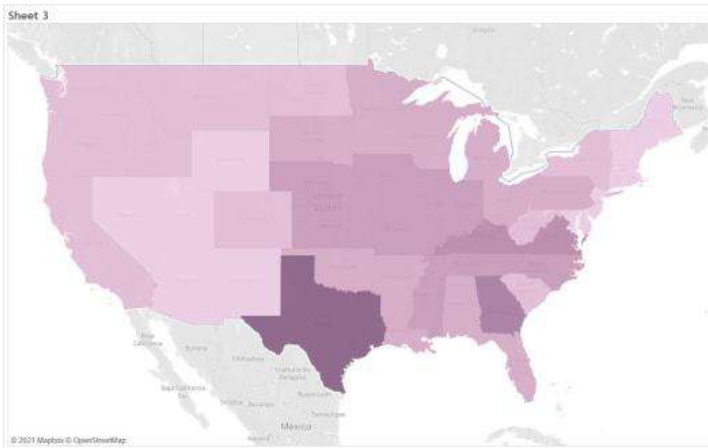


- **Step 14:** The map view for 4 Stepped Color might look like this.



By selecting 4 instead of 5, you will understand that obesity rates are higher in the South. However, prior maps were showing even distribution of colors or obesity rates in the United States (US). All the maps are great to show aggregate data, yet each is giving you prominent information on obesity rates in different countries.

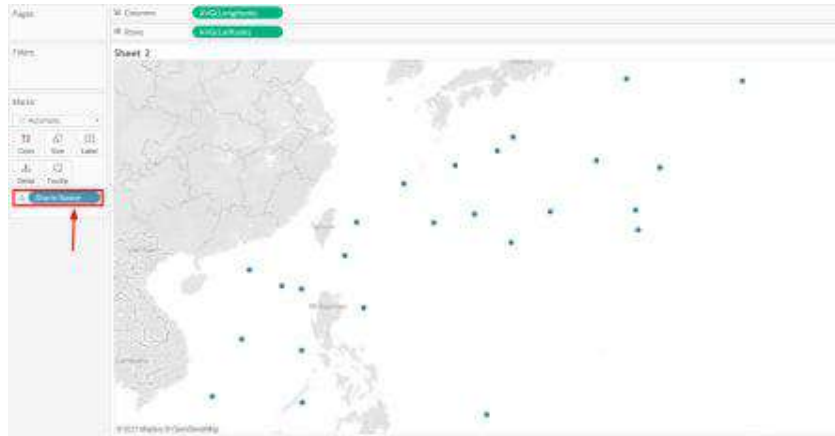
Similarly, if you want to plot the map for a **State Level** detail, remove the County from the **Marks** chart. You can analyze that Texas has higher obesity rates, followed by Georgia.



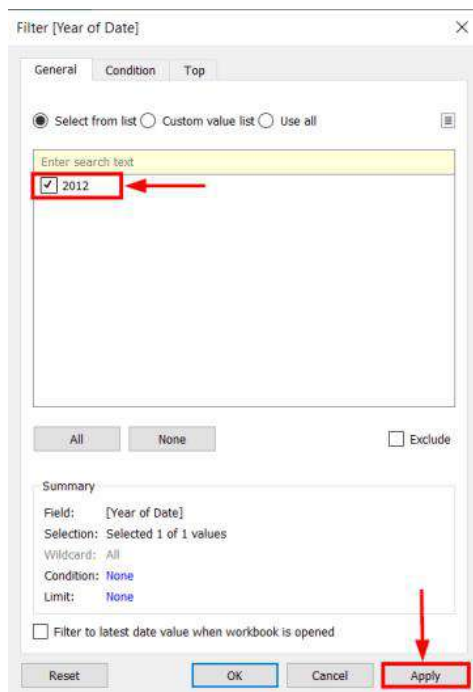
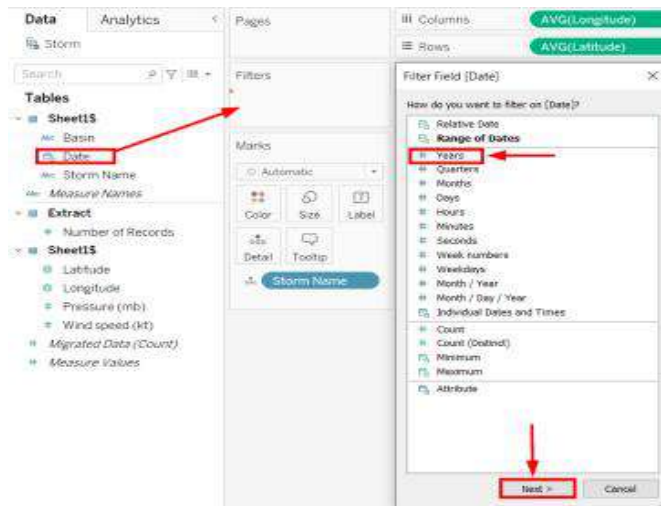
2) Flow or Path Tableau Custom Maps

Tableau Business Intelligence tool allows users to determine the flow of path over time, e.g., the path of the storm, through Flow or Path Maps. To create Flow Maps in Tableau, download [Example Workbook](#) and implement the following steps:

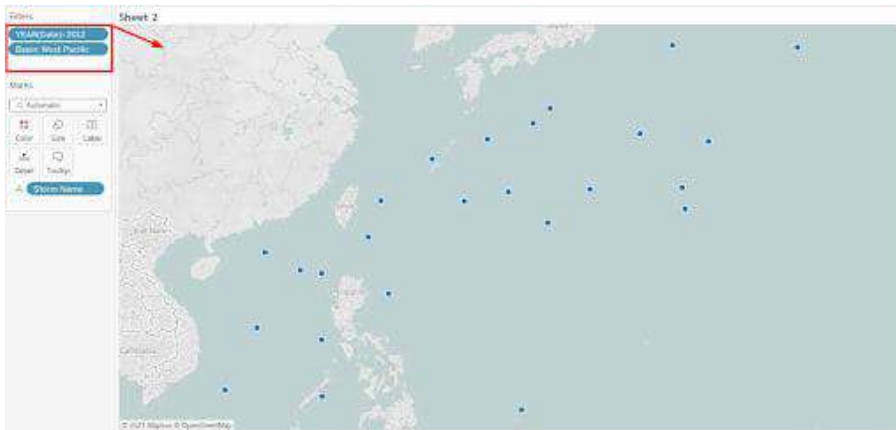
- **Step 1:** Open the downloaded example in **Tableau Desktop**.
- **Step 2:** Open a **New Worksheet**.
- **Step 3:** Move **Latitude** and **Longitude** coordinates using the drag-and-drop method.
- **Step 4:** Choose the **Storm Name** and place it over the **Details** icon in the Marks pane.



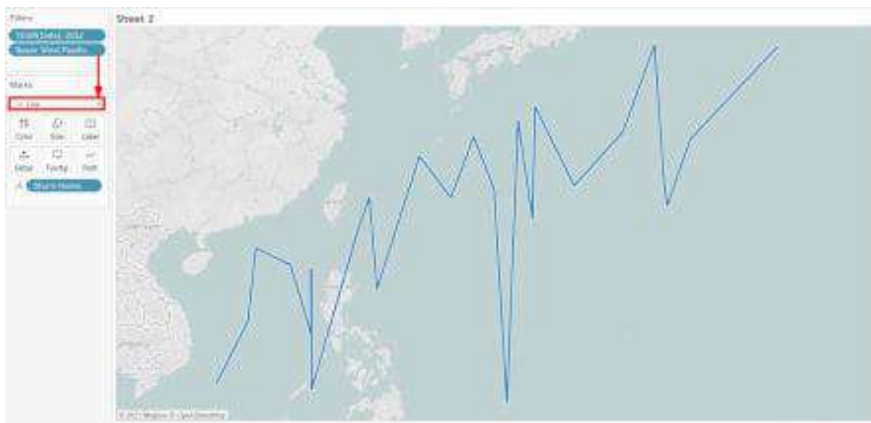
- **Step 5:** To apply filters, select the **Date** from the **Data** pane and place it over the **Filters** area.
- **Step 6:** Choose Year, such as 2012.
- **Step 7:** Click on **Apply** and close the screen.



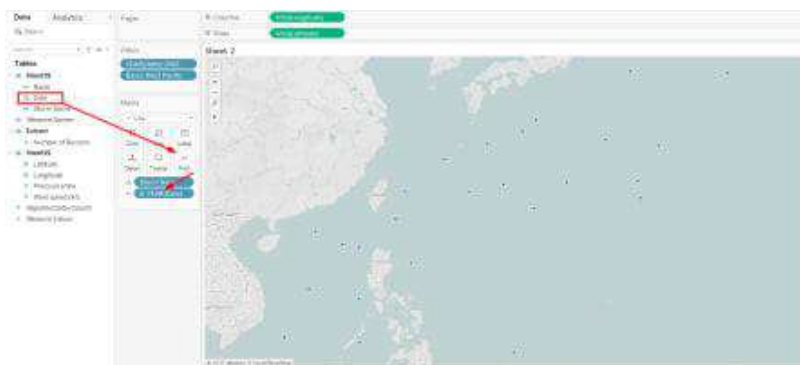
- **Step 8:** Repeat the same steps for **Bhasin** and select the **West Pacific** region.
- **Step 9:** Select **Normal Background** from the **Map** tab. The final map might look like this.



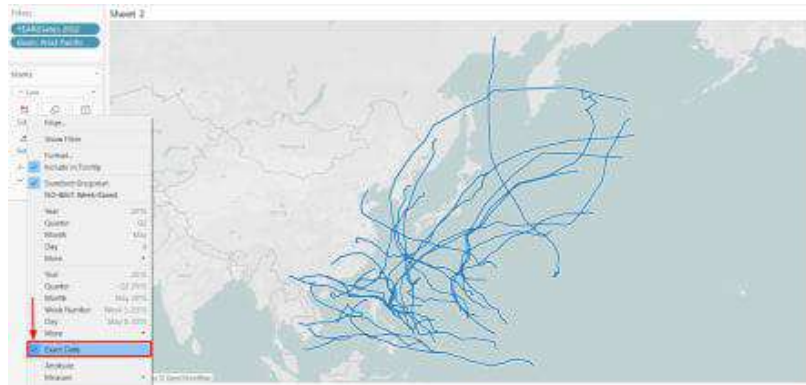
- **Step 10:** Select a **Line** from the **Marks** pane.



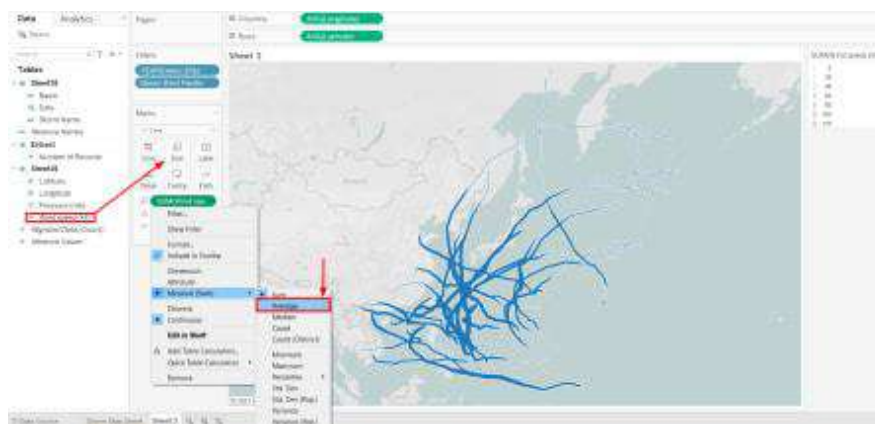
Step 11: Drag the **Date** from the **Data** pane and place it over the **Path** icon. This will remove the line due to the absence of an exact date.



- **Step 12:** Click on the **Date** parameter, select an **Exact Date** option.



- Step 13: Drag the **Wind Speed (kt)** from the Data pane and place it over the **Size** icon.
- Step 14: Right-click over the **Wind Speed (kt)** and choose the **Average** parameter.



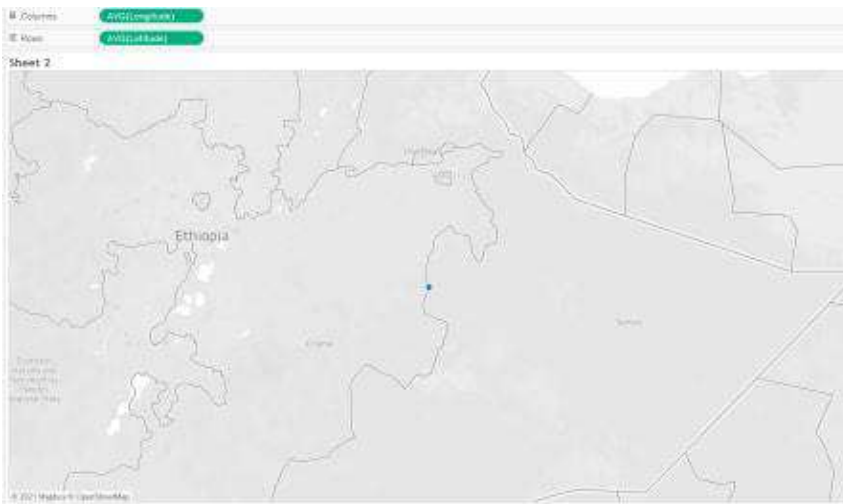
- Step 15: Place **Storm Name** over the **Colors** icon to complete the **Flow Map**.



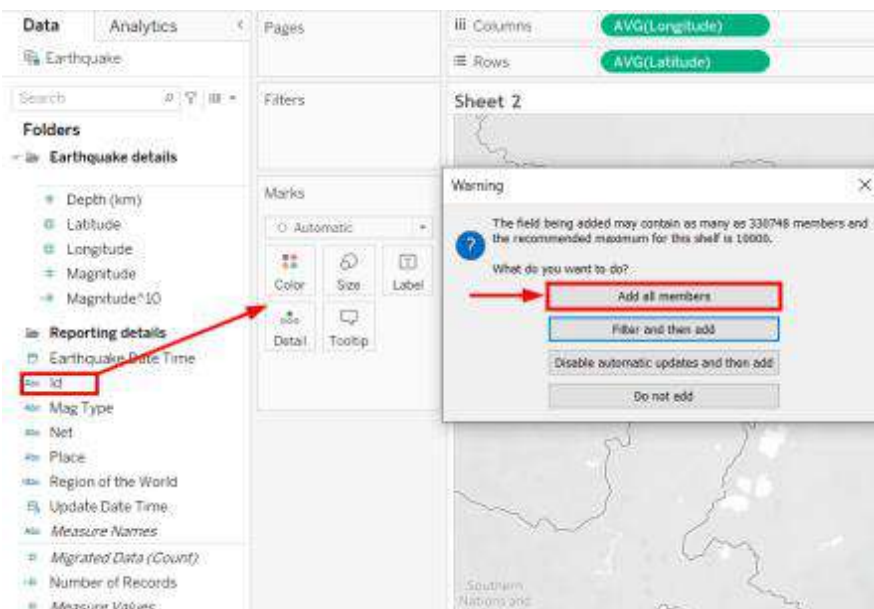
3) Proportional Symbol Tableau Custom Maps

A Proportional Symbol Map is a great start to acquire quantitative values for individual locations. Nevertheless, your data source should contain quantitative values, longitude and latitude coordinates to create Proportional Symbol Maps. Download [Example Workbook](#) to learn more in detail.

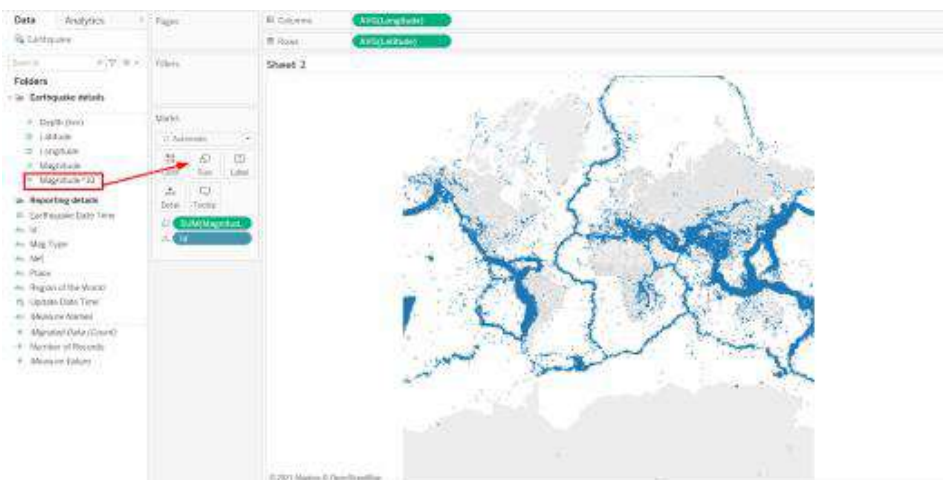
- Step 1: Download **Example Workbook**.
- Step 2: Open the downloaded file on **Tableau Desktop**.
- Step 3: Open a **New Worksheet**.
- Step 4: Drag **Latitude** and **Longitude** to the sheet.



- **Step 5:** Select the ID from the **Data** pane and place it over the **Details** icon.
- **Step 6:** A dialog box will appear, select **Add All Members**.



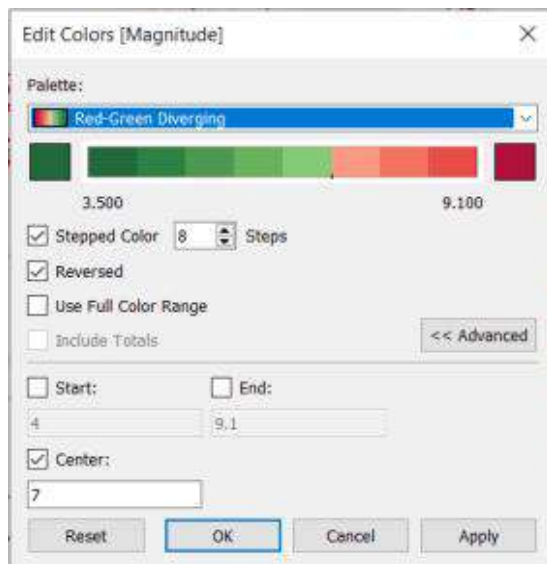
- **Step 7:** Select **Magnitude^10** and place it over **Size** in Marks.



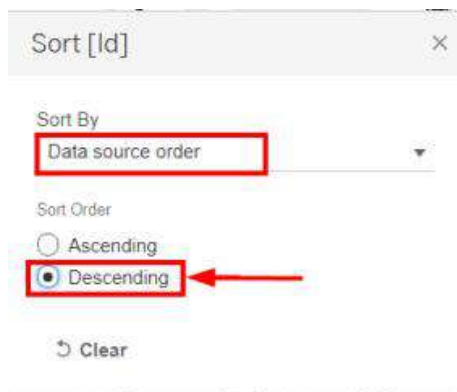
- **Step 8:** Grab the **Magnitude** to Color option.



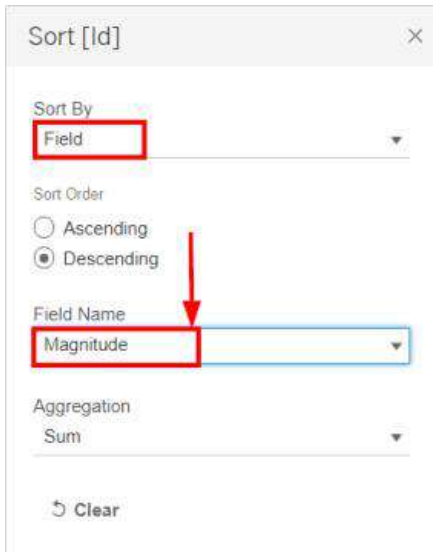
- **Step 9:** Click on **Edit Colors** from the **Color** icon.
- **Step 10:** Select your preferred color, opacity (70%), and Border.
- **Step 11:** Click on **Stepped Color** and choose 8.
- **Step 12:** Click the **Reversed** checkbox.
- **Step 13:** Click on **Advanced**, click **Center**, and enter 7.



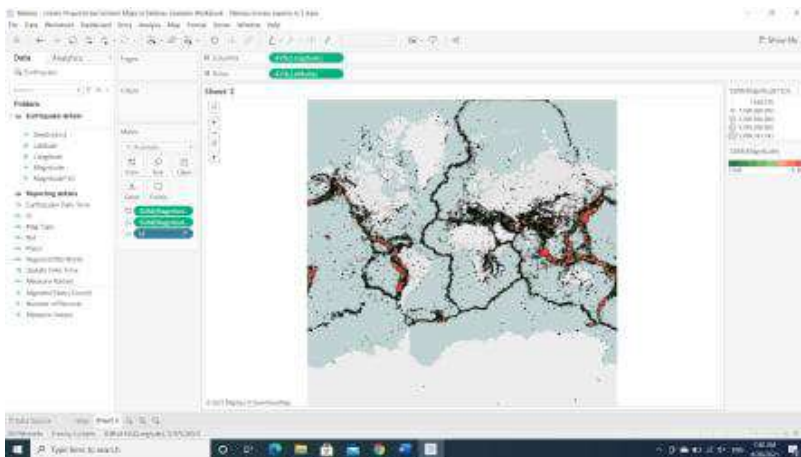
- **Step 14:** Right-click over the **ID** and select the **Sort** option.
- **Step 15:** Choose **Descending** for **Sort Order** option.



- **Step 16:** Choose **Fields** for **Sort By** option and then choose **Magnitude**.
- **Step 17:** Click **OK**.



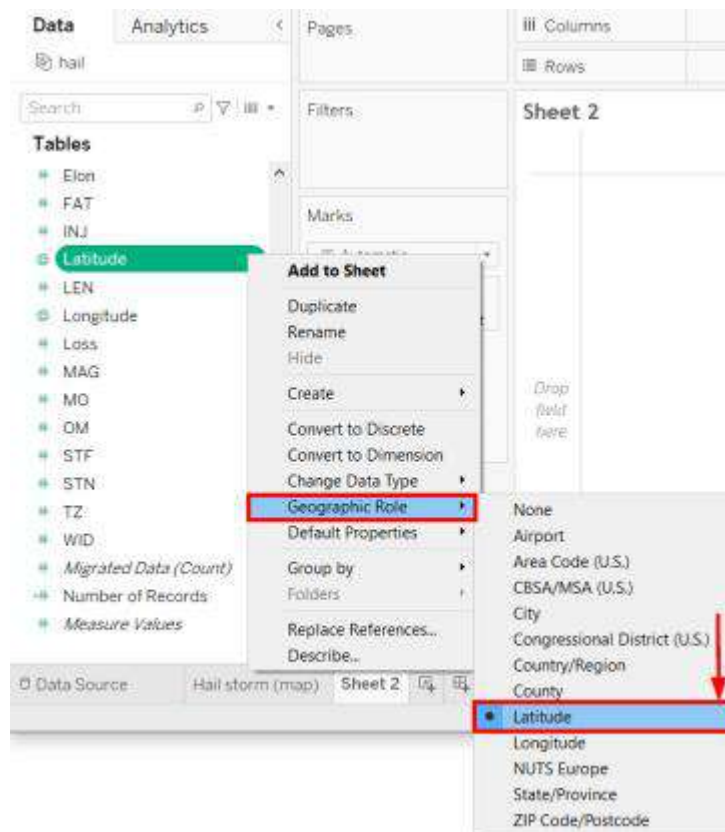
Step 18: Select any appropriate background for your map. The final image of the map might look like this.



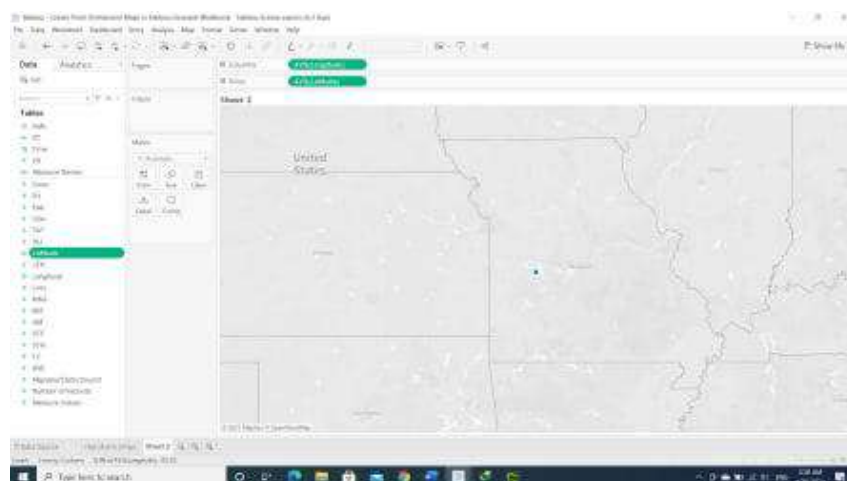
7.4 Point Distribution Tableau Custom Maps

Everyone loves to spot visual clusters, and Tableau Desktop makes this process super easy through Point Distribution Maps. But your data source should have longitude and latitude coordinates to map visual clusters. Download the [Example Workbook](#) right now and implement the following steps:

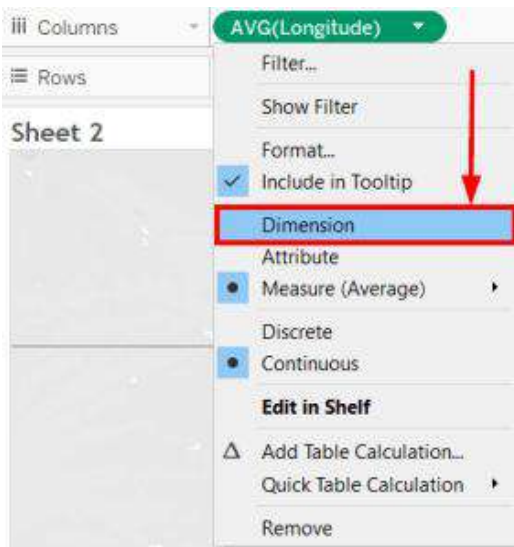
- **Step 1:** Open Tableau Desktop and select a **New Worksheet**.
- **Step 2:** Click on the **Latitude** dimension.
- **Step 3:** Select the **Geographic Role**.
- **Step 4:** Choose the **Latitude** parameter.



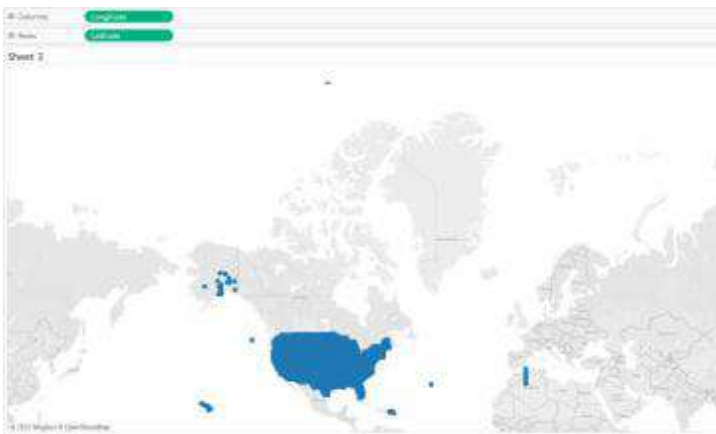
- **Step 5:** Click on the **Longitude** dimension.
- **Step 6:** Select the **Geographic** role.
- **Step 7:** Choose the **Longitude** parameter.
- **Step 8:** Double-click over both **Longitude** and **Latitude** dimensions.



- **Step 9:** Click on the **AVG(Longitude)** and select **Dimension**.
- **Step 10:** Click on the **AVG(Latitude)** and select **Dimension**.

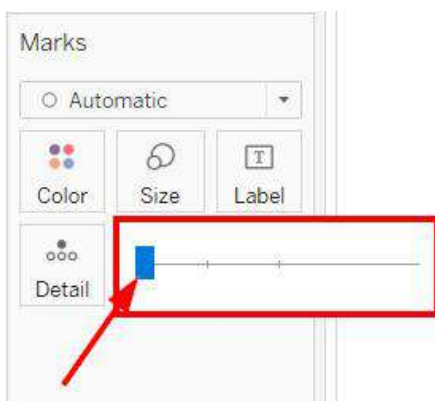


The map might look like something as follows:



To make it clearer, move your cursor to the **Marks** card.

- **Step 11:** Click on the **Size**.
- **Step 12:** Move the bar to the left edge.



- **Step 13:** Zoom the graph to get the entire picture.



Maps are one of the most inherent and useful features in Tableau. The visualizations that contain maps in Tableau look very appealing and is interactive as well. Most demographic data like income, census based population, housing and household rates are in-built. It is also possible to use custom geocodes to add geographic roles such as zip code, street names, etc.

Maps give an easy-to-infer advantage over the other charts that are available in Tableau. If the available population data is consumed on the map, we can comprehend which regions are densely/scarcely populated at a glance.

If your data set contains any kind of spatial data viz. State-wise or Country-wise data, Tableau auto-generates the respective latitude and longitude for the spatial fields that are available in the data set. However, the latitude and longitude fields that are auto-generated by Tableau can only be used for generating the maps and cannot be used in any of the calculation fields or parameters of the report. Tableau generates a map with the generated longitude and latitude by just a click of that particular spatial field, which we will be discussing later in the blog.

Tableau provides two types of maps by default:

Symbol map

Filled map

Some of the basic scenarios that we might come across is just to view the spatial distribution of data. Here, the coordinates of the geographic location do not play a significant role. In such cases, a map may not even be the right choice of visualization of the data.

Summary

- Geographic Analysis of business and customer data is essential for revenue growth.
- By visualizing data on a map, businesses can answer numerous questions such as which regions bring more sales, which countries are more profitable, which countries require more Marketing efforts, etc.
- All in all, the mapping features of Tableau Desktop gives business the ability to get all the answers to spatial questions.
- Tableau is a popular Business Intelligence and Data Analytics tool that was developed to help organizational decision-makers visualize, analyze and understand complex business data and make data-driven decisions.

Keywords

- There are many reasons to put your data on a map. Perhaps you have some location data in your data source? Or maybe you think a map could really make your data pop? Both of those are good enough reasons to create a map visualization, but it's important to keep in mind that maps, like any other type of visualization, serve a particular purpose: they answer spatial questions.
- You make a map in Tableau because you have a spatial question, and you need to use a map to understand the trends or patterns in your data.
- But what is a spatial question? Some examples might be:
- Which state has the most farmers markets?
- Where are the regions in the U.S. with the high obesity rates?

Self-Assessment

1. Default Aggregation Used for Tree Map
 - A. Sum
 - B. Avg
 - C. Count
 - D. Countd

2. What Are the File Extensions In Tableau?
 - A. Tableau Workbook (.twb)
 - B. Tableau Packaged Workbook (.twbx)
 - C. Tableau Data Source(.tds)
 - D. **All of the above**

3. What Type of Join Is Used in Blending?
 - A. Right join
 - B. **Left join**
 - C. Full join
 - D. Inner join

4.The _____keyword returns all records from the right table (table2), and the matching records from the left table (table1).

- A. **Right join**
- B. Left join
- C. Full join
- D. Inner join

5.The _____keyword returns all records from the left table (table1), and the matching records from the right table (table2).

- A. Right join
- B. **Left join**
- C. Full join

D. Inner join

6. _____ returns all the rows from both joined tables, whether they have a matching row or not.

- A. Right join
- B. Left join
- C. **Full join**
- D. Inner join

7. The INNER JOIN keyword selects records that have matching values in both tables.

- A. Right join
- B. Left join
- C. Full join
- D. **Inner join**

8. Power BI is a product of

- A. Oracle
- B. Facebook
- C. **Microsoft**
- D. SAP

9. What are the components of a dashboard?

- A. Horizontal
- B. Vertical
- C. Image Extract
- D. **All of the above**

10. How many maximum tables can you join in Tableau?

- A. 2
- B. 8
- C. 16
- D. **32**

11. For creating variable size bins we use _____

- A. Sets
- B. Groups
- C. **Calculated fields**
- D. Table

12. For differentiating two dimensions we use

- A. **Sets**
- B. Measures

- C. Fields
- D. Table

13. Geo dimension required in which type of graph

- A. Heat
- B. Scatter plot
- C. **Maps**
- D. Text chart

14. Geo dimension required in which type of graph

- A. Symbol maps
- B. Scatter plot
- C. Maps
- D. **Both A and C**

15. 2 to 4 measures s required in which type of graph

- A. Heat map
- B. Scatter plot
- C. Maps
- D. Text chart

Answers for Self Assessment

1 A	2 D	3 B	4 A	5 B	6 C	7 D	8 C
9 D	10 D	11 C	12 A	13 C	14 D	15 B	

Review Questions

- What are the map types in Tableau?
- Which is the easiest way to create a map on Tableau?
- What are the options for maps in Tableau?
- How to define geographical role in Tableau maps?
- What are advantages of Tableau maps?



Further Readings

"Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few

"Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"



Web Links

<https://www.tableau.com/>

<https://intellipaat.com/blog/what-is-tableau/>

Unit 08: Tableau Calculations & Filters

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- 8.2 Types of Tableau Filters
- 8.3 Data Source Filter
- 8.4 Context Filter
- 8.5 Dimension Filter
- 8.6 Measure Filter
- 8.7 User Filter
- 8.8 How to Implement Filters in Tableau?

Summary

Keywords

Self-Assessment

Answers for Self Assessment

Review Question

Further Readings

Objectives

After studying this unit, you will be able to:

- understand concept of tableau filters.
- apply filters on dataset in tableau.
- understand real time analysis.
- collaboration with data.

Introduction

Tableau is a software tool that is used for data visualization and helps with data analysis and business intelligence. Its technology allows you to perform complex computations, data blending, and dashboarding to create visualizations that deliver insights that can't be obtained from a spreadsheet. Tableau has tools for organizing and simplifying data like Tableau filters. Tableau filters help in minimizing the size of the data for efficiency purposes, cleaning up underlying data, removing irrelevant dimension members, and setting measure or date ranges for what you want to analyze. Tableau can assist anyone in seeing and comprehending their data. It uses Tableau Filters to make the data more readable and organized. You can connect to any database, create visualizations by dragging and dropping, and share them with a single click. The main objective of Tableau is to help people visualize and understand their data.

Tableau's self-service analytics platform enables anyone to work with data, regardless of their skill level. It was aimed to help users create visuals and graphics without requiring the assistance of a programmer or any prior programming knowledge. It is a highly scalable and easily deployable platform.

Filtering is the process of removing certain information from the available data by putting different filters. Tableau is the most widely used data visualization tool with plenty of features to simplify the process. Tableau provides both basic filters to deal with simple scenarios and advanced context-based filters for performing complex calculations. The three types of basic filters available in Tableau are: Filter Dates – This filter is applied on the date fields to remove specific date entries that are not required. Filter Measures – This filter is applied to the measure fields to remove specific measures based on the requirements. Filter Dimensions – This filter is applied on the dimension fields for removing certain measures that are not required for the calculation

In Tableau, there are three types of basic filters as follows:

- Filters Dimensions: Filter dimensions are the filters applied to the dimension fields.
- Filters Measures: Filter measures are the filters applied to the measure fields.
- Filter Dates: Filter dates are the filters applied on the date fields.

8.1 What are Tableau Filters?

Tableau lets you filter individual views or entire data sources based on dimensions, measures, or sets. In databases, filtering is a useful way to see only the data you want to see. When the data is visualized in a readable, actionable format, Tableau filters are required to highlight any underlying insights that can be derived from it.

[Tableau filters](#) are based on a condition that can be used to limit the number of records in the database. Tableau filters support both simple cases based on field values and advanced calculations or context-based filters. The Tableau filter you choose, or a combination of Tableau filters, is largely determined by what you want to limit your data set to.

8.2 Types of Tableau Filters

Tableau filters can be used to organize and visualize data based on predefined criteria in several ways. Tableau has a total of six different types of filters:

- Extract Filter
- Data Source Filter
- Context Filter
- Dimension Filter
- Measure Filter
- User Filter

Extract Filter

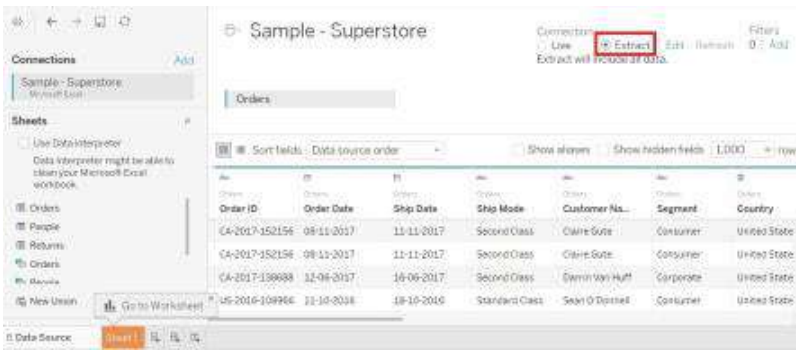
As understood by its name, the extract filters are used to extract data from the various sources, by saving a screengrab of the way it gets added on your file. Such methods can help in lowering the tableau queries to the data source. As soon as you are done extracting data into your dashboard, you can create the extract and execute Hide All Unused Files to clear the columns unused in the datasheet of your panel.

The Tableau filter that extracts a small subset of data from the original data source is the extract filter. If the user extracts data from the data source, this Tableau filter is used.

After connecting the text file to Tableau, you'll see two options in the top right corner of the data source tab: Live and Extract. A direct connection to a data source is referred to as a live connection. And the extract connection takes the data from the data source and saves it to the Tableau repository as a local copy.

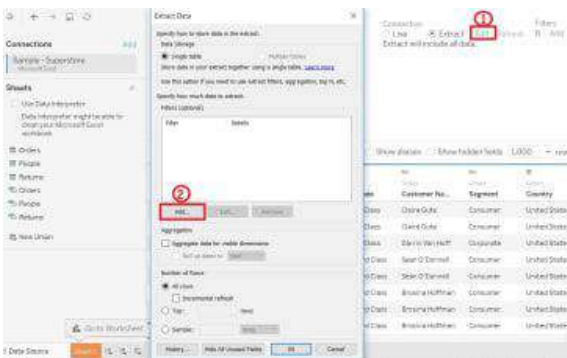
The following is a step-by-step procedure for creating a Tableau extract filter:

- **Step 1:** Connect the text file to Tableau.
- **Step 2:** Click on the Extract button as shown below:

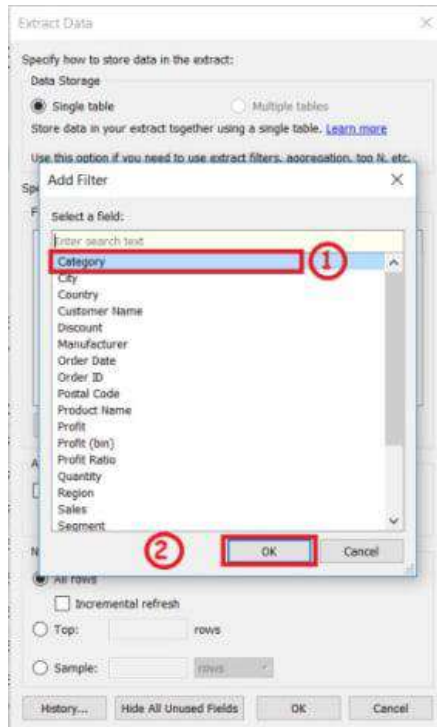


This creates a local copy in the Tableau repository.

- **Step 3:** Select Edit from the drop-down menu near the Extract button in the top right corner. The Extract Data window is opened. Select the Add option in the Window.



- **Step 4:** Select a Tableau filter condition from the Add Filter window. Any of the fields can be added as an Extract filter. Choose the category from the list and click OK.



After clicking on OK, a filtered window will appear which shows data that was extracted using the Extract Tableau filter.



You can also customize the list or use all values in the list.

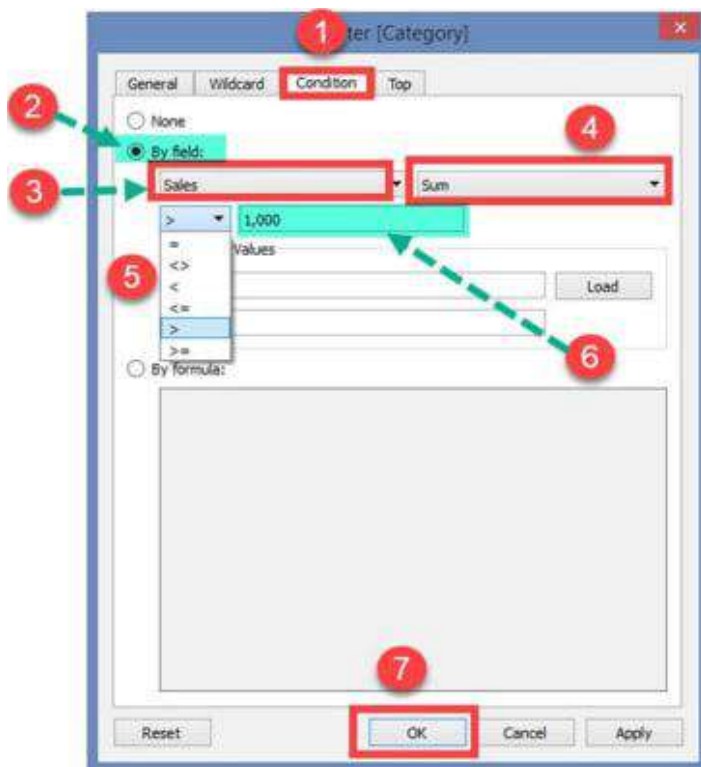
There are different options other than the general category from which you can extract data using Extract filter:

- The Wildcard option is used to filter fields using a Wildcard match. Users can type the character and the field will be filtered according to the match. The different types of matches are:

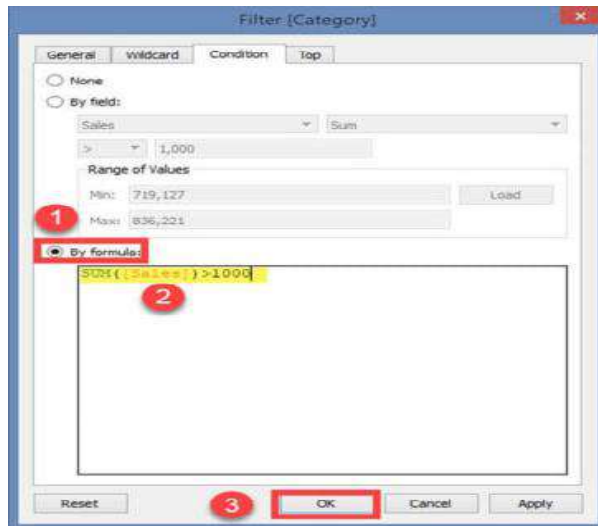
Contains	Select the members if the member name contains typed characters.
Starts with	Select the members if the member name starts with typed characters.
Ends with	Select the members if the member name ends with typed characters.
Exactly matches	Select the members if the member name exactly matches with typed characters.

You can customize your data using these matches and you will get the filtered data.

- The Tableau filter on condition option is used to filter the data set by giving several conditions.
 - You can filter data using multiple Byfield conditions following the steps below:
 - Step 1:** In the Filter, the window selects the Condition tab.
 - Step 2:** Click on the **Byfield** button.
 - Step 3:** Select the name of the field to be filtered.
 - Step 4:** Choose the aggregation type like Sum, average, and median from the drop-down list.
 - Step 5:** Select the operator from the drop-down list.
 - Step 6:** Filter the selected field by entering the value.
 - Step 7:** Click Ok.

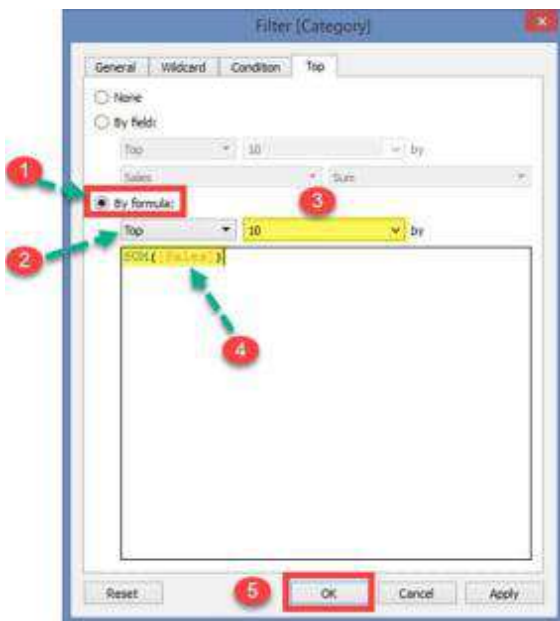
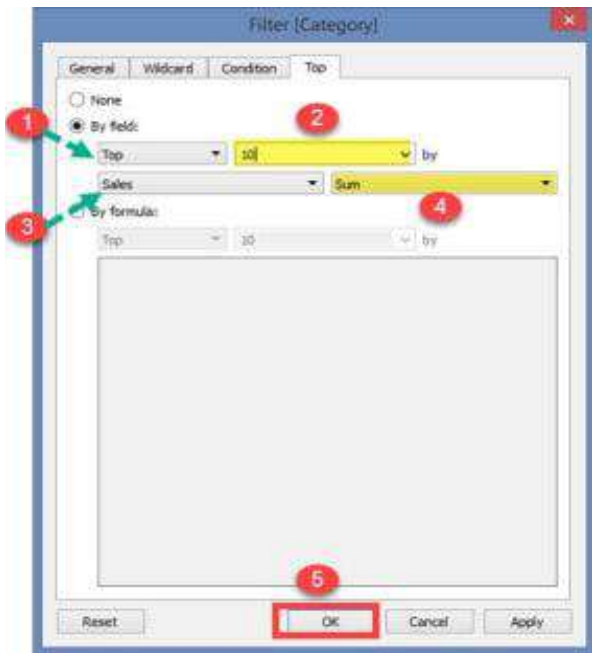


- You can also filter by condition using a formula. Follow the steps below to filter using conditions:
 - **Step 1:** Click on the By formula.
 - **Step 2:** Enter the formula in the box.
 - **Step 3:** Click on the Ok button.



You can also filter data using Top or Bottom filters, which are used to select the top or bottom n number of records. You can select filters Byfield or by the formula in this option too by following the steps from the previous option or referring to the steps from [here](#).



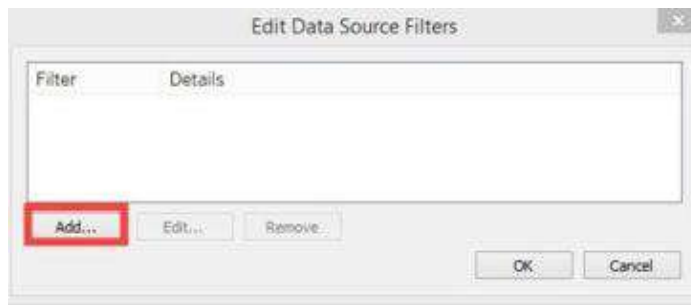


8.3 Data Source Filter

The Tableau Filter that applies the filter directly to the data source, allowing for quick uploads of data is the Data Source Filter. It can limit the number of records in the data set. Both live and extracted connections are supported by the Data Source Filter.

The process to select data filter is done by following the steps given:

- **Step 1:** On the data source tab, click the Add button in the top right corner.
- **Step 2:** The Edit Data Source Filters window appears. In the window, select the Add option.



- **Step 3:** Follow the remaining steps from the topic Extract Filters -> Step 3 after clicking the Add button.

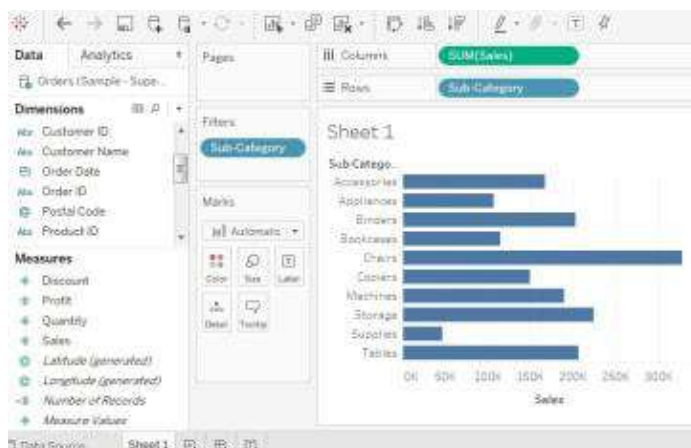
8.4 Context Filter

A context filter is a discrete filter on its own, creating datasets based on the original datasheet and the presets chosen for compiling the data. Since all the types of filters in tableau get applied to all rows in the datasheet, irrespective of any other filters, the context filter would ensure that it is first to get processed

Despite being constrained to view all data rows, it can be implemented to choose sheets as and when required to optimize its performance by minimizing the data efficiently. ntext Filter is a standalone Tableau filter that can create a new dataset from the original data set and compute the worksheet selections. Context Filters are used to boost the performance of data source views, filters, and queries. You could run a context filter before any other Tableau Filters, and then apply the remaining filters on top of the data returned after context filtering.

To make a Context Filter, go to the context menu of an existing categorical filter and select Add to Context. Once the view is created, the context is calculated. The context is then used to calculate all other filters. Consider using a data source like Sample-superstore to find the top 10 subcategories of products in the Furniture category. The following are the steps to take to create a context filter:

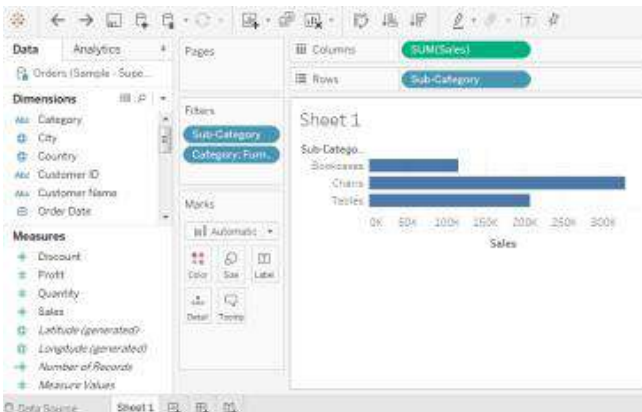
- **Step 1:** Drag the Sales field to the Columns shelf and the Sub-Category field to the Rows shelf.
- **Step 2:** From the Show Me tab, select the horizontal bar chart.
- **Step 3:** Drag the Sub-Category to the Filters shelf once more. The chart below is what you'll get.



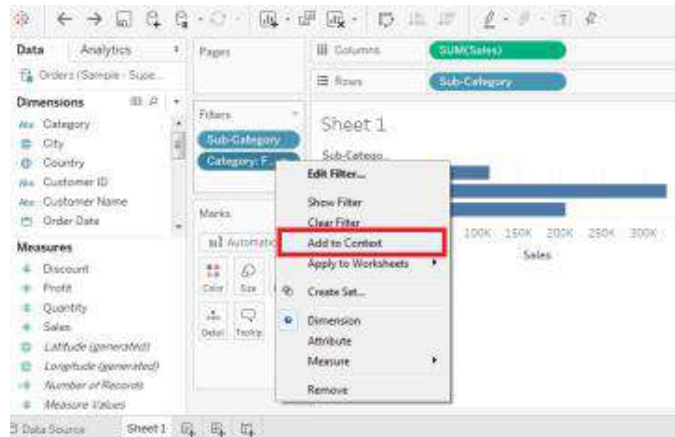
- **Step 4:** In the filter shelf, right-click on the Sub-Category field and select Edit Filter, then select the Top tab in the pop-up window.
- **Step 5:** Select the set fields set from the drop-down menu. Select Top 10 by Sales Sum from the next drop-down menu, as shown below:



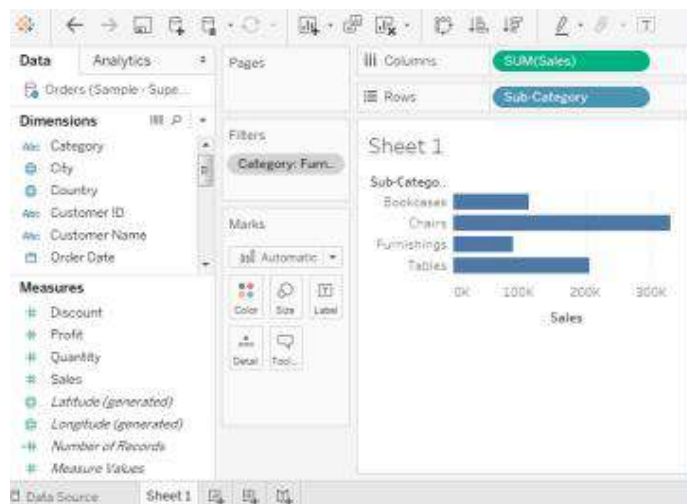
- **Step 6:** Select the Category field and drag it to the filter shelf. To edit the Category field, right-click on it and select **Furniture** from the drop-down menu. As a result, three product subcategories are displayed below.



- **Step 7:** Right-click on the **Category: Furniture** filter and select Add to Context to add the context filter.



- **Step 8:** All of the preceding steps combine to produce a final result that displays a subcategory of products from the Furniture category.



Context filter is created because:

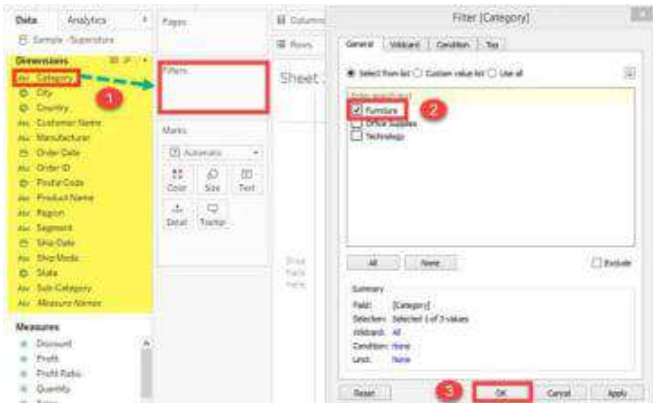
- **Improve Performance:** Queries will take a long time to run if you want to use a lot of filters or if your data source is large. In this case, you can improve performance by using one or more context filters.
- **Create a Dependent Numerical or Top N Filter:** You can arrange a numerical or top N filter after setting a context filter to include only the data of interest.

8.5 Dimension Filter

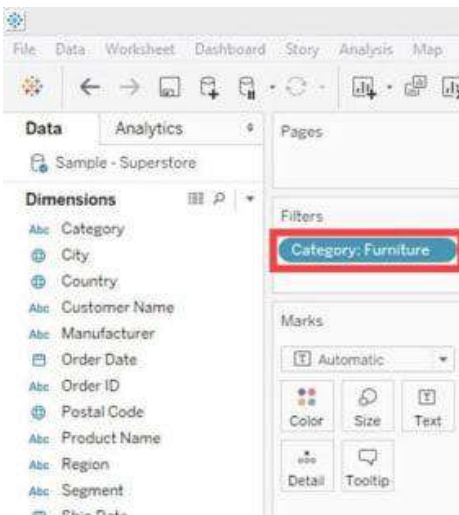
In Tableau, dimensions are independent fields, typically any field that contains categorical or qualitative data. Dimension Filters are those Tableau Filters that are applied to dimensional data. It's a non-aggregated filter that allows you to add a dimension, group, sets, and bins. The top or bottom conditions, wildcard match, and formula can all be used to apply a Dimension Filter. This Tableau filter can be used to include or exclude members from a dimension from the list. The following is the procedure for adding a dimension as a filter:

- **Step 1:** Choose a dimension from the drop-down menu.

- **Step 2:** The Tableau Filter Window appears. Choose a member from the drop-down menu.
- **Step 3:** Click on the Ok button.



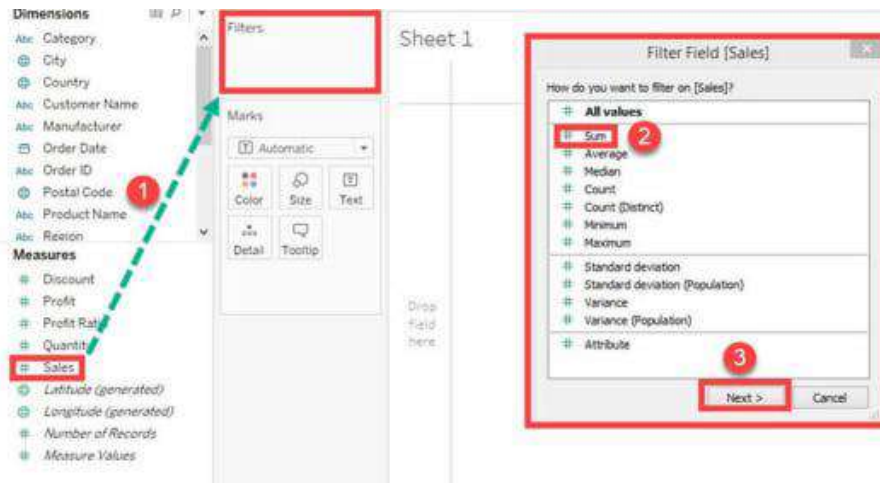
The procedure above filters the data set to only show records for the category Furniture.



8.6 Measure Filter

The Tableau Filter that can be used to filter data based on the values in a measure is called the Measure Filter. Fields containing quantitative data are commonly referred to as measures. The data can be modified using the aggregated measure values in a Measure Filter. A Measure Filter can be applied by following the procedure:

- **Step 1:** You can gain access to Worksheet
 - Choose a measure from the Measures tab. Drag the value into the Tableau Filter field.
 - The Measures tab allows you to select a metric. In the Tableau Filter field, drag the value.
 - Select Next.



- It brings up a window where you must choose a value range. The following are the other types of options available in the window.

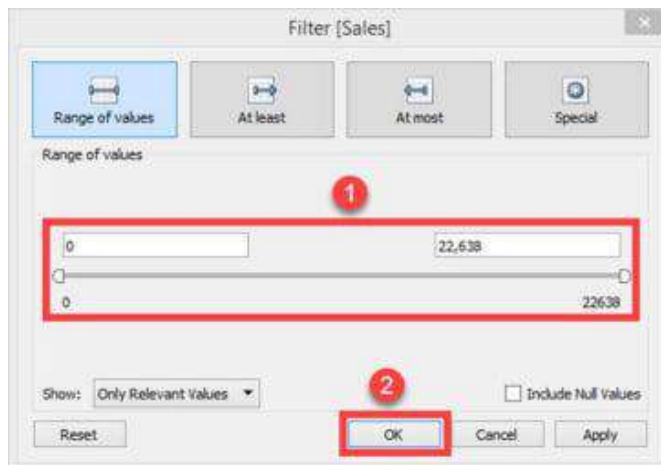
Range of values The minimum and maximum range of measure values can be given and filtered.

At least A minimum value of a measure is given to filter the data.

At most A maximum value of a measure is given to filter the data.

Special An option to select null or non-null values and filter the data.

- **Step 1:** Choose a range of values. The upper and lower limits for the range of values can be changed.
- **Step 2:** Click on the Ok button.



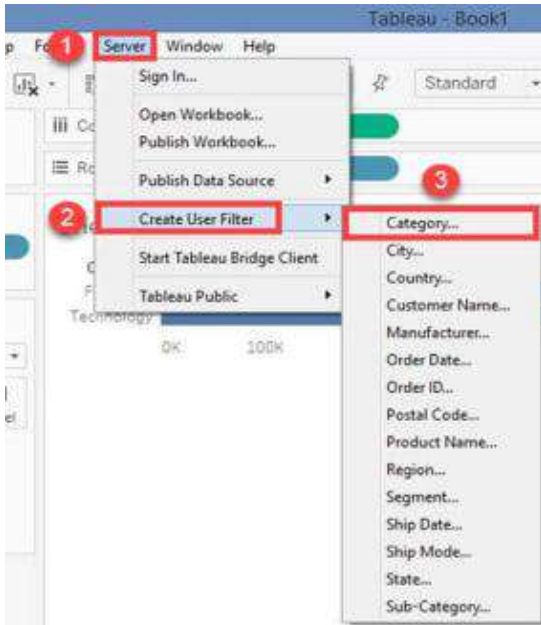
8.7 User Filter

The Tableau filter that protects the row-level data in a dataset is the User Filter. When the workbook is published on a server, it can be used. For different users, different filtering conditions

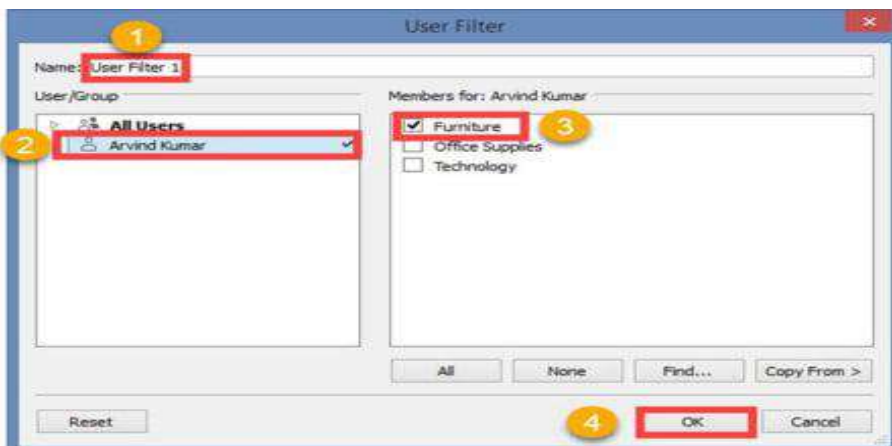
can be used. It's the process of limiting what data a user can see depending on who's looking at the dashboard.

To apply the User Filter follow the steps:

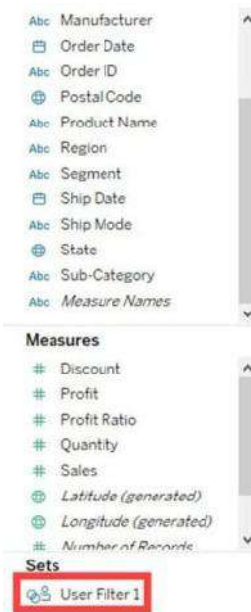
- **Step 1:** In the Menu bar, select Server from the drop-down menu. Select the Create User Filter option by moving the cursor over it. To create a user filter, select the field.



- **Step 2:** The Tableau Server Sign-in window appears. In the window, choose the Tableau Online option.
- **Step 3:** A Tableau Online Sign-in Window appears. Fill in your email address and password. Select the Sign In option.
- **Step 4:** It brings up a window labeled 'User Filter.' Add a User Filter by following the steps below.
 - Give your user filter a name.
 - Choose a user from the list of users.
 - Check in the members who are required to appear for the selected member.
- Choose Ok.



It establishes a Tableau user filter. As shown below, you can find the user filter in the sets pane.



The user sees only the filtered data when the workbook is published on the server. To secure data, multiple users can have their User Filters.

8.8 How to Implement Filters in Tableau?

1. Keep or exclude data points by Selecting in your view

You can filter individual data points (marks), or a selection of data points from your view. For example, if you have a scatter plot with outliers, you can exclude them from the view so you can better focus on the rest of the data.

To filter marks from the view, select a single mark (data point) or click and drag in the view to select several marks. On the tooltip that appears, you can:

Select Keep Only to keep only the selected marks in the view.

Select Exclude to remove the selected marks from the view.

♣ These filtering options are not available if a Wildcard Match filter is already specified for the same field.

2. Filter data using headers

You can also select headers to filter them from your view. To filter entire rows or columns of data from your view, select the header in the view. On the tooltip that appears, select to Exclude or Keep Only the selected data.

When you select a table header that is part of a hierarchy, all of the next level headers are also selected.

3. Filter by dragging a field directly onto the Filters shelf

Another way to create a filter is to drag a field directly from the Data pane to the Filters shelf.

In Tableau Desktop, when you add a field to the Filters shelf, the Filter dialog box opens so you can define the filter. The Filter dialog box differs depending on whether you are filtering categorical data (dimensions), quantitative data (measures), or date fields.

4. Quick Filters/Filter Cards

You can control the appearance and interaction of your filter card in the view by selecting a filter card mode. To select a filter card mode, in the view, click the drop-down menu on the filter card and then select a mode from the list.

Summary

- Filtering is the way of expelling certain esteems or scope of qualities from an outcome set.
- The filtering capability in a BI tool can serve a variety of purposes including minimizing the size of the data for efficiency purposes, cleaning up underlying data, removing irrelevant dimension members, and setting measure or date ranges for what you want to analyze.
- Data can also be organized and simplified before actual drill downs and aggregation functions through these filters.
- Tableau treats the date field in three different ways while applying the date field. It can apply filter by taking a relative date as compared to today, an absolute date, or range of dates.

Keywords

- Filtering is the process of removing certain values or range of values from a result set. Tableau filtering feature allows both simple scenarios using field values as well as advanced calculation or context-based filters.
- Filter Dimensions are the filters applied on the dimension fields.
- Filter Measures are the filters applied on the measure fields.
- Filter Dates are the filters applied on the date fields.

Self-Assessment

1. Default aggregation used for tree map_____

- A. Avg
- B. Count
- C. Sum
- D. Countd

2. The best feature Tableau are except_____ -

- A. Collaboration of data
- B. Data Blending
- C. Real time analysis

- D. Data is more small and fit
-
3. How do you find the field is discrete in Tableau ?
- A. Green color
 - B. # symbol
 - C. Blue color
 - D. None
-
4. Where can we apply global filters?
- A. Dashboards
 - B. Stories
 - C. Sheets
 - D. All of the above
-
5. Which of the following is not a Trend Line model ?
- A. Linear Trend Line
 - B. Binomial Trend Line
 - C. Exponential Trend Line
 - D. Logarithmic Trend Line
-
6. Where can we apply global filters?
- A. Dashboards
 - B. Stories
 - C. Sheets
 - D. All of the above
-
7. Tableau File Extension is _____
- A. twbx
 - B. twby
 - C. twbw
 - D. twbz
-
8. What type of join is used in blending?
- A. Left join
 - B. Full join
 - C. Right join
 - D. Inner join
-
9. Which is type of filter in tableau

- A. Context Filter
- B. Extract Filter
- C. Data Source Filter
- D. All of the above

10. _____ in Tableau are used to extract a small subset of data from the original data source

- A. Context Filter
- B. Extract Filter
- C. Data Source Filter
- D. All of the above

11. _____ allow the direct application to source data.

- A. Context Filter
- B. Extract Filter
- C. Data Source Filter
- D. All of the above

12. _____ in Tableau are non-aggregated filters.

- A. Context Filter
- B. Extract Filter
- C. Dimension Filters
- D. All of the above

13. These are Aggregated filters and are always applied after non-aggregated filters

- A. Context Filter
- B. Measure Filters
- C. Dimension Filters
- D. All of the above

14. The _____ can be applied across multiple worksheets by using the same source data within a workbook

- A. Context Filter
- B. Global filters
- C. Dimension Filters
- D. All of the above

15. Filter types in Tableau are quickly accessible by using the right-click option

- A. Context Filter
- B. Quick Filters
- C. Dimension Filters
- D. All of the above

Answers for Self Assessment

1 C	2 D	3 C	4 D	5 B	6 D	7 A	8 A
9 D	10 B	11 C	12 C	13 B	14 B	15 B	

Review Question

What are filters and its types in Tableau?

How many types of filters are there in Tableau?

What is the difference between context filter and regular filter Tableau?

What is the difference between a normal filter and a quick filter in Tableau?

What is data source filters in Tableau?

What is the difference between data source filter and extract filter in Tableau?



Further Readings

"Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few

"Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"



Web Links

<https://www.tableau.com/>

<https://intellipaat.com/blog/what-is-tableau/>

Unit 09: Managing, Organizing and Enhancing Data in Tableau

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Objectives

After studying this unit, you will be able to:

- Understand data visualization
- Analyze tools of data visualization
- Analyze data using tableau

Introduction

In our increasingly data-driven world, it's more important than ever to have accessible ways to view and understand data. After all, the demand for data skills in employees is steadily increasing each year. Employees and business owners at every level need to have an understanding of data and of its impact.

That's where data visualization comes in handy. With the goal of making data more accessible and understandable, data visualization in the form of dashboards is the go-to tool for many businesses to analyze and share information.

9.1 Data Visualization

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data. Additionally, it provides an excellent way for employees or business owners to present data to non-technical audiences without confusion.

Data visualization is the practice of translating information into a visual context, such as a map or graph, to make data easier for the human brain to understand and pull insights from. The main goal of data visualization is to make it easier to identify patterns, trends and outliers in large data sets. The term is often used interchangeably with others, including information graphics, information visualization and statistical graphics.

Data visualization is one of the steps of the data science process, which states that after data has been collected, processed and modeled, it must be visualized for conclusions to be made. Data visualization is also an element of the broader data presentation architecture (DPA) discipline, which aims to identify, locate, manipulate, format and deliver data in the most efficient way possible.

Data visualization is important for almost every career. It can be used by teachers to display student test results, by computer scientists exploring advancements in artificial intelligence (AI) or by executives looking to share information with stakeholders. It also plays an important role in big data projects. As businesses accumulated massive collections of data during the early years of the big data trend, they needed a way to get an overview of their data quickly and easily. Visualization tools were a natural fit.

Visualization is central to advanced analytics for similar reasons. When a data scientist is writing advanced predictive analytics or machine learning (ML) algorithms, it becomes important to visualize the outputs to monitor results and ensure that models are performing as intended. This is because visualizations of complex algorithms are generally easier to interpret than numerical outputs.

Why is data visualization important?

Data visualization provides a quick and effective way to communicate information in a universal manner using visual information. The practice can also help businesses identify which factors affect customer behavior; pinpoint areas that need to be improved or need more attention; make data more memorable for stakeholders; understand when and where to place specific products; and predict sales volumes.

Other benefits of data visualization include the following:

- ✓ the ability to absorb information quickly, improve insights and make faster decisions;
- ✓ an increased understanding of the next steps that must be taken to improve the organization;
- ✓ an improved ability to maintain the audience's interest with information they can understand;
- ✓ an easy distribution of information that increases the opportunity to share insights with everyone involved;
- ✓ eliminate the need for data scientists since data is more accessible and understandable; and
- ✓ an increased ability to act on findings quickly and, therefore, achieve success with greater speed and less mistakes.

9.2 Keys Factors of Data Visualization

Data visualization is a crucial part of data analytics that helps you visualize your data and uncover significant trends and patterns that would otherwise have been lost. Effective data visualization depends on your software as nobody has the time to code the visualizations themselves with loads of data involved in the process.

Several data visualization tools, such as Oracle Visual Builder Cloud Service (VBCS), Tableau, Power BI, etc., have comparable features and capabilities, making selecting the right tool for your

needs even more challenging. So, what are the factors to be considered in choosing the right data visualization solution for your use case?

Let us talk deep on it. Here are the main specifics.

1. Dashboard Design

It is important to check on the right balance between the simplicity and complexity of a dashboard when it comes to enterprise reporting. While simpler designs may be easy to use, they may not be able to pack in much helpful information. However, complex dashboards could clutter your screen and make it difficult to understand the data right in front of your eyes. If you're not an expert and don't know much about dashboard design, know that the dashboard must have balanced colors naturally appealing to the eye. It is intuitive to have colorful highlights between appropriate white spaces. Too much white space could over-simplify the design, while too much color could affect usability. Modern tools like Oracle Visual Builder Cloud Service strike a balance between simplicity and complexity and avoid highly complex designs even if they could deliver much more information in a compact setting.

2. Use Case

Different use cases demand different types of dashboards. For example, a simple use-case like the real-time analytics of a store will be very different from a more complex use-case like viewing stock market reports. It's a great way to personalize your data visualization, and several modern Analytics & BI Applications like Oracle Visual Builder Cloud Service offer this feature. Not only is the solution tailored to your needs, but it also provides an enhanced user experience.

3. Data Connectivity

Data is key to your visualization; poor data integration or missing data can have a considerable impact. Business data is the primary input for a data visualization tool, so ensuring that the right data sources are connected to the tool is of paramount importance. Data is often pulled from multiple dynamic sources, so it needs to be up-to-date for your visualizations to stay relevant. The ability to connect and integrate with other data sources is a critical factor in enabling effective data visualization.

4. Target Audience

Data visualizations often convey information to users who don't fully understand the application or the process. They could include line-of-business users, external users, and other stakeholders. They only need access to the data relevant to their role in the organization. The ability of data visualization tools like Oracle VBCS to adapt according to the audience plays a key role. So, ensure the tool is specific to the target audience and provides role-based user access.

5. Functionality

Keeping the data visualization tool's functionality aligned with your organization's needs is crucial. Business leaders often consider going for the software packed with the most number of features or with greater functionality, when in reality, they only require a fraction of these capabilities. Not only does it increase complexity, but it also drives up costs and impacts your ability to use it for its true purpose. Ultimately, you're left with too many features you don't need and will never use. Focus on acquiring the functionality your organization truly needs instead of fancy features, and you can keep adding more functionality as your business grows. Oracle VBCS allows you to add features based on your evolving needs.

9.3 Data Visualization Tools and type of data

Data visualization tools are cloud-based applications that help you to represent raw data in easy to understand graphical formats. You can use these programs to produce customizable bar charts, pie charts, column charts, and more.

Following is a handpicked list of Top Data Visualization Tool with their popular features and website links. The list contains both open-source(free) and commercial(paid) software.

Followings are some popular data visualization tools

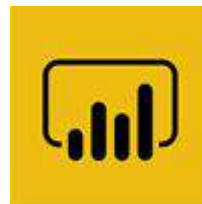
1) Zoho Analytics

Zoho Analytics is a robust and versatile data visualization tool. It allows users to create insightful reports and dashboards, and visually analyze any data in minutes. It features an AI powered assistant that enables users to ask questions and get intelligent answers in the form of meaningful reports.



2) Power BI

Power BI is a Business Intelligence and Data Visualization tool which helps you to convert data from various data sources into interactive dashboards and reports. It provides multiple software connectors and services.



3) Whatagraph

Whatagraph is a data visualization tool that enables you to monitor and compare the performance of multiple campaigns. This application allows you to transfer custom data from Google sheet and API.



4) Tableau

Tableau is a robust tool for visualizing data in a better way. You can connect any database to create understandable visuals. It is one of the best visualization tools that enables you to share visualization with other people.



5) Qlik

Qlik is a data visualization software which is used for converting raw data into knowledge. This software acts like a human brain which works on “association” and can go into any direction to search the answers.



6) Adaptive Insights

Adaptive Insights is a data visualization tool built to boost your business. It is one of the best data visualisation tools that helps you to plan, budget, as well as forecast to make better decisions.



7) Dundas BI

Dundas BI is an enterprise-ready Business Intelligence platform. You can deploy it as the central data portal for your company or integrate into any website.



8) Domo

Domo is a cloud platform that helps you to conduct analysis and create interactive visualization. It enables you to examine important data using graphs and pie charts. This app helps you to simplify administration data.



9) Cluvio

Cluvio is a platform that enables you to run SQL queries for your database. It allows you to visualize the result in a better and understandable way.



10) Datawrapper

Datawrapper is an open-source tool that enables you to create interactive charts. You can load CSV (Comma-separated Values) data files into this app and embed maps onto your website.

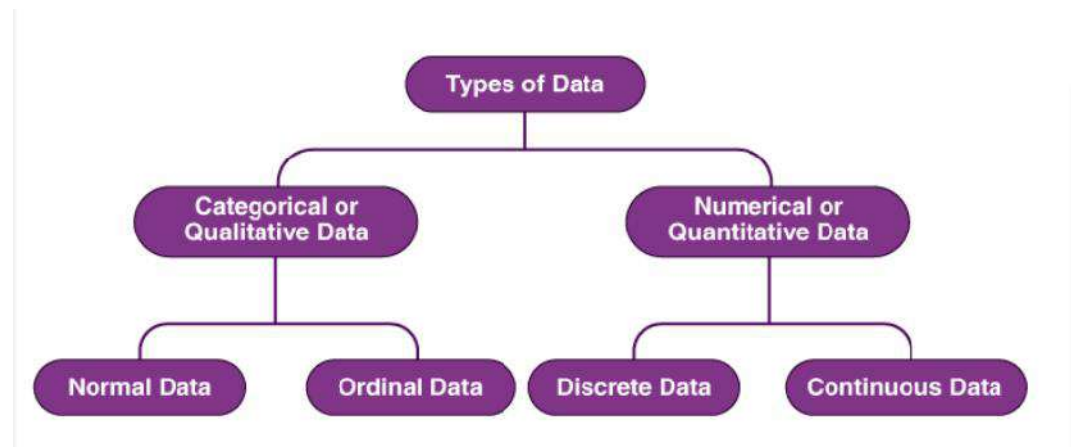


Types of data

The data is classified into majorly four categories:

1. Nominal data
2. Ordinal data
3. Discrete data
4. Continuous data

Further, we can classify these data as follows:



Qualitative or Categorical Data

Qualitative data, also known as the categorical data, describes the data that fits into the categories. Qualitative data are not numerical. The categorical information involves categorical variables that describe the features such as a person's gender, home town etc. Categorical measures are defined in terms of natural language specifications, but not in terms of numbers.

Sometimes categorical data can hold numerical values (quantitative value), but those values do not have a mathematical sense. Examples of the categorical data are birthdate, favourite sport, school postcode. Here, the birthdate and school postcode hold the quantitative value, but it does not give numerical meaning.

Nominal Data

Nominal data is one of the types of qualitative information which helps to label the variables without providing the numerical value. Nominal data is also called the nominal scale. It cannot be

ordered and measured. But sometimes, the data can be qualitative and quantitative. Examples of nominal data are letters, symbols, words, gender etc.

The nominal data are examined using the grouping method. In this method, the data are grouped into categories, and then the frequency or the percentage of the data can be calculated. These data are visually represented using the pie charts.

Ordinal Data

Ordinal data/variable is a type of data that follows a natural order. The significant feature of the nominal data is that the difference between the data values is not determined. This variable is mostly found in surveys, finance, economics, questionnaires, and so on.

The ordinal data is commonly represented using a bar chart. These data are investigated and interpreted through many visualisation tools. The information may be expressed using tables in which each row in the table shows a distinct category.

Quantitative or Numerical Data

Quantitative data is also known as numerical data which represents the numerical value (i.e., how much, how often, how many). Numerical data gives information about the quantities of a specific thing. Some examples of numerical data are height, length, size, weight, and so on. Quantitative data can be classified into two different types based on the data sets. The two different classifications of numerical data are discrete data and continuous data.

Discrete Data

Discrete data can take only discrete values. Discrete information contains only a finite number of possible values. Those values cannot be subdivided meaningfully. Here, things can be counted in whole numbers.

Example: Number of students in the class

Continuous Data

Continuous data is data that can be calculated. It has an infinite number of probable values that can be selected within a given specific range.

Example: Temperature range

Summary

- Data visualization is the representation of data through use of common graphics, such as charts, plots, infographics, and even animations. These visual displays of information communicate complex data relationships and data-driven insights in a way that is easy to understand.
- Data visualizations are used to discover unknown facts and trends. You can see visualizations in the form of line charts to display change over time. Bar and column charts are useful for observing relationships and making comparisons. A pie chart is a great way to show parts of a whole. And maps are the best way to share geographical data visually.

- To craft an effective data visualization, you need to start with clean data that is well-sourced and complete. After the data is ready to visualize, you need to pick the right chart.

Keywords

Data: In computing, data is information that has been translated into a form that is efficient for movement or processing.

Data Visualization: Data and information visualization is an interdisciplinary field that deals with the graphic representation of data and information.

Charts: A data chart is a type of diagram or graph, that organizes and represents a set of numerical or qualitative data. Maps that are adorned with extra information (map surround) for a specific purpose are often known as charts, such as a nautical chart or aeronautical chart, typically spread over several map sheets.

Data analysis: Data Analysis. Data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data.

Self-Assessment

1. What is true about Data Visualization?

- A. Data Visualization is used to communicate information clearly and efficiently to users by the usage of information graphics such as tables and charts.
- B. Data Visualization helps users in analyzing a large amount of data in a simpler way.
- C. Data Visualization makes complex data more accessible, understandable, and usable.
- D. All of the above

2. Which are pros of data visualization?

- A. It can be accessed quickly by a wider audience.
- B. It can misrepresent information
- C. It can be distracting
- D. None Of the above

3. Data can be visualized using?

- A. graphs
- B. charts
- C. maps
- D. All of the above

4. Which are cons of data visualization?

- A. It conveys a lot of information in a small space.
- B. It makes your report more visually appealing.
- C. visual data is distorted or excessively used.
- D. None Of the above

5. Which of the following is not a data visualization tool?

- A. Tablue

- B. Cluvio
- C. Microsoft Word
- D. Domo

6. Data visualization is also an element of the broader _____.

- A. deliver presentation architecture
- B. data presentation architecture
- C. dataset presentation architecture
- D. data process architecture

7. Which of the intricate techniques is not used for data visualization?

- A. Bullet Graphs
- B. Bubble Clouds
- C. Fever Maps
- D. Heat Maps

8. Which method shows hierarchical data in a nested format?

- A. Treemaps
- B. Scatter plots
- C. Population pyramids
- D. Area charts

9. Which one of the following is most basic and commonly used techniques?

- A. Line charts
- B. Scatter plots
- C. Population pyramids
- D. Area charts

10. The best feature Tableau are except _____ -

- A. Collaboration of data
- B. Data Blending
- C. Real time analysis
- D. Data is more small and fit

11. Where can we apply global filters?

- A. Dashboards
- B. Stories
- C. Sheets
- D. All of the above

12. _____ is the representation of data through use of common graphics, such as charts, plots, infographics, and even animations.

- A. Data visualization
- B. Data
- C. Tablue
- D. None of above

13. Who is the parent company of Tableau?

- A. Salesforce
- B. Workday
- C. Microsoft
- D. Google

14. What are the file extensions in Tableau ?

- A. Tableau Packaged Workbook (.twbx)
- B. Tableau Data Source(.tds)
- C. Tableau Workbook (.twb)
- D. All of the above

15. Power BI is a product of _____

- A. Facebook
- B. Oracle
- C. Microsoft
- D. SAP

Answers for Self-Assessment

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. D | 2. A | 3. D | 4. C | 5. A |
| 6. B | 7. C | 8. A | 9. A | 10. D |
| 11. D | 12. A | 13. A | 14. D | 15. C |

Review Questions

1. What do you mean by data visualization?
2. Explain the need for data visualization tools in now's industry.
3. What is the difference between data and data visualization?
4. Explain Types of Data Visualizations Elements.
5. What do you mean by data visualization tools? Explain with an example.



Further Readings

1. Communication Data With Tableau, Ben Jones, O' Reilly Publications



Web Links

<https://www.tableau.com/>

<https://www.datacamp.com/tutorial/data-visualisation-tableau>

Unit 10: Making Comparisons and Basic Calculation

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- 10.1 Usage of Tableau software:
- 10.2 Why Tableau?
- 10.3 Features of Tableau:
- 10.4 Tableau Product Suite
- 10.5 Installation steps
- 10.6 Configure Tableau Server for a forward proxy

Summary

Keywords

Self-assessment questions

Review Question

Objectives

- After studying this unit, you will be able to:
- Understand concept of data visualization.
- install software for data visualization.
- Understand real time analysis.
- Collaboration with data.

Introduction

Tableau is an excellent data visualization and business intelligence tool used for reporting and analyzing vast volumes of data. It is an American company that started in 2003 – in June 2019, Salesforce acquired Tableau. It helps users create different charts, graphs, maps, dashboards, and stories for visualizing and analyzing data, to help in making business decisions. Tableau has a lot of unique, exciting features that make it one of the most popular tools in business intelligence (BI). Let's learn more about some of the essential Tableau Desktop features. Now that we know what is tableau exactly, let us understand some of its salient features.

Tableau is capable of connecting with a wide range of data sources. It can connect to files present in your system, such as Microsoft Excel, text files, JSON, PDF, etc. It can also work on data present on a database server, such as Microsoft SQL Server, MySQL, Oracle, Teradata, etc. There are other saved data sources that Tableau can connect with. It also can connect and fetch data from cloud sources, like AWS, Azure SQL Data Warehouse, and Google Cloud SQL.

Tableau Uses:

10.1 Usage of Tableau software:

The best features of Tableau software are

Data Blending

Real time analysis

Collaboration of data

The great thing about Tableau software is that it doesn't require any technical or any kind of programming skills to operate. The tool has garnered interest among the people from all sectors such as business, research.

Tableau is a powerful and fastest growing data visualization tool used in the Business Intelligence Industry. It helps in simplifying raw data in a very easily understandable format. Tableau helps create the data that can be understood by professionals at any level in an organization. It also allows non-technical users to create customized dashboards.

Data analysis is very fast with Tableau tool and the visualizations created are in the form of dashboards archers, different industries, etc.

Business Intelligence

Data Visualization

Data Blending

Data Collaboration

Query translation into visualization

To create no-code data queries

Real-time data analysis

To manage large size metadata

To import large size of data

10.2 Why Tableau?

Why use Tableau software when there are a whole lot of tools available to perform data visualization?

Tableau is greatly used because data can be analyzed very quickly with it. Also, visualizations are generated as dashboards and worksheets. Tableau allows one to create dashboards that provide actionable insights and drive the business forward. Tableau products always operate in virtualized environments when they are configured with the proper underlying operating system and hardware. Tableau is used by data scientists to explore data with limitless visual analytics.



10.3 Features of Tableau:

- Tableau Dashboard
- Collaboration and Sharing
- Live and In-memory Data

- [Data Sources in Tableau](#)
- Advanced Visualizations
- Mobile View
- Revision History
- Licensing Views
- Subscribe others
- ETL Refresh and many more make Tableau one of the most famous Data Visualization tools.

What is Data Visualization in Tableau?

Data Visualization is a pictorial representation of a dataset or information using maps, graphs, charts, and other visual elements. Data Visualization helps in easy understanding of the trend, insights, patterns, and other connections in a Dataset. Tableau is one of the most popular Data Visualization tools used by many enterprises and businesses to gain better insights into their data to offer the best customer experience.

How does Tableau work?

The major work of Tableau software is to connect and extract the data stored in various places. It can pull data from any platform. Tableau can extract data from any database, be it Excel, PDF, Oracle, or even Amazon Web Services.

Once Tableau is launched, ready data connectors are available which allow you to connect to any database.

The data extracted can be connected live to the Tableau data engine, Tableau Desktop. This is where a Data Analyst or a Data Engineer works with the data that was pulled up and develop visualization. The created dashboards are shared with users in the form of static files. The users receiving dashboards view the files using Tableau Reader.

The data extracted from Tableau Desktop can be published to Tableau Server, which is an enterprise platform where collaboration, distribution, governance, security model, and automation features are supported. Using Tableau Server, end users can access the files from all locations, be it a desktop or a mobile phone.

How Does Tableau Work How Does Tableau Work

Gartner Magic Quadrant for Business Intelligence and Analytics Platforms

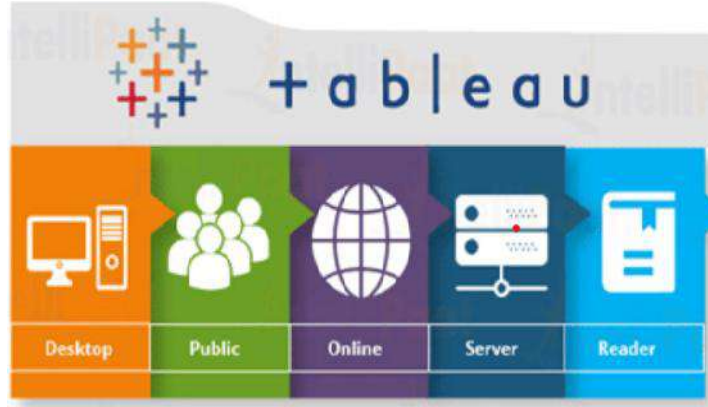
Following are the two ways in which Data Analytics of Tableau can be described:

Developer Tools: Tools used in development, like designing charts, dashboards, reports, and visualizations, come under this category. The major Tableau products in this category are Tableau Public and Tableau Desktop.

Sharing Tools: By the name, you would have understood what these tools do. Well, they are used for sharing reports, visualizations, and dashboards which are created using the developer tools.

The main products that fall in this category are Tableau Online, Tableau Reader, and Tableau Server.

10.4 Tableau Product Suite



What is Tableau Desktop?

This product allows one to code and modifies the reports. Starting from creating reports and charts to combining them to form a dashboard, all this work is done in Tableau Desktop.

Tableau Desktop is classified into the following according to connectivity and data sources:

Tableau Desktop Personal

The development features of the Tableau Desktop Personal version are close enough to that of the Tableau Desktop. In this particular version, the workbook is in private mode and the access is limited. That means, these workbooks can't be posted and are for personal use only. Therefore, they have to be divided either on Tableau Public or Offline.

Tableau Desktop Professional

This version is very much like Tableau Desktop, only that the work generated or created in Tableau Desktop is published on the Tableau Server. In this version, there would be full access to all sorts of data types. It is great for people who wish to publish their work on the Tableau Server.

What is Tableau Reader?

It is a tool that allows one to view visualizations and workbooks generated using Tableau Public or Tableau Desktop. This data can easily be filtered, yet modifications are limited. Since anyone getting the workbook can view it using Tableau Reader, there is no security.

What is Tableau Server?

This is mainly used to share visualizations and workbooks which get generated in the Tableau Desktop application throughout the organization. The work will become accessible once it is uploaded to the respective servers.

To increase sharing of dashboards in Tableau Server, you should publish your work beforehand in Tableau Desktop. Though, it's not completely mandatory for licensed users to have an installed Tableau Server. They just need the login credentials using which they can verify these reports.

Tableau Online

As the term 'online' suggests, Tableau Online is a sharing tool. It has a similar usage as Tableau Server, but the data is saved on servers that are provided in the cloud maintained by the Tableau group.

The data that can be published on Tableau Online has no storage limit. Tableau Online and Server, both need workbooks that are created by Tableau Desktop to broadcast the data. Data streamed from web applications, be it Salesforce or Google Analytics, are supported by both, Tableau Online and Tableau Server.

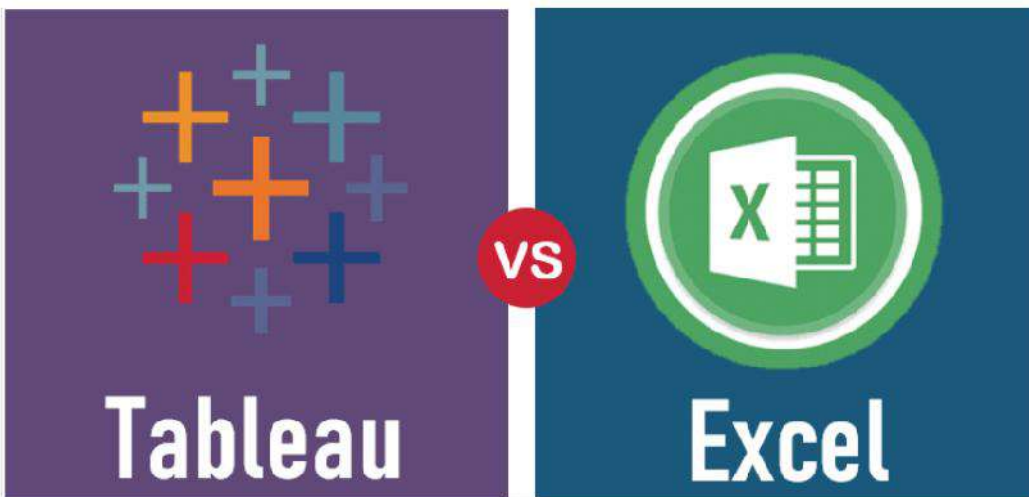
Tableau Public

Tableau Public is specially built for money-saving users. As the word 'public' suggests, the created workbooks can't be locally saved, rather it is sent to Tableau's public cloud which can be accessed by the general public. This is an economical version which is very good for people wanting to learn and share their data with people.

Tableau

vs

Excel



Excel and Tableau, are data analysis tools, but both of them have a unique approach to data exploration. Where Excel works with columns and rows in spreadsheets, Tableau explores the Excel data using its drag-and-drop feature. It formats the data in graphs and pictures that are easy to understand.

Tableau	MS Excel
Tableau is basically a data visualization tool which provides pictorial and graphical representations of data.	Excel is basically a spreadsheet for working with data in rows and columns. You need to first represent your data into a tabular format and then you can apply visualizations on top of it.
In Tableau, you can gain insights that you never thought possible. You can play with interactive	When it comes to Excel, you need to have a prior knowledge of the insight that you

visualizations, deploy data drilling tools, and explore various data that is available, and you don't need to have any specific knowledge of the insight you are looking for.	want and then work with various formulae in order to get there, along with that tabulation is also needed.
With Tableau, it is all about an easy and interactive approach.	In Excel, you need to have some programming in order to come up with real-time data visualization.

Advantages of Tableau

Fantastic Visualizations

You can now work with a lot of data that doesn't have any order to it and create a range of visualizations. Well, thanks to the in-built features of Tableau which help you create visualizations that surely stand out of the crowd. You also have the option of switching between different visualizations to bring about a greater context, ways of drilling down data, and exploring the data at a minute level.

In-depth Insights

Tableau can help enterprises futuristically to analyze data without any specific goals in mind. You can explore visualizations and have a look at the same data from different angles. You can frame 'what if' queries and work with data by hypothetically visualizing it in a different manner and dynamically adding components for comparison and analysis. When you are working with real-time data, then these capabilities are highlighted in a huge manner.

User-friendly Approach

This is the greatest strength of Tableau. It is built from the ground level for people who don't have any technical skills or coding experience. So, everything can be done with this tool by anybody without any prior set of skills. Since most of the features are in a drag-and-drop format, each visualization is so intuitive and self-depicting



.Working with Disparate Data Sources

Tableau has a powerful reason to be included by various organizations in today's data-driven world where data can come from any point and any disparate sources. Tableau has an edge over other Business Intelligence and Analytics tools as it lets you work by connecting to various Tableau data sources, data warehouses, and files that exist in the cloud, big data that exists in spreadsheets, and non-relational data, among other types of data. Tableau effortlessly blends all different types of data to help organizations come up with compelling visualizations.

Adding Datasets

Be it a database or an Excel workbook, with Tableau, one can easily add new datasets which get automatically blended with Tableau using common fields.

Switching Between Visualizations

You also have the option of switching between different visualizations to bring about a greater context, with ways of drilling down data and exploring it at a minute level.

Tableau is one of the top Business Intelligence and Data Visualization tools available today. It is being used by most of the Fortune Global 500 list of companies in order to derive valuable insights from their data.

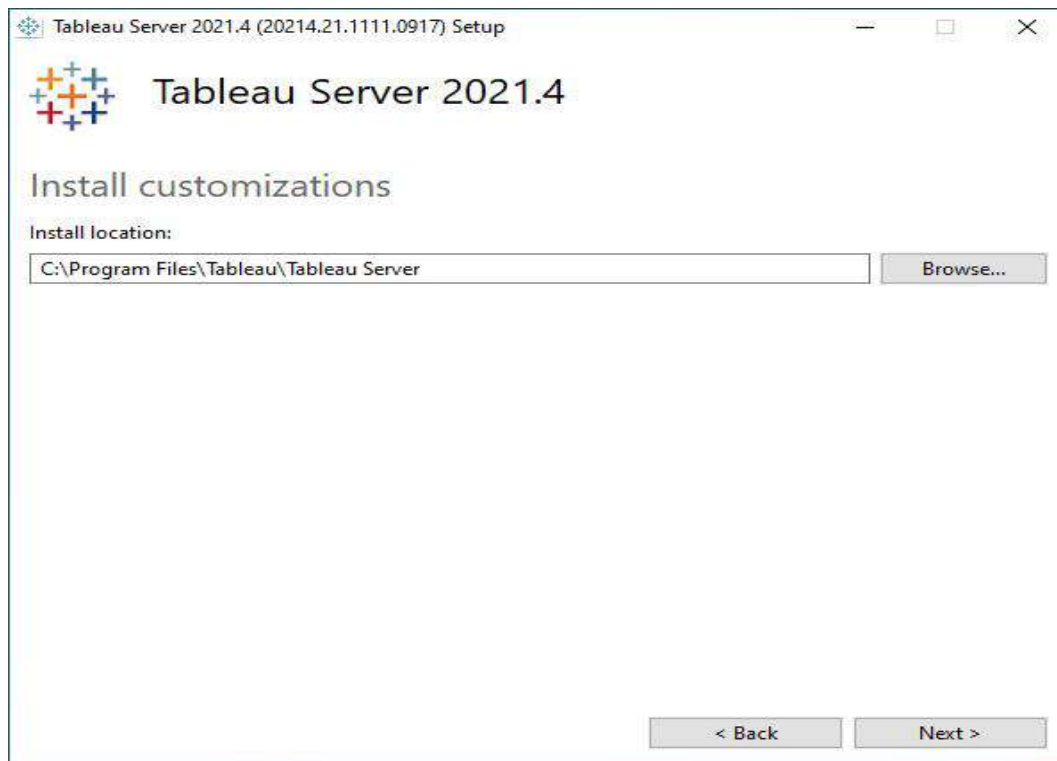
10.5 Installation steps

Running Setup

After you download the Tableau Server installation file, follow the instructions below to install the server.

Important: Do not install a beta version of Tableau Server in your production environment. You should also never restore a production Tableau Server installation using a backup of a beta version.

1. Sign in as a user with administrator access to the computer where you want to install Tableau Server and double-click the installation file.
2. Follow the on-screen instructions to complete Setup and install the application.

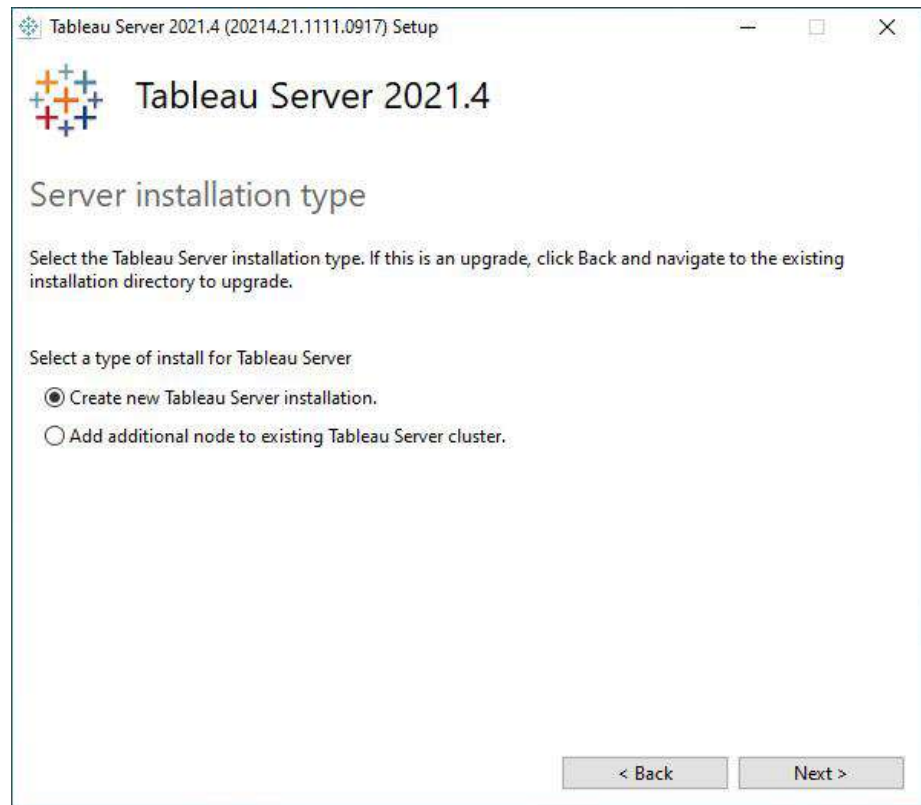


The default installation path is C:\Program Files\Tableau\Tableau Server\<version>. The Setup program displays the install path without the version, like this: C:\Program Files\Tableau\Tableau Server. You can choose a different location, including a different drive, either by browsing to or typing in a new path. Be aware that if you browse to a location, the Setup program appends \Tableau Server to the end of the path. You can remove this if it is not the location you want.

If you are upgrading from Tableau Server version 2018.1 or earlier and Tableau was installed to a non-default location, you need to specify the location of your existing version. Upgrade steps vary depending on your target version and install location. See [Upgrade Tableau Server Overview](#) for information on how to choose your upgrade steps.

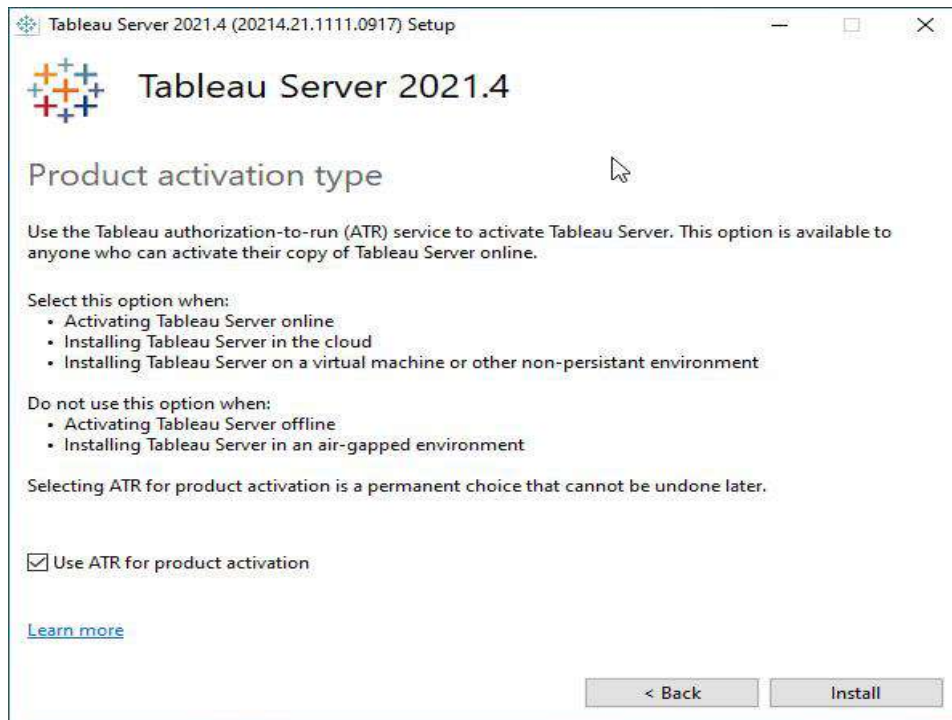
Note: If you are prompted by Windows Defender Firewall, click **Allow access**. You may need to do this multiple times for the installation to complete.

- 3. Click Next.



On the **Server installation type** page, you can specify whether you are installing the first node of a Server installation, or additional nodes in a multi-node installation. You do not need to change this from the default (Create new Tableau Server installation.) unless you are installing a multi-node Tableau Server. If you are installing a multi-node Tableau Server, see [Install and Configure Additional Nodes](#).

- 4. Click Next.



On the **Product activation type** page, select whether you want to use the Tableau authorization-to-run (ATR) service to activate Tableau Server (the default), and then click **Install**. For more information about the Tableau authorization-to-run (ATR) service, see [Activate Tableau Server using the authorization-to-run \(ATR\) service](#) (Link opens in a new window).

5. After the installation completes, click **Finish**. Setup will then open the TSM configuration web page on the computer where you are installing Tableau Server.

If you need to support characters that are not the Latin-1 set, install the Windows Language Packs via **Control Panel > Regional and Language Options**. The language packs will need to be installed on the initial server as well as any additional nodes.

10.6 Configure Tableau Server for a forward proxy

If your organization uses a forward proxy solution to access the internet, then configure Tableau Server to use the proxy server. Tableau Server must access the internet for map data and for default licensing functionality.

We recommend configuring Tableau Server for a forward proxy solution at this point of the installation process. See [Configuring Tableau Server on Windows to work with a forward proxy](#)

Activate and Register Tableau Server

Tableau Server requires at least one product key that both activates the server and specifies the number of license levels you can assign to users. You can access your product keys from the Customer Portal.

If you need to activate Tableau Server on a computer that is offline, see [Activate Tableau Server Offline - Adding a License](#). If you need to activate additional product keys to add capacity to an existing Tableau Server installation, see [Add Capacity to Tableau Server](#).

Prerequisite

Prerequisite

Before proceeding with the procedures in this topic, complete the following prerequisites as outlined in Install and Configure Tableau Server:

Install TSM

TSM uses port 8850. If you are running a local firewall, open port 8850.

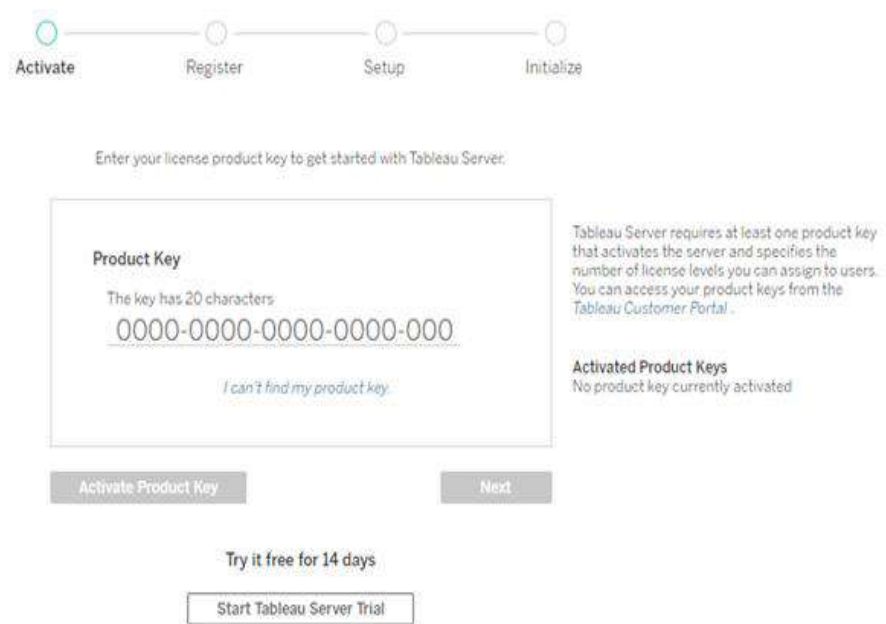
Configure Product Key Operations with Forward Proxy

1. If the computer where you are installing Tableau Server has been configured to connect to the internet through a forward proxy, follow the procedure in the topic, [Configure Product Key Operations with Forward Proxy](#), before continuing.
2. [Sign in to Tableau Services Manager Web UI](#).

The account you use must have administrative privileges on the computer where TSM is installed.

3. On the **Activate** page, Enter or paste your product key and click **Activate Product Key**.

After your product key is activated, it appears under **Activated Product Keys**.



4. To activate another product key, type over they key you just entered to add the new product key, and then click **Activate Product Key**. After your product key is activated, it appears under **Activated Product Keys**. Continue adding product keys in this manner until you're done.
5. When you're finished activating product keys, click **Next**.

Note: If the product keys you have activated don't have the necessary capacity, such as not enough cores or only a Viewer role product key, Tableau Services Manager displays the **Insufficient licenses applied** dialog box. Click **Activate Another Product Key** to add another product key and increase capacity on your Tableau Server installation.

Insufficient licenses applied

You have not activated enough product keys for your Tableau Server deployment.

If you try to activate Tableau Server using these licenses, it may not run properly. We recommend that you activate additional licenses to support this Tableau Server deployment

[Tableau Customer Portal](#)
[Troubleshooting](#)

Activate Another Product Key

6. On the **Register** page, enter your information into the fields and click **Register**.



Register with Tableau. All fields are required.

Contact Information

First Name	Last Name
<input type="text"/>	<input type="text"/>
Phone Number	Email
<input type="text"/>	<input type="text"/>

Company Information

Organization

Industry	Company Size
<input type="text"/>	<input type="text"/>
Department	Job Role
<input type="text"/>	<input type="text"/>

Region Information

City	Postal Code
<input type="text"/>	<input type="text"/>
Country/Region	State/Province
<input type="text"/>	<input type="text"/>

By registering, you confirm that you agree to the processing of your personal data by Salesforce as described in the [Privacy Statement](#).

Register

If you have a product key for Data Management or Advanced Management, you must activate that key to use the additional functionality. Product keys for these licenses should only be activated after at least one capacity product key has been activated on the server.

- For license information on Tableau Data Management, see [License Data Management](#).
- For license information on Tableau Advanced Management, see [About Tableau Advanced Management on Tableau Server](#).

Summary

- Tableau Desktop has a rich feature set and allows you to code and customize reports. Right from creating the charts, reports, to blending them all together to form a dashboard, all the necessary work is created in Tableau Desktop.
- For live data analysis, Tableau Desktop provides connectivity to Data Warehouse, as well as other various types of files. The workbooks and the dashboards created here can be either shared locally or publicly.
- Based on the connectivity to the data sources and publishing option, Tableau Desktop is classified into
- Tableau Desktop Personal: The development features are similar to Tableau Desktop. Personal version keeps the workbook private, and the access is limited. The workbooks cannot be published online. Therefore, it should be distributed either Offline or in Tableau Public.
- Tableau Desktop Professional: It is pretty much similar to Tableau Desktop. The difference is that the work created in the Tableau Desktop can be published online or in Tableau Server. Also, in Professional version, there is full access to all sorts of the datatype. It is best suitable for those who wish to publish their work in Tableau Server.

Keywords

- Tableau connects and extracts the data stored in various places. It can pull data from any platform imaginable. A simple database such as an excel, pdf, to a complex database like Oracle, a database in the cloud such as Amazon webs services, Microsoft Azure SQL database, Google Cloud SQL and various other data sources can be extracted by Tableau.
- When Tableau is launched, ready data connectors are available which allows you to connect to any database.
- Depending on the version of Tableau that you have purchased the number of data connectors supported by Tableau will vary.
- The pulled data can be either connected live or extracted to the Tableau's data engine, Tableau Desktop. This is where the Data analyst, data engineer work with the data that was pulled up and develop visualizations.
- The created dashboards are shared with the users as a static file. The users who receive the dashboards views the file using Tableau Reader.
- The data from the Tableau Desktop can be published to the Tableau server. This is an enterprise platform where collaboration, distribution, governance, security model, automation features are supported.
- With the Tableau server, the end users have a better experience in accessing the files from all locations be it a desktop, mobile or email.

Self-assessment questions

1. Default aggregation used for tree map_____
 - a. Avg
 - b. Count
 - c. Sum

2. The best feature Tableau are except_____ -
 - a. Collaboration of data
 - b. Data Blending
 - c. Real time analysis
 - d. Data is smaller and more fit

3. How do you find the field is discrete in Tableau ?
 - a. Green color
 - b. # symbol
 - c. Blue color
 - d. None

4. What percent of total profits do the top 10 customer by Sales represent in sample superstore dataset ?
 - a. 5.03%
 - b. 17.54%
 - c. 16.26%
 - d. 3.50%

5. Which of the following is not a Trend Line model ?
 - a. Linear Trend Line
 - b. Binomial Trend Line
 - c. Exponential Trend Line
 - d. Logarithmic Trend Line

6. Where can we apply global filters?
 - a. Dashboards
 - b. Stories
 - c. Sheets
 - d. All of the above

7. The Tableau Product Suite consists of_____ -
- a. Tableau Desktop ,Tableau Public, Tableau Online, Tableau Server, Tableau Measure
 - b. Tableau Desktop, Tableau Public ,Tableau Online ,Tableau Server ,Tableau Reader
 - c. Tableau Desktop ,Tableau Public ,Tableau Dimension ,Tableau Server, Tableau Reader
 - d. Tableau Desktop ,Tableau Public ,Tableau Online, Tableau Server ,Tableau Organic
8. Tableau File Extension is_____
- a. twbx
 - b. twby
 - c. twbw
 - d. twbz
9. What is the possible cause of the data not being updated?
- a. Data Extrac needs an update
 - b. The data source configuration of Data Extract needs to be refreshed
 - c. Services on Data Extrac are not running
 - d. The workers of Data Extrac are taking a timeout
10. What type of join is used in blending?
- a. Left join
 - b. Full join
 - c. Right join
 - d. Inner join
11. A justifiable reason to utilize a projectile chart.
- a. Looking at the genuine against the objective deals
 - b. Examining the pattern for an era
 - c. Showing the business development for a specific year
 - d. Adding information and ascertaining tally measure
12. What insight will the Link Utilization Hourly Trend give you?
- a. This will allow us to identify the specific times during the day the bandwidth utilization is the highest
 - b. This will allow us to identify the critical links that don't need attention
 - c. This will allow us to correlate bandwidth usage to user traffic
 - d. This will allow us to identify and set the optimum bandwidth thresholds in Tableau
13. Data Values available for the visualization_____
- a. Basic Expression
 - b. Table Calculation
 - c. None of the above
 - d. LoD Expression

14. In which Region do all Product Categories fall beneath the overall average profit in sample superstore dataset?

- a. East
- b. West
- c. Central
- d. South

15. Which of these is not a datatype in Tableau?

- a. Integer
- b. Character
- c. Float
- d. String

1 c	2 d	3 c	4 a	5 b	6 d	7 b	8 a
9 c	10 a	11 a	12 a	13 b	14 d	15 b	

Review Question

1. What Are the Data Types Supported in Tableau?
2. How Will You Understand Dimensions and Measures?
3. What is Meant by 'discrete' and 'continuous' in Tableau?
4. What Are the Filters? Name the Different Filters in Tableau.
5. What Are the Different Joins in Tableau?



Further Readings

"Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few

"Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"



Web Links

<https://www.tableau.com/>

<https://intellipaat.com/blog/what-is-tableau/>

Unit 11: Advance Calculation

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3.3 Tableau Sets & Parameters

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Review Questions

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Objectives

After studying this unit, you will be able to:

- Understand sets and parameters
- Analyze data using the tableau parameter
- Understand data sources

Introduction

In order to master any Business Intelligence tool, the most basic operation we need to learn is to connect to a data source. Once we establish a successful connection with a data source, we can access all its data, bring some part of it in Tableau's repository (extract) and use it for our analysis. Tableau offers a myriad of data sources such as local text files, MS Excel, PDFs, JSON or databases and servers like Tableau Server, MySQL Server, Microsoft SQL Server, etc.

A data source is made up of fields and groups. In the same way that folders on your hard disk contain and organize your files, fields contain the data that users enter into forms that are based on your form template, and groups contain and organize those fields.

3.1 Data Sources in Tableau

Tableau can connect to all the popular data sources which are widely used. Tableau's native connectors can connect to the following types of data sources.

- File Systems such as CSV, Excel, etc.
- Relational Systems such as Oracle, Sql Server, DB2, etc.
- Cloud Systems such as Windows Azure, Google BigQuery, etc.
- Other Sources using ODBC

The following picture shows most of the data sources available through Tableau’s native data connectors.

Connect Live

The Connect Live feature is used for real-time data analysis. In this case, Tableau connects to real-time data source and keeps reading the data. Thus, the result of the analysis is up to the second, and the latest changes are reflected in the result. However, on the downside, it burdens the source system as it has to keep sending the data to Tableau.

In-Memory

Tableau can also process data in-memory by caching them in memory and not being connected to the source anymore while analyzing the data. Of course, there will be a limit to the amount of data cached depending on the availability of memory.

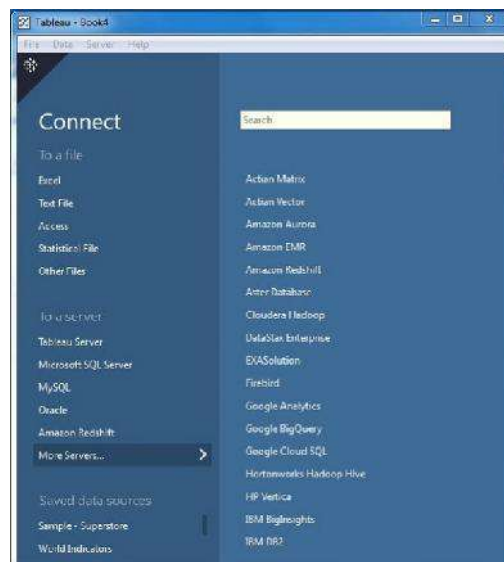
Combine Data

Tableau can connect to the same time. For workbook you can a relational source by connections. This is which is a very unique

How to Establish a

Moving on, let us see data source from will show you how to an MS Excel file and in Tableau.

Open Tableau Desktop as it opens, you will



Sources

different data sources at example, in a single connect to a flat file and defining multiple used in data blending, feature in Tableau.

Connection?

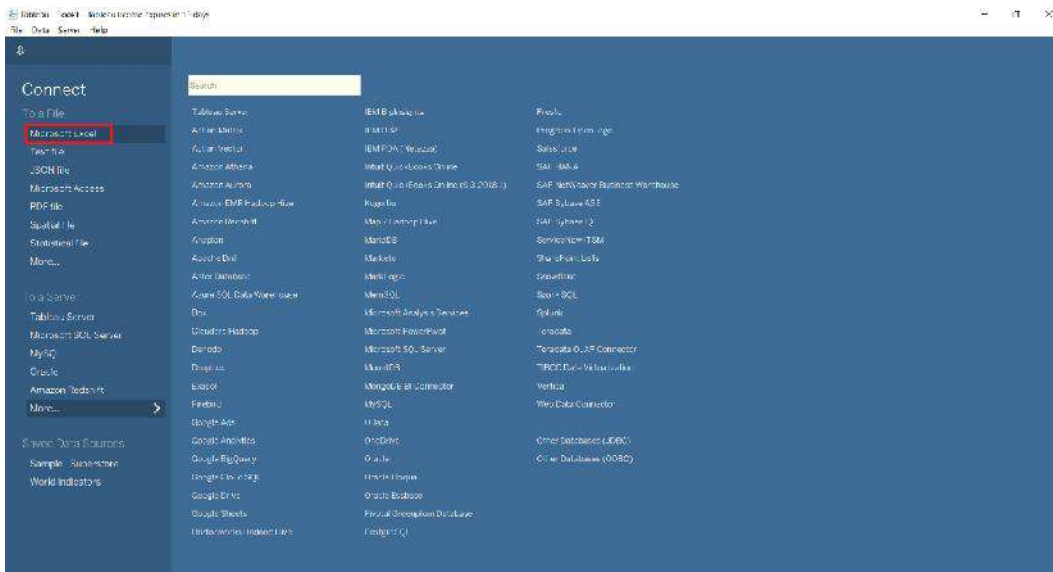
how do we connect to a Tableau Desktop. We establish a connection to use its data for analysis

in your system. As soon get the Tableau welcome

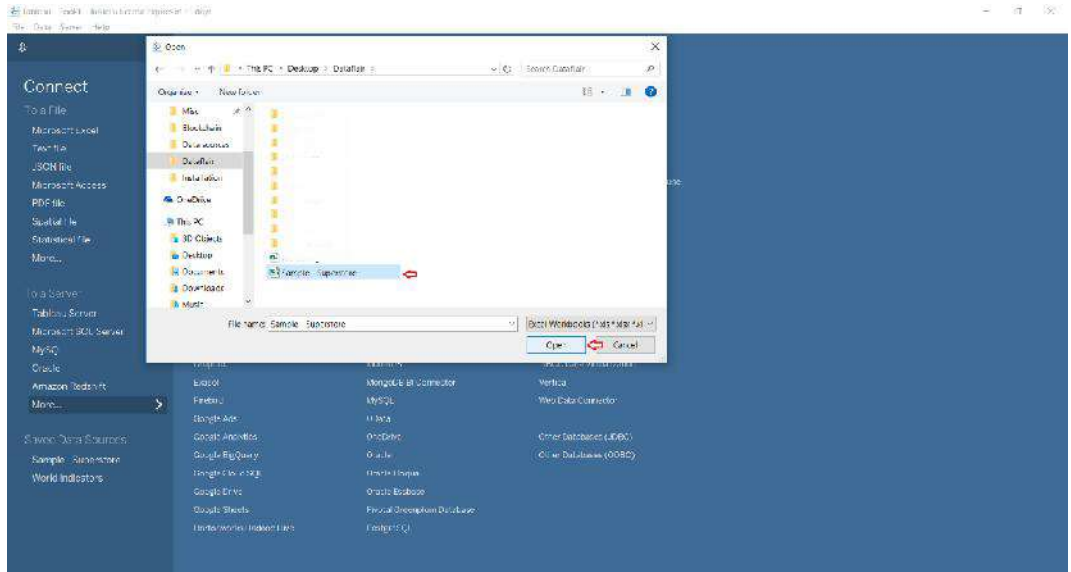
page. On this page, you will find a blue pane on the left with the heading Connect. In this pane, you will find a list of data connectors for file-based and server-based sources. You can click on the data connector name, select a file or establish a connection.



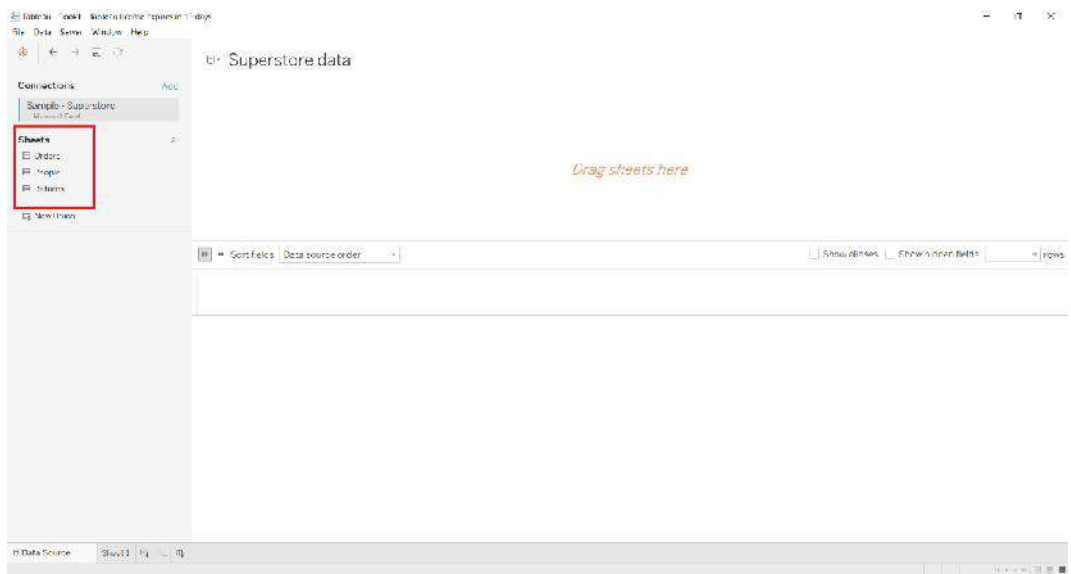
To fetch a Microsoft Excel file, we click on the option Microsoft Excel from the list.



It will open a new dialog box from where you can access files from your system. We have a sample Excel file which we are going to select and click Open.

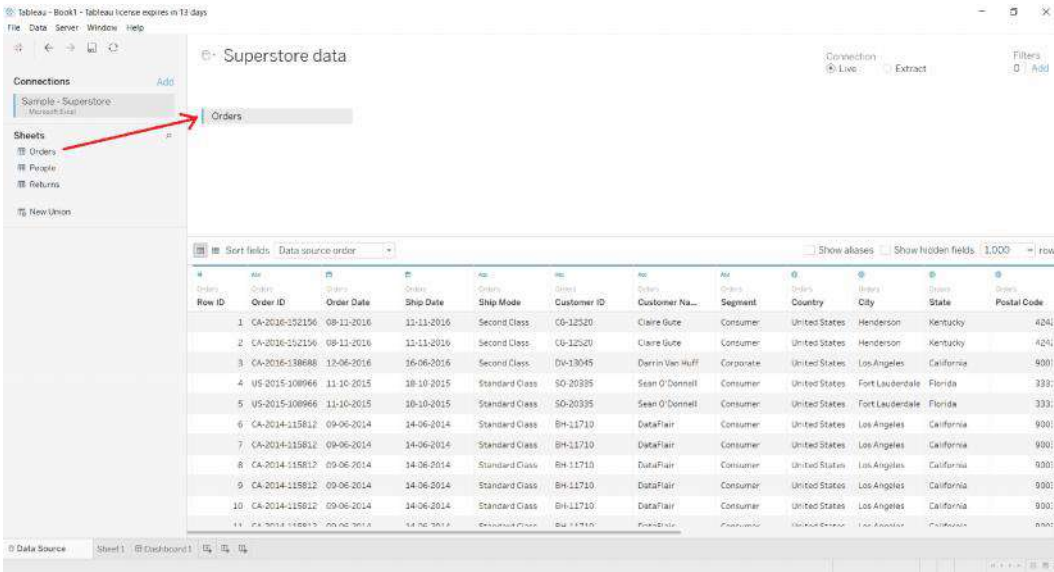


This will open the contents of the Excel file in a Data Source tab in a Tableau workbook.

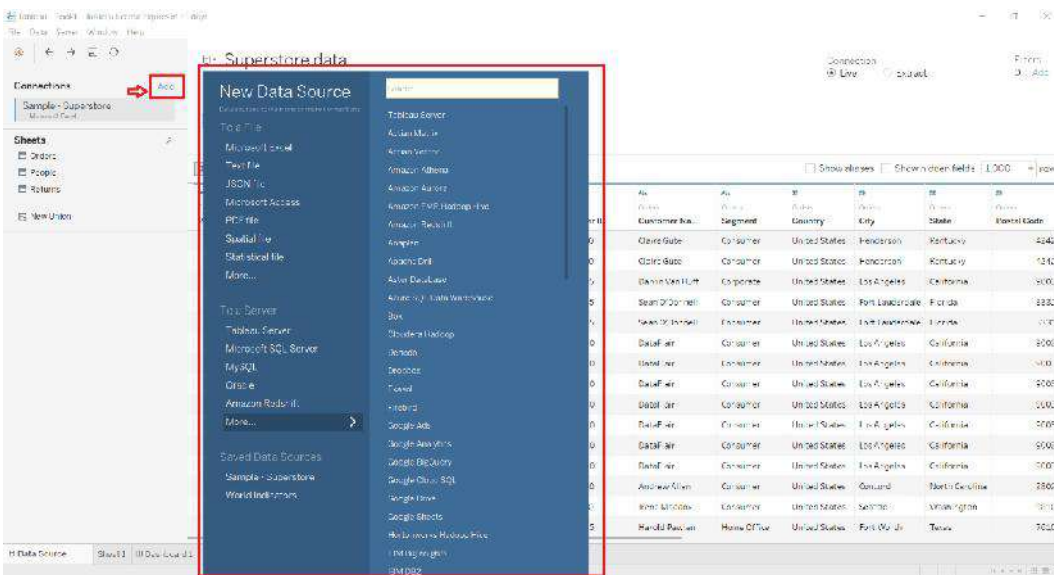


This tab has a Connections pane at its left which shows the name of the data source and its contents; that is, the number of sheets in the case of an Excel file.

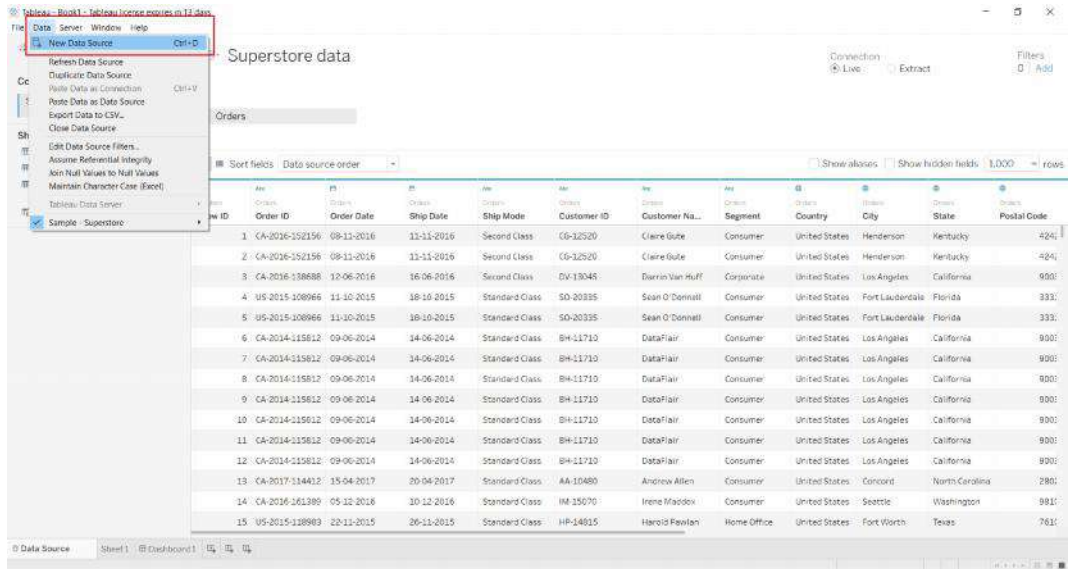
We can manage and view the contents of a data source by dragging and dropping sheets to the central pane. It will display the entire table with proper rows and columns of the respective sheet.



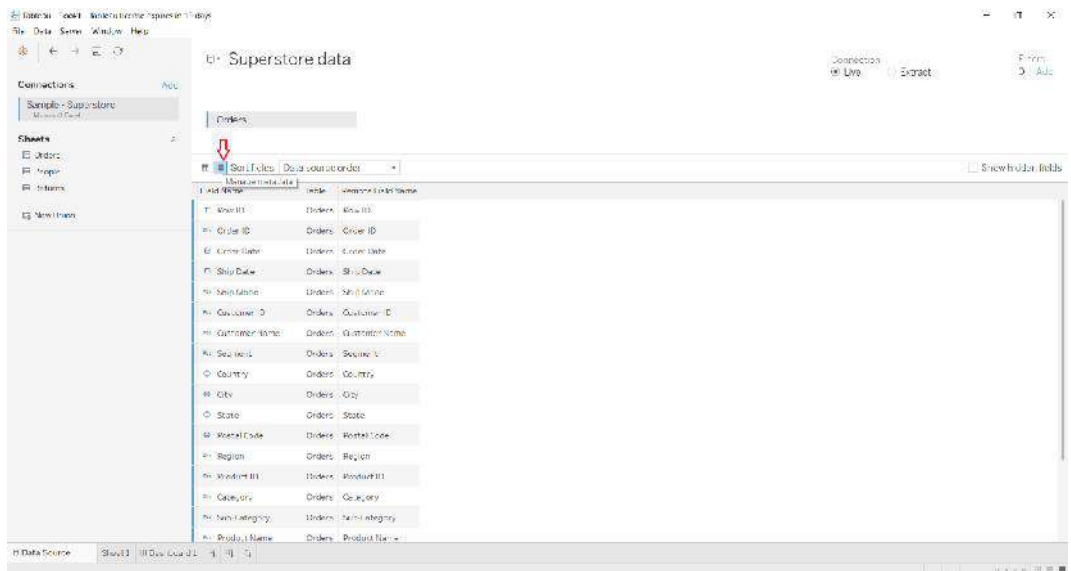
In addition to this, you can also add a new data source here by clicking on the **Add** option and then selecting the data file or connector of your choice.



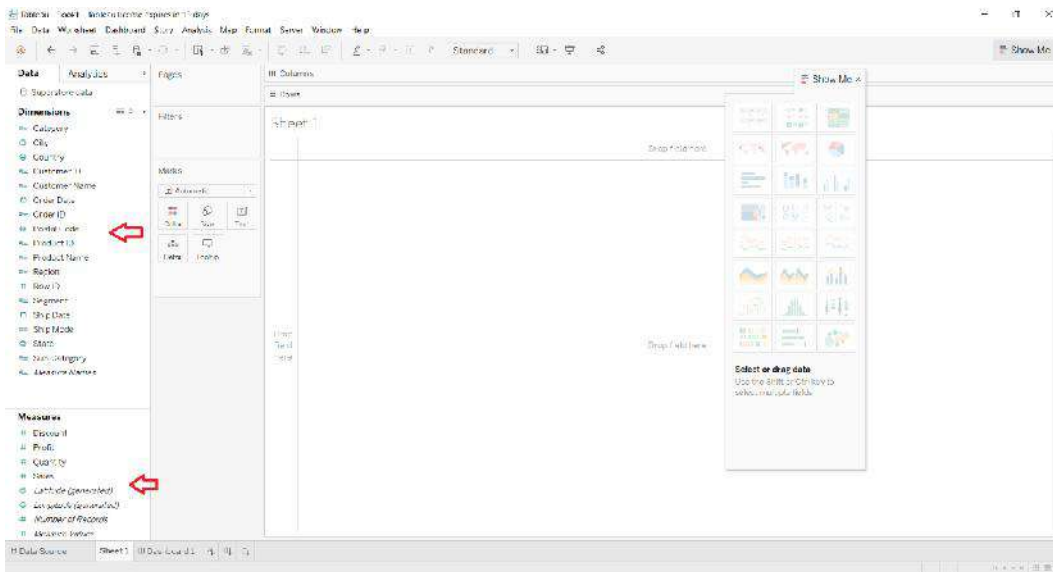
Or, by clicking on the Data tab present on the top-left bar and then selecting **New Data Source** option from there.



From here, we can sort fields and manage metadata where you can see the names of all the columns present in their concerning tables. In this way, we can also manage multiple linked data sources.



Once we load our data source, we can move on to create a worksheet in Tableau. Open the tab called **Sheet1** just next to the **Data Source** tab and you will find a list of available data sources and fields within it. On the left, there is an organized list of available dimensions and measures from where you can select and use them to create charts and graphs. Just drag and drop dimensions and measures to the *Columns* and *Rows* section to start making visualizations.



Every data source, especially server-based sources have different steps to follow in order to establish a connection with. Follow the steps, provide the necessary information and start working with your data in Tableau to carry out the analysis.

3.2 Combining Data Sources

There are several ways to combine data, each with their own strengths and weaknesses.

Relationships are the default method and can be used in most instances, including across tables with different levels of detail. Relationships are flexible and adapt to the structure of the analysis on a sheet by sheet basis. However, you can't create relationships between tables from published data sources.

Joins combine tables by adding more columns of data across similar row structures. This can cause data loss or duplication if tables are at different levels of detail, and joins must be established before analysis can begin. You can't use a published data source in a join.

Blends, unlike relationships or joins, never combine the data directly. Instead, blends query each data source independently, aggregate the results to the appropriate level, then present the results together visually in the view. Because of this, blends can handle different levels of detail and also work with published data sources. Blends don't create a new, blended data source (and therefore can't be published as a "blended data source"). Instead, they are simply blended results visualized per sheet.

3.3 Tableau Sets & Parameters

Sets

You can use sets to compare and ask questions about a subset of data. Sets are custom fields that define a subset of data based on some conditions.

You can make sets more dynamic and interactive by using them in Set Actions. Set actions let your audience interact directly with a viz or dashboard to control aspects of their analysis. When someone selects marks in the view, set actions can change the values in a set.

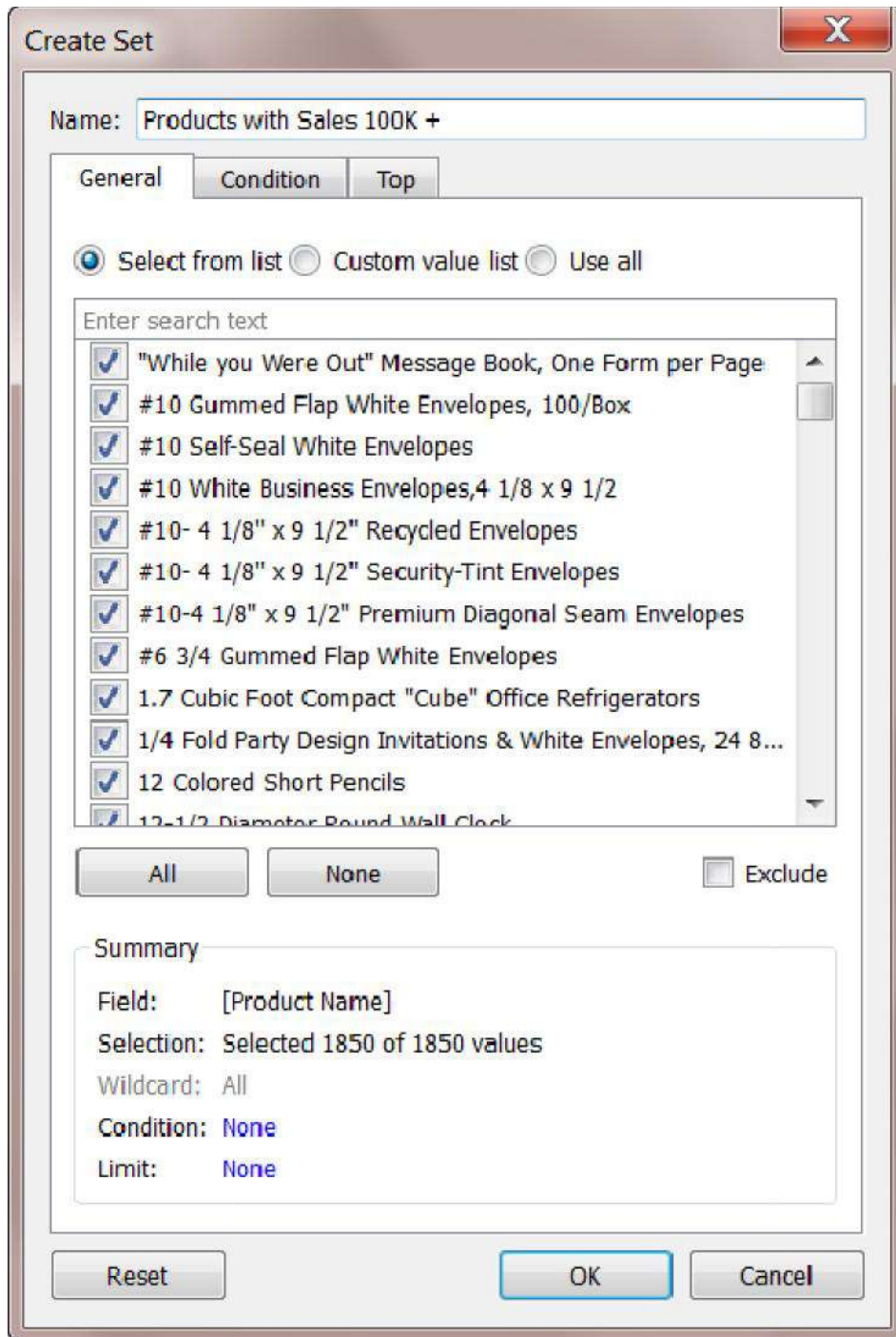
Create a dynamic set

There are two types of sets: dynamic sets and fixed sets. The members of a dynamic set change when the underlying data changes. Dynamic sets can only be based on a single dimension.

To create a dynamic set:

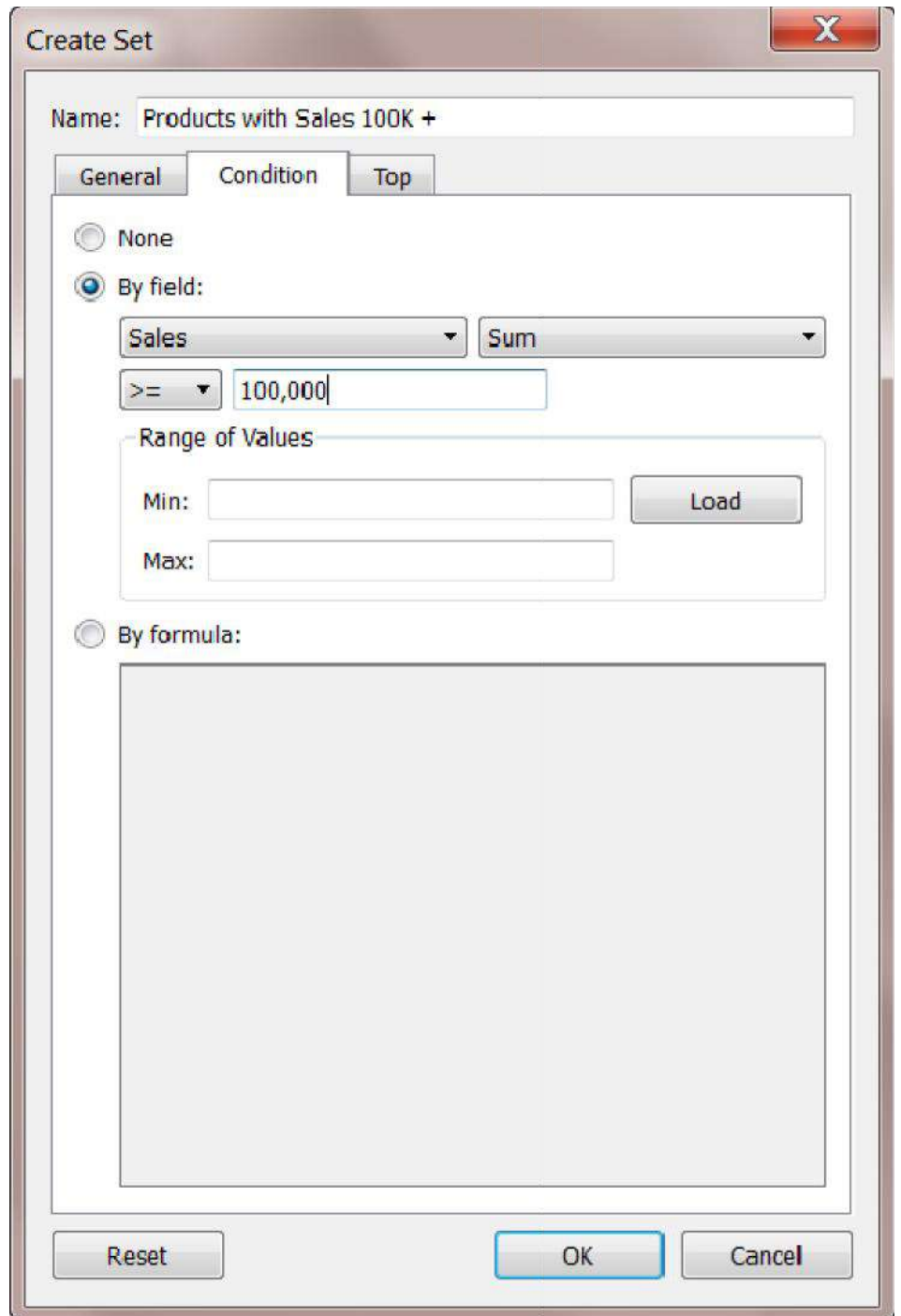
1. In the Data pane, right-click a dimension and select **Create > Set**.
2. In the Create Set dialog box, configure your set. You can configure your set using the following tabs:
 - **General:** Use the General tab to select one or more values that will be considered when computing the set.

You can alternatively select the **Use all** option to always consider all members even when new members are added or removed.



- **Condition:** Use the Condition tab to define rules that determine which members to include in the set.

For example, you might specify a condition that is based on total sales that only includes products with sales over \$100,000.



- **Top:** Use the Top tab to define limits on what members to include in the set.

For example, you might specify a limit that is based on total sales that only includes the top 5 products based on their sales.

Create Set

Name: Products with Sales 100K +

General Condition Top

None

By field:

Top 5 by

Sales Sum

By formula:

Top 10 by

Reset OK Cancel

- When finished, click **OK**.

The new set is added to the bottom of the Data pane, under the Sets section. A set icon  indicates the field is a set.

Sets

- State - High Sales & Profit
 - Top Customers by Profit
-

Parameters

A parameter is a workbook variable such as a number, date, or string that can replace a constant value in a calculation, filter, or reference line.



Example you may create a calculated field that returns True if Sales is greater than \$500,000 and otherwise returns False. You can replace the constant value of “500000” in the formula with a parameter. Then, using the parameter control, you can dynamically change the threshold in your calculation.

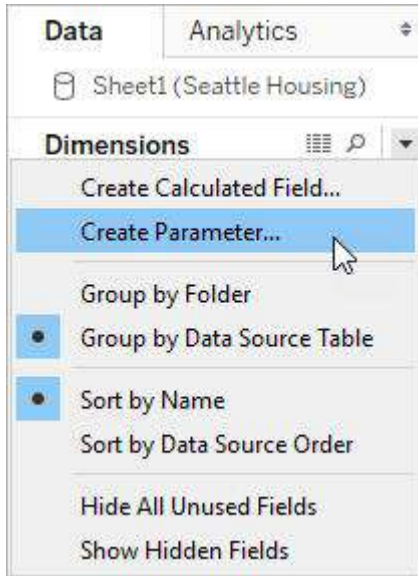
You can even create a dynamic parameter that’s set to automatically refresh its current value (to the result of a single-value, view-independent calculation), list of values (based on a data source column), or range of values. This will happen each time the workbook is opened and Tableau connects to the data source referenced by the parameter, or whenever you select Refresh from the data source’s context menu..

You can make your parameters more dynamic and interactive by using them in Parameter Actions. Parameter actions let your audience change a parameter value through direct interaction with a viz, such as clicking or selecting a mark.

Create a parameter

Follow the instructions below to create a new parameter from the Data pane.

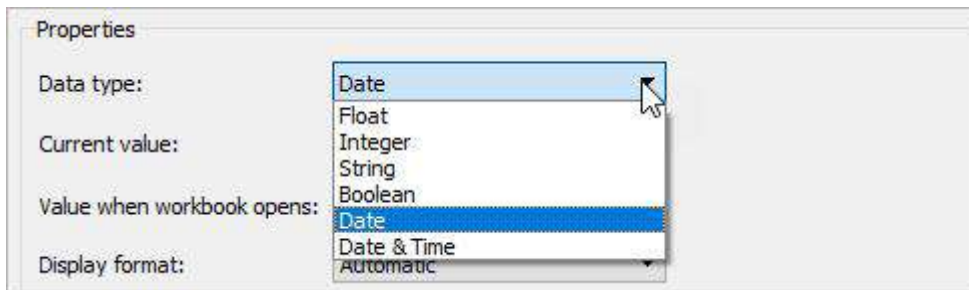
1. In the Data pane, click the drop-down arrow in the upper right corner and select **Create Parameter**.



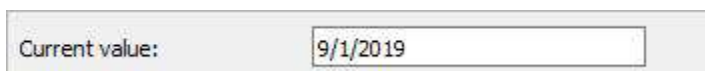
2. In the Create Parameter dialog box, give the field a **Name**.



3. Specify the data type for the values it will accept:



4. Specify a current value. This is the default value for the parameter. In this case, let's leave the field as is because we'll be using the latest data, which we'll configure in the next step.



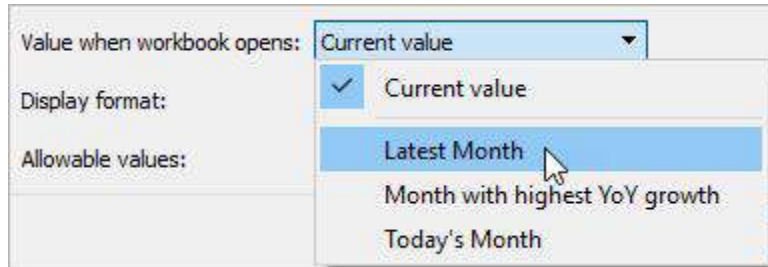
5. Specify a value when the workbook opens. In this case, let's create a dynamic parameter by setting the parameter's default value to the result of a single-value, view-independent calculation.

 **Notes**

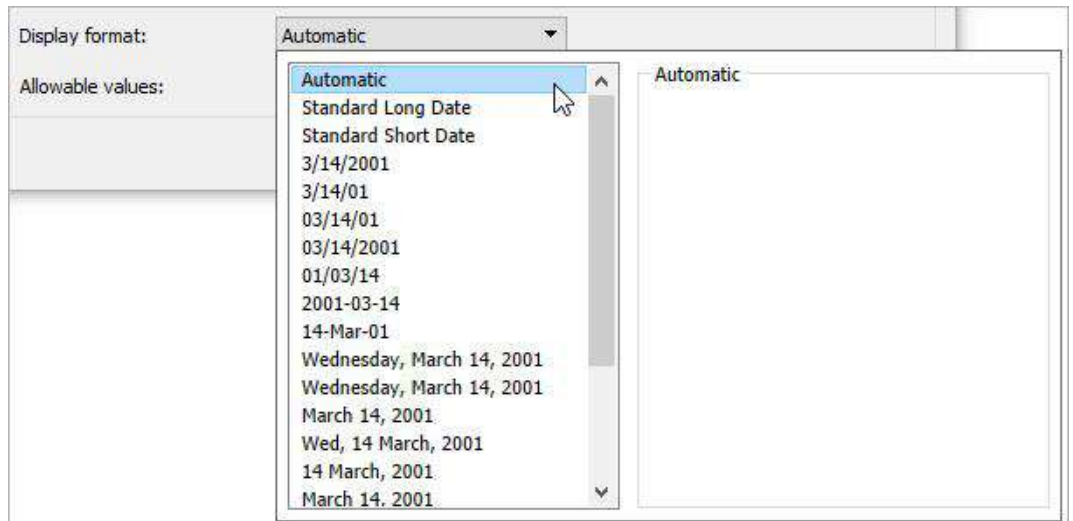
If there is more than one value, the workbook would not be able to choose a default value. The calculation must also be view-independent so that the value won't change as the viz changes. To do this, you can use a FIXED level of detail (LOD) expression that is not dependent on the structure of the viz. All parts of the calculation

must be inside the FIXED LOD expression. If you use a FIXED LOD expression as the default value and are using context filters, the dynamic parameter will not reflect any context filters. For more information on LOD expressions, see Create Level of Detail Expressions in Tableau.

For this dynamic parameter, let's use **Latest Month**. This means that if the connected data source is updated and the workbook is opened, the parameter will automatically update when the workbook is opened.



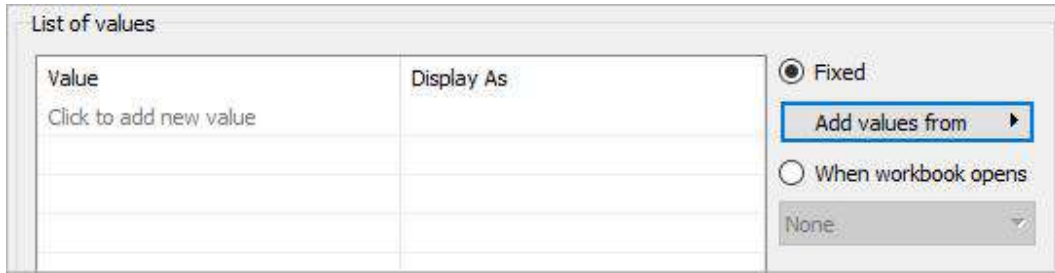
6. Specify the display format to use in the parameter control (Tableau Desktop only).



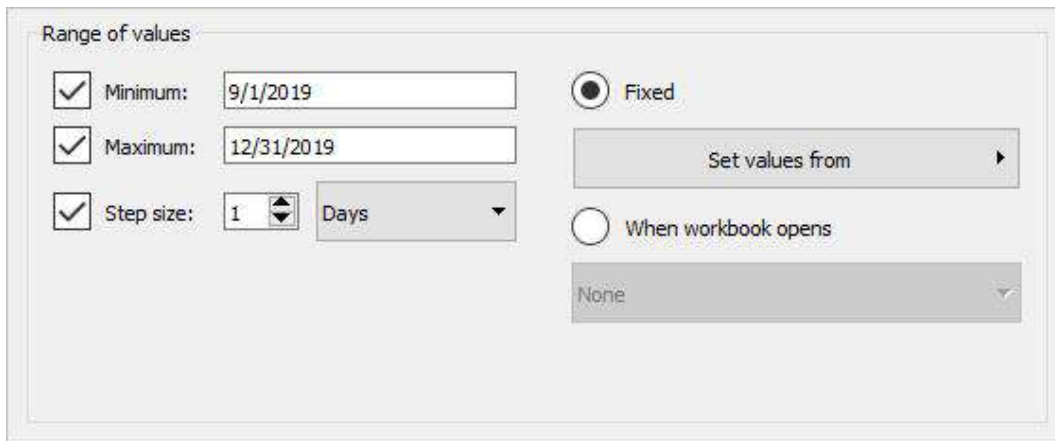
7. Specify how the parameter will accept values. You can select from the following options:
 - **All** - The parameter control is a simple text field.
 - **List** - The parameter control provides a list of possible values for you to select from.
 - **Range** - The parameter control lets you select values within a specified range.

The availability of these options is determined by the data type. For example, a string parameter can only accept all values or a list. It does not support a range.

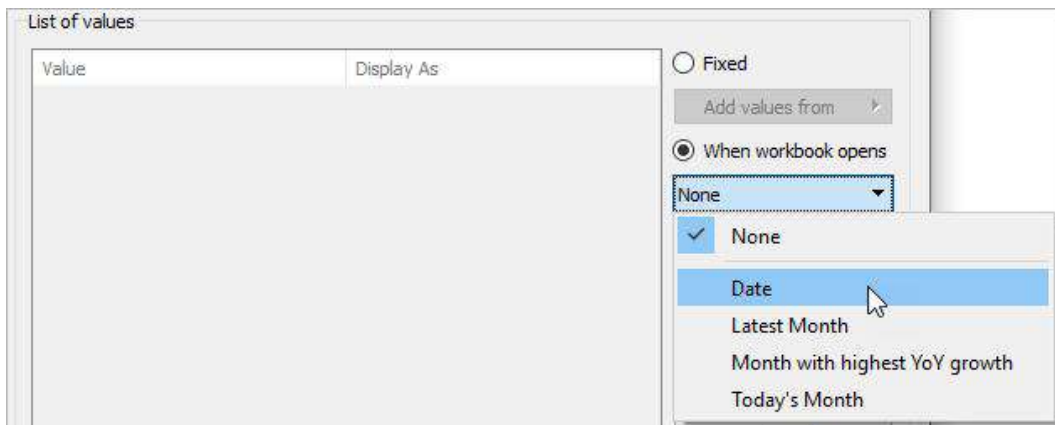
If you select List, you must specify the list of values. Click in the left column to type your list of values, or you can add members of a field by selecting **Add values from**.



If you select Range, you must specify a minimum, maximum, and step size. For example, you can define a date range between January 1, 2019 and December 31, 2019, with the step size set to 1 month to create a parameter control that lets you select each month in 2019.

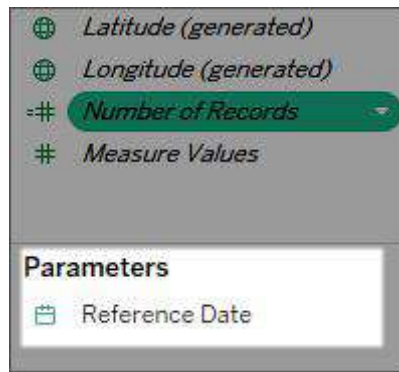


In this case, to refresh the parameter’s list of values (or domain) whenever the workbook opens, select **List**, and then select **When workbook opens**. Notice that the list of values on the left is grayed out because the workbook is dynamically pulling values from the data source.



8. When finished, click **OK**.

The parameter is now listed in the Parameters section at the bottom of the **Data** pane.



The parameter is also available everywhere else you can use a parameter – for example, on the Top tab in the Filter dialog box, or in the Reference Line dialog box. Parameters are global across the workbook and can be used in any worksheet.

Summary

- Tableau is a popular Business Intelligence tool used by thousands of companies around the world. It helps businesses generate valuable insights by connecting and analyzing the raw data from different sources. It offers various tools and techniques that a business can use to establish relationships between different data sources.
- Parameters in Tableau are the container of values used to calculate and dynamically enter the values that are otherwise not present in the original dataset. You can add conditions and select the range of the values for which you want to create a parameter. After that, you can incorporate these values into reports and dashboards and see their effect on different visualizations.
- Parameters are a method that transfers the control on datasets from the author of the report to the user.
- Parameters or container values in Tableau are mainly used to dynamically enter the values in the dataset that would otherwise not be present in it. With tableau parameters, you can set the range for any dataset and only focus on specific data variables/dimensions for performing data analysis.

Keywords

Parameters: Parameters are useful when you want to add interactivity and flexibility to a report, or to experiment with what-if scenarios. Suppose you are unsure which fields to include in your view or which layout would work best for your viewers.

Data Source: Data Source is a name given to the connection set up to a database from a server. The name is commonly used when creating a query to the database. The data source name need not be the same as the filename for the database.

Sets: Sets are custom fields that define a subset of data based on some conditions. A set can be based on a computed condition, for example, a set may contain customers with sales over a certain threshold. Computed sets update as your data changes. Alternatively, a set can be based on specific data point in your view.

Self-Assessment

1. What are the different Tableau files?
 - A. Workbooks
 - B. Bookmarks
 - C. Packaged Workbooks
 - D. All of these

2. What are the characteristics to distinguish data source?
 - A. Icon/Name
 - B. Connection Type
 - C. Connects to
 - D. All of these

3. Tableau was founded by
 - A. Chris Stoltecorrect
 - B. Chris Jordan
 - C. Alexander Fleming
 - D. None

4. How do you identify a continuous field in Tableau?
 - A. It is identified by a blue pill in the visualizationwrong
 - B.It is identified by a green pill in a visualizationcorrect
 - C. It is preceded by a # symbol in the data window

- D. When added to the visualization, it produces distinct values
- 5. The icon associated with the field that has been grouped is a _____
 - A. Paper Clipcorrect
 - B. Set
 - C. Hashwrong
 - D. Equal To
- 6. What are the file extensions in Tableau?
 - A. Tableau Bookmark (.tdm)
 - B. Tableau Map Source (.tms)
 - C. Tableau Preferences (.tps)
 - D. All of the abovecorrect
- 7. How do you identify a discrete field in Tableau?
 - A. It is identified by a blue pill in the visualization
 - B. It is identified by a green pill in a visualization
 - C. It is preceded by a # symbol in the data window
 - D. When added to the visualization, it produces distinct values
- 8. It contains qualitative values.....
 - A. Dimensions
 - B. Measures
 - C. Show me
 - D. Calculated fields
- 9. It contains quantitative values.....
 - A. Dimensions
 - B. Measures

- C. Show me
- D. Calculated fields

10. It contains options to create graphs

- A. Dimensions
- B. Measures
- C. Show me
- D. Calculated fields

11. It contains option to apply all formulas

- A. Dimensions
- B. Measures
- C. Show me
- D. Calculated fields

12. It can be used to define the level of detail to perform an aggregation on

- A. Dimensions
- B. Measures
- C. Show me
- D. Calculated fields

13. In which type of graph geographical role is defined

- A. Bar graph
- B. Map charts
- C. Scatter plot
- D. Dimensions

14. In which type of graph spatial data is required

- A. Bar graph
- B. Map charts
- C. Scatter plot

D. Dimensions

15. Tableau takes at least one measure in the Rows shelf and one measure in the Columns shelf to create a _____

- A. Bar graph
- B. Map charts
- C. Scatter plot
- D. Dimensions

Answers for Self-Assessment

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. D | 2. D | 3. A | 4. A | 5. C |
| 6. D | 7. A | 8. A | 9. B | 10. C |
| 11. D | 12. A | 13. B | 14. B | 15. C |

Review Questions

- 1. Why Tableau is preferred by the business community?
- 2. What do you mean by data source? How it is important for tableau.
- 3. What is a parameter? Write the steps to implement parameters using tableau.
- 4. What are the different responsibilities of a Tableau professional?
- 5. What are sets?



Further Readings

- 1. Communication Data With Tablue, Ben Jones, O' Reilly Publications



Web Links

<https://www.tableau.com/>

<https://www.datacamp.com/tutorial/data-visualisation-tableau>

Unit 12: Analytical Topic/Capability

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12.3 Data Visualizations

12.4 Various Graphs and Charts

12.5 Filters

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Answers for Assessment

Review Questions

Objectives

After studying this unit, you will be able to:

- Understand concept of different graphs.
- install software for data visualization.
- Understand dimensions and measures.
- Understand continuous and discrete data.

Introduction

Data Visualization with tableau is the process of presenting information through visual rendering. From centuries back, people have used to visualizations such as charts and maps to understand information more quickly and easily. As far as the human brain is concerned, it recognizes visual data more quickly than text data.

12.1 What is Tableau?

Tableau is a Data Visualisation tool that is widely used for Business Intelligence but is not limited to it. It helps create interactive graphs and charts in the form of dashboards and worksheets to gain business insights. And all of this is made possible with gestures as simple as drag and drop!

What Products does Tableau offer?

	Key Features	Other Features	Operating System	License
Tableau Desktop	Creating Dashboards and Stories locally	Tableau Personal - limited data sources, non connectivity to Tableau Server Tableau Professional - Full enterprise capabilities	Windows, Mac	Personal - \$999 Professional - \$1999
Tableau Public	A Massive, public, non commercial Tableau Server	All data published in public	-	Free
Tableau Online	Creating Dashboards and Stories on the Cloud	Live Connections	-	\$500 per year per
Tableau Reader	View Dashboards and Sheets locally	Cannot modify workbooks or connect to the server	Windows, Mac	Free
Tableau Server	Connect to Data sources and share Dashboards	Users can directly interact with Dashboards via browser	Windows	Core Licensing

12.2 Installation:

To work on Tableau, you **need** Tableau, right?

Out of the five above mentioned products, Tableau Desktop, Public and Online offer Data Visual Creation.

Tableau Desktop

It is available in the following three formats:

1. [Free trial for 14 days](#)
2. If you are a student or a teacher, you get free access to the [Desktop](#) for a full year.
3. [Purchase Tableau](#)

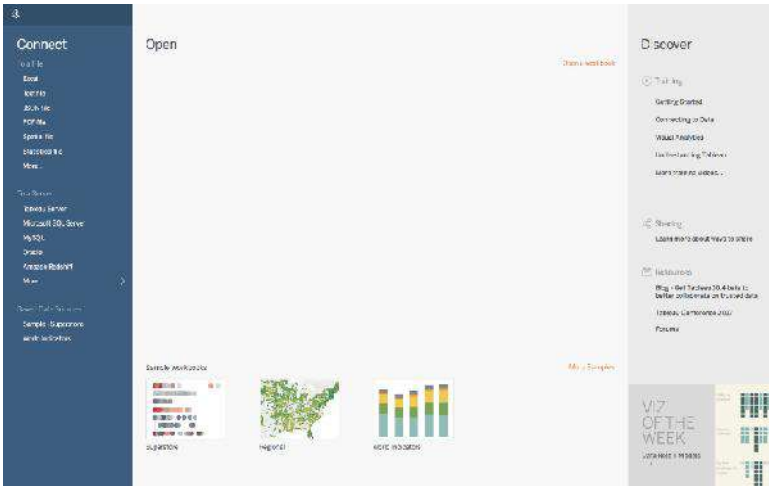
Tableau Public

[Tableau Public](#) is purely free of all costs and does not require any license. But it comes with a limitation that all of your data and workbooks are made public to all Tableau users.

Tableau Online

[Tableau Online](#) is the best option for you, if you wish to make your Workbooks on the Cloud and be able to access them from anywhere.

Connect to the Data



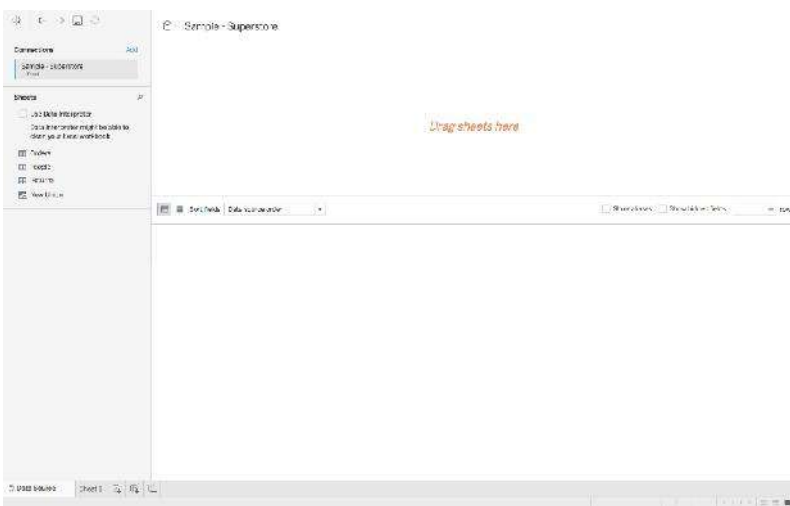
You should see a screen similar to the one above. This is where you import your data. As is visible, there are multiple formats that your data can be in. It can be in a flat-file such as Excel, CSV or you can directly load it from data servers too.

You can see that Tableau itself offers some Sample Workbooks, with pre-drawn charts, graphs, and other visuals. I would suggest going through these later for further exploration.

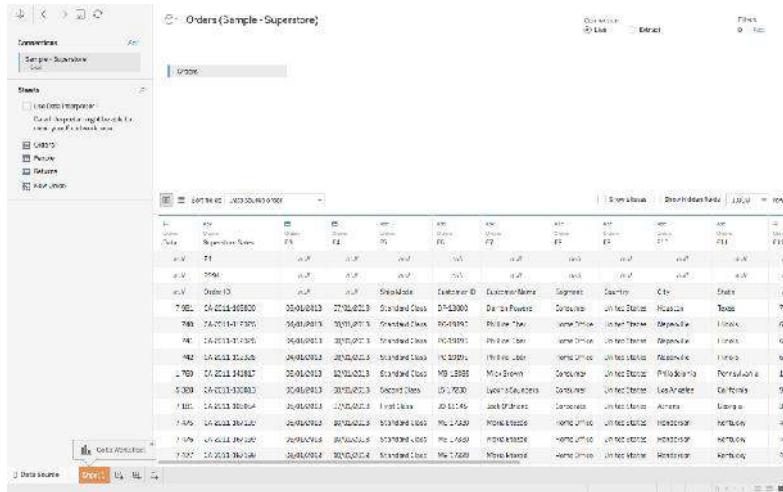
The best way to learn is to get your hands dirty. Let us start with our Data, which can be found [here](#). The data is that of a United States’ Superstore which is deliberating over its expansion. It wishes to know the prospective regions of the country where it could and hence requires your help.

The first thing that you will obviously need to do is import the data onto Tableau. So quickly follow the below steps:

1. Since the data is in an Excel File, click on **Excel** and choose the Sample – Superstore.xls file to get :



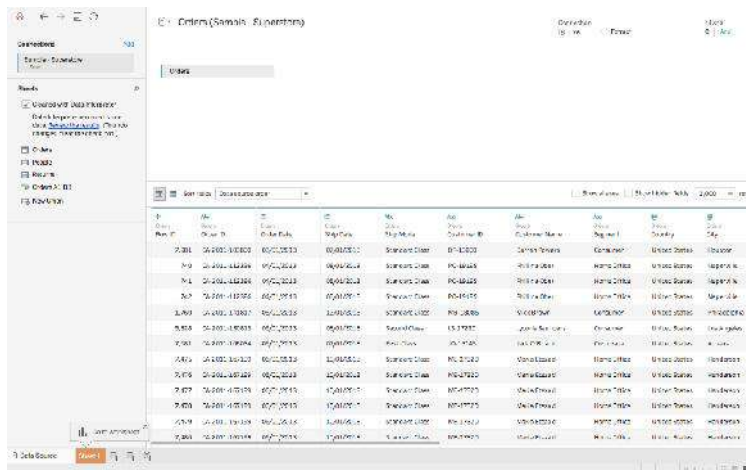
2. You can see three sheets on the screen, but we are only going to be dealing with Orders here, so go ahead and drag the same on *Drag sheets here* :



Uh oh, the imported data looks a bit different for the first few rows. Don't worry, the solution lies right ahead.

Data Interpreter

3. You see the option of Use Data Interpreter? Click on it to get the following clean view :



All that messy data magically disappeared!

If you open the Excel data file, you will see some metadata in it, i.e. information about data :

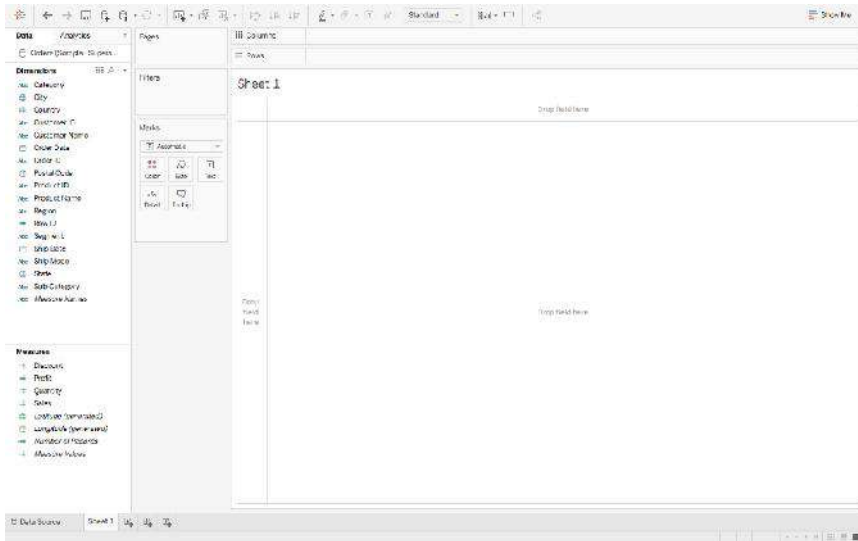
	A	B
1	Data	Superstore Sales
2	Fields	21
3	Rows	9994

Tableau imports the entire data file as is, but anticipating such discrepancies, explicitly provides a solution in the form of a Data Interpreter. If you wish to view the exact changes that it made, click on **Review the results**, and choose the **Orders** tab in the opened Excel sheet.

As it will show, it simply removed the erroneous data.

12.3 Data Visualizations

As soon as you had imported your dataset, next to the Data Source tab near the bottom of the screen, you immediately must have seen **Go to Worksheet**. A Worksheet is where you make all of your graphs, so click on that tab to reach the following screen:



Don't get overwhelmed by the various elements that you see here, we will cover them all one by one.

Dimensions and Measures:

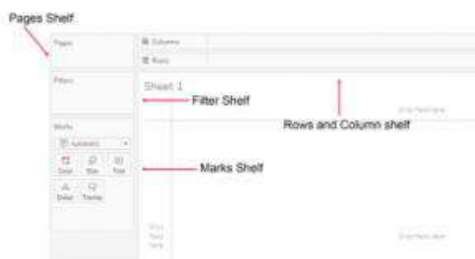
Dimension

Dimensions are the fields that you cannot aggregate. They are generally string values, or Discrete values, and are mostly used as column or row headings. E.g. CountryName, ProductName etc

Measure

Measures, as the name suggests are the fields that you can measure or aggregate. They are generally numerical values, or Continuous and are mostly used as plotting values. E.g. CountryPopulation, ProductSales etc

Moving onto **Shelves** :



Visualization in Tableau is possible through dragging and dropping Measures and Dimensions onto these different Shelves.

Rows and Columns : Represent the x and y-axis of your graphs / charts.
Filter: Filters help you view a strained version of your data. For example, instead of seeing the combined Sales of all the Categories, you can look at a specific one, such as just Furniture.

Pages: Pages work on the same principle as Filters, with the difference that you can actually see the changes as you shift between the Paged values. Remember that Rosling chart? You can easily make one of your own using Pages.
Marks: The Marks property is used to control the mark types of your data. You may choose to represent your data using different shapes, sizes or text.

And finally, there is **Show Me**, the brain of Tableau!



When you drag and drop fields onto the visualization area, Tableau makes default graphs for you, as we shall see soon, but you can change these by referring to the **Show Me** option.

Note: Not every graph can be made with any combination of Dimensions or Measures. Each graph has its own conditions for the number and types of fields that can be used, which we shall discuss next.

12.4 Various Graphs and Charts

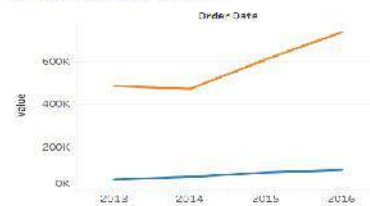
Using Superstore Sales and Profit Statistics. That would include the Net Sales, the Net Profit and the growth of the two measures, to name a few. Here is a gist of what we will be making:

Overview of the Superstore

Net Statistics

Measure	Profit	Quantity	Sales
Value	286,397	37,873	2,297,201

Sales and Profit Growth



Peak Sales and Profit Months



Year of Order Date	Sales	Profit
2013	504,257,4082	47,544
2014	470,553,509070001	61,619
2015	508,473,03	81,727
2016	738,947,028199999	97,508

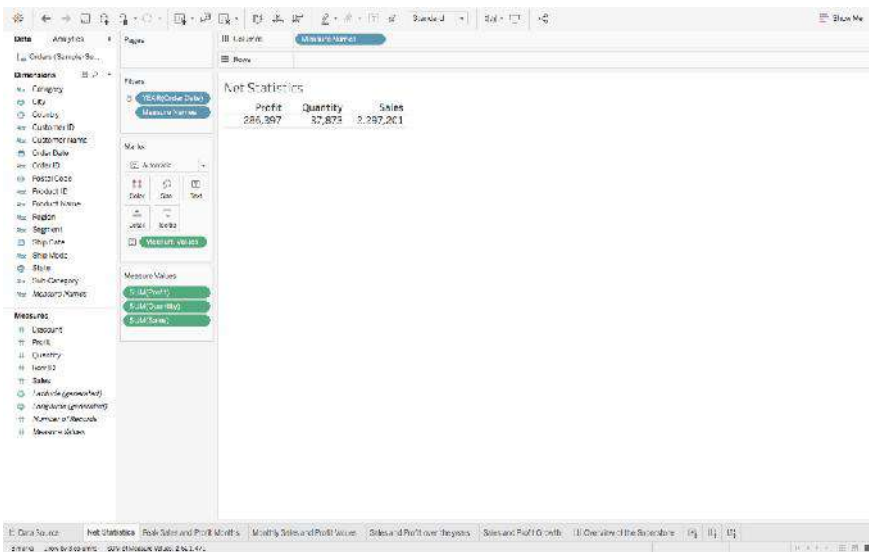
Month of Order Date	Sales	Profit
January	96,856,6226	9,709
February	59,840,1774	10,286
March	707,475,8508	78,508
April	139,260,8826	11,267
May	154,730,1607	22,277
June	153,804,8888	21,035
July	145,416,889	18,894
August	161,194,283	22,143
September	207,148,8897	26,329
October	197,698,5897	31,304
November	258,240,428	35,833
December	325,530,5775	43,897

From what can be observed, the net sales are on the rise, but the Profit is creeping up slowly. We can also quite clearly see the peak Sales Months, which could be attributed to various reasons. We can only know more as we explore more.

Before we start, there is one thing that I would like to recommend and that is you name your Worksheets as being done here.

Let's begin with the simplest visualization, and that is displaying the **Net Statistics** numbers. Tableau, being as smart as it is, automatically computes such values under **Measure Names** and **Measure Values**. Follow these steps to make what is called a **Text Table** :

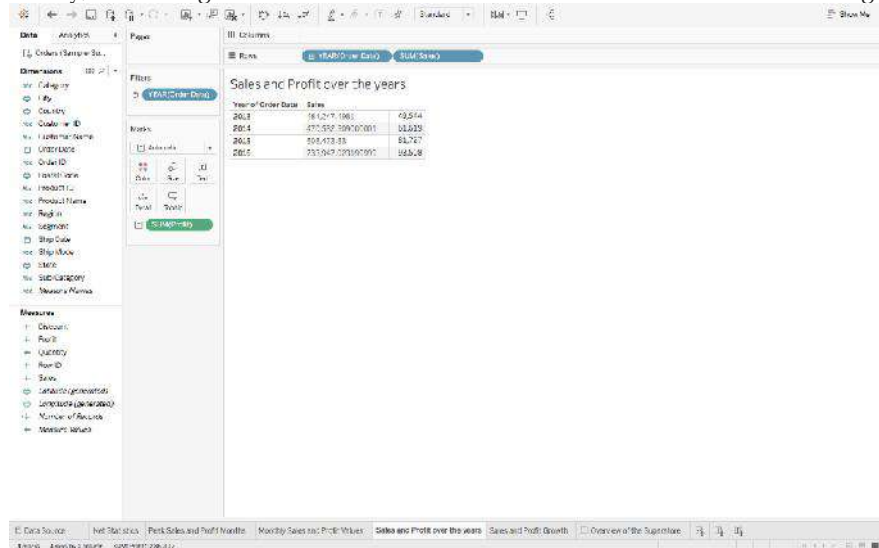
1. Drag **Measure Names** from Dimensions onto the central empty area so that you see a Text Table.
2. **Measure Names** will be displayed automatically onto Rows, so drag it from Rows to Columns.
3. Since we don't really need Measures like the Row ID, Discount, etc, you can drag them off from below the Marks Pane, to get something like this :



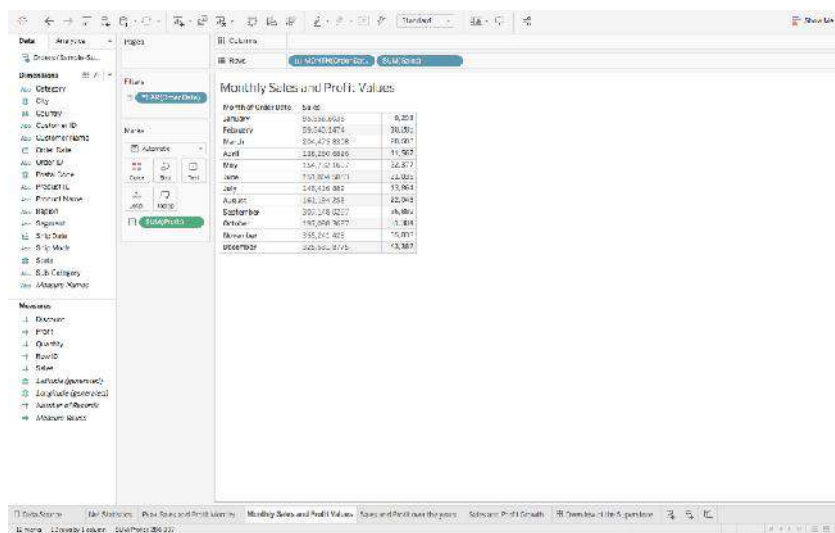
Note: Don't get confused by the different colors of the fields that you see. Just remember one small **trick: Blue means Discrete and Green, Continuous.**

So we have the net Sales and Profit values, let's delve a little deeper by getting the **Sales and Profit Values over the years**. Let's make another, but a more detailed, Text Table :

1. Drag **Order Date** from Dimensions and **Sales** from Measures to Rows.
2. Right-click on the green **Sales Pill**, and select **Discrete**, in place of **Continuous**, since we want the explicit values and not the bar graphs.
3. Finally, drag **Profit** on the 'abc' column to get :



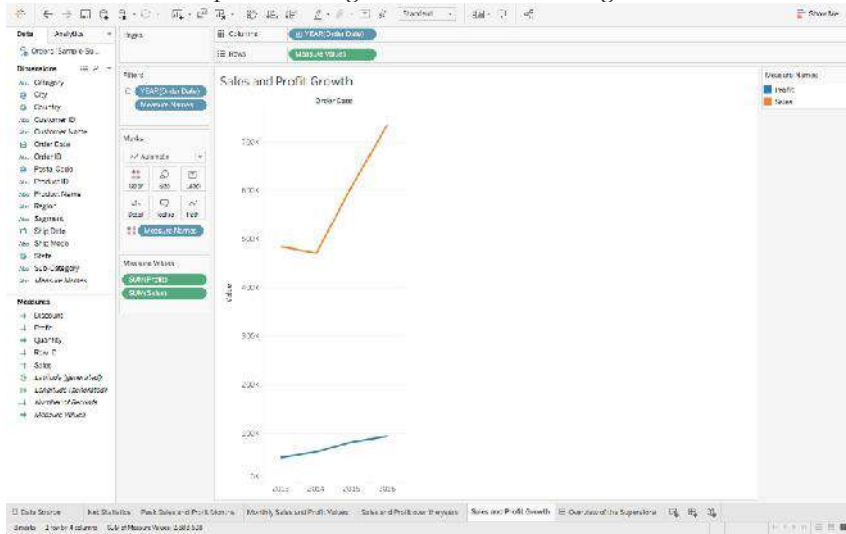
4. Do the same thing for **Monthly Sales and Profit Values**, but this time changes the format of **Order Date**, from **Year to Month**, by right-clicking on **Order Date** in the **Rows**, and choosing **Month**, to get something like this :



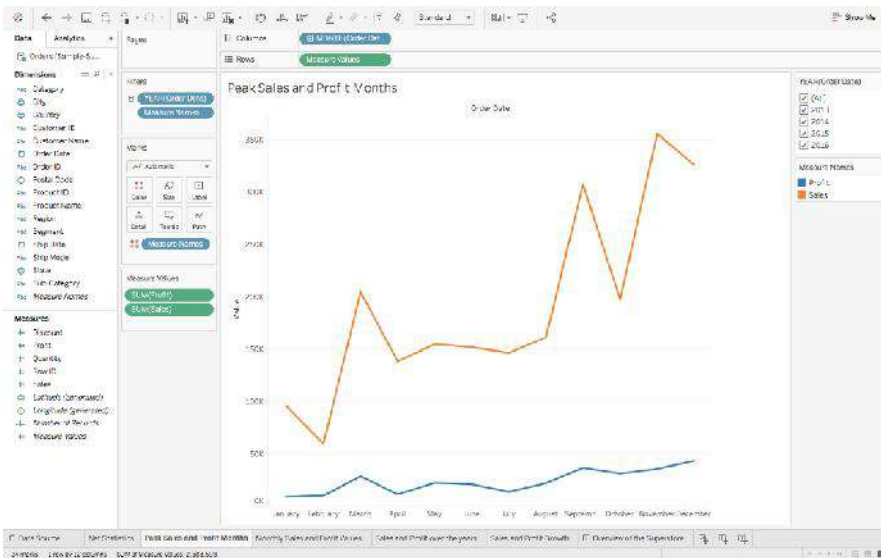
We have just covered the numeric part of the Dashboard, but that is not its selling point. It's the **Line Charts**. Lets quickly learn how to make one :

1. To create the chart of **Sales and Profit Growth**, drag **Order Date** over the **Columns**, **Sales** over **Rows** and then **Profit** over the formed **Sales** axis – so that you

see an equals sign - to get the following :

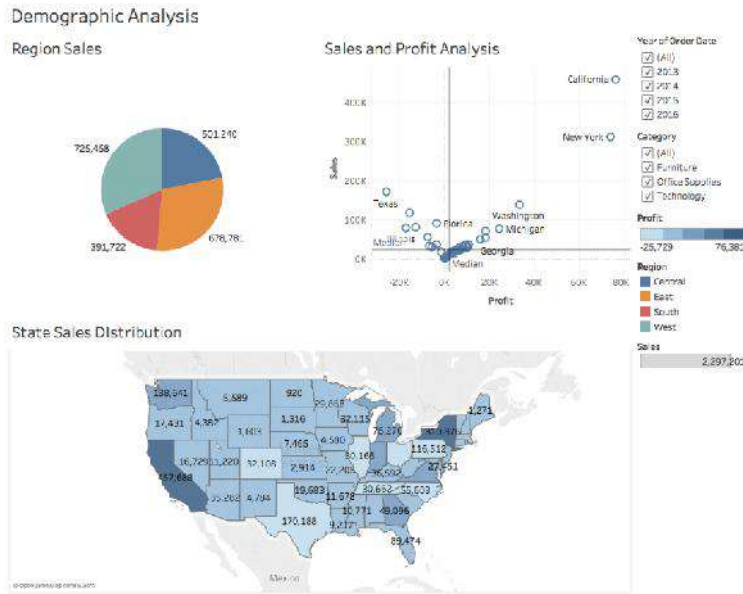


2. Repeat the same to find the **Peak Sales and Profit Months**, but again change the format of **Order Date**, from **Year to Month**, and get :



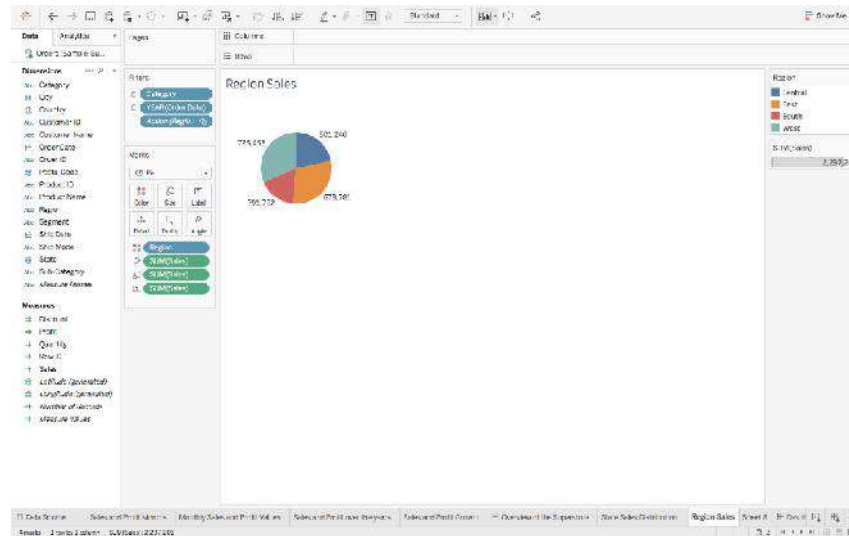
If you were to click on **Show Me**, you will see the different types of Line Charts that you can make, and if you were to hover over each of them, you will get to see their Dimension and Measure requirements too. In case you ever feel lost, I recommend referring to Show Me.

With the previous visualizations, we had gotten a brief overview of the Superstore. Let's dig a little deeper now. The next thing that I can think of exploring is the demographic of the Sales and Profit. What are the States that have the highest Sales Revenue, which ones are generating the maximum Profits:



Before discussing the inferences, let's first create the **Pie Chart of Region Sales** :

1. Drag **Regions** onto Rows and **Sales** onto Columns.
2. Go to **Show Me**, and select the **Pie Chart**.
3. And finally, drag **Sales** over the **Label** in the **Marks Pane** to get :



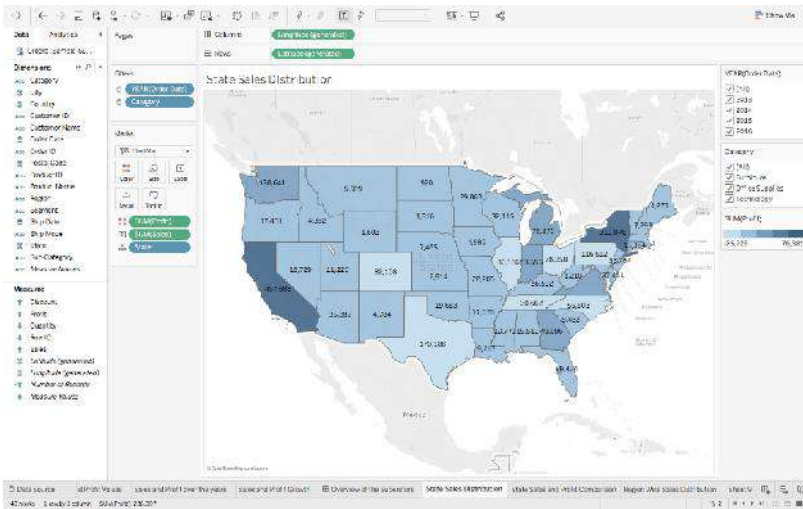
From the visual, it's pretty evident that the two opposite ends, East and West are leading in the Sales game. Let's dissect this a bit more.

Note : Whenever you have some geographical data, it is always advisable to plot and see it on a Map to gain better insights.

So, we are now going to make the **Map Chart of State Sales Distribution** :

1. Since its the States that we wish to analyze, drag **States** onto the empty area, so that you automatically see a Map, with small Circles. Follow this step by dragging **Profits** next. You will notice the size of these circles changing to represent the varying values of Profits. This is called a **Symbol Map**. But we are going to convert this into a **Filled** one, by going to Show Me, and selecting the **Filled Map**.

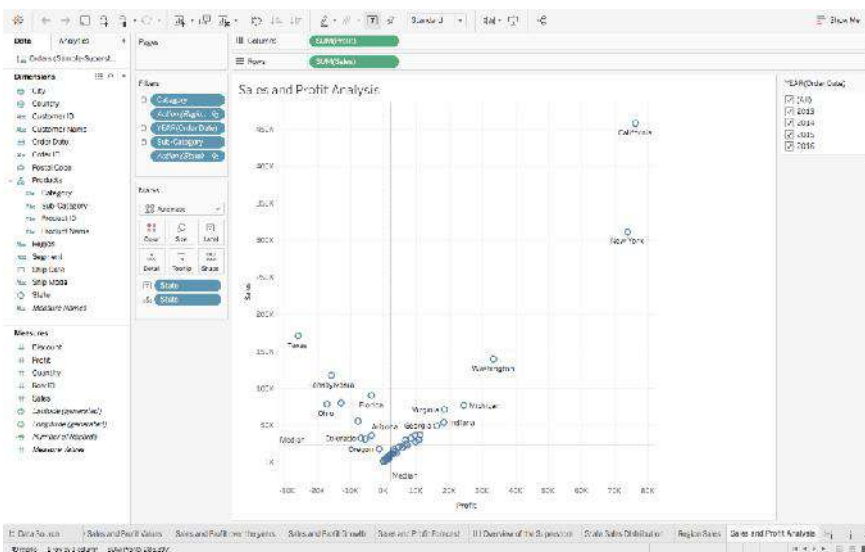
2. Drag **Profits** again, but this time onto **Label** in the **Marks Pane**, to view the Profit Values mapped as well, like so :



California and New York are the top most sellers from the West and East region, but unfortunately, there are other states such as Texas, Colorado which even after having good Sales, have negative Profits! This is certainly not good news for the Superstore. You can perceive a good analysis for the other States as well.

And lastly, here are the steps for making the **Scatter Plot of Sales and Profit Analysis** :

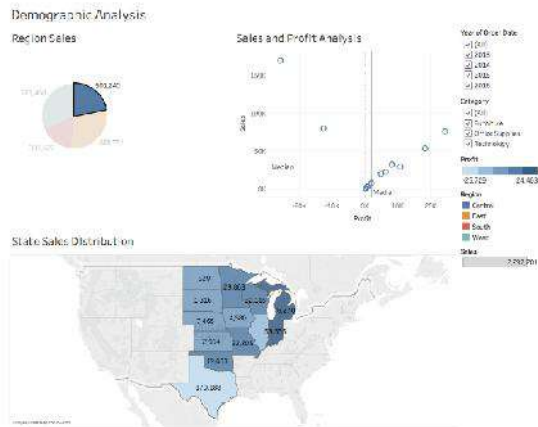
1. Drag **Sales** onto Rows, and **Profit** onto Columns. You will see one tiny circle, which actually represents the Total Sales and Profit Values.
2. To get more information, drag **States** onto the graph created, so that these circles/bubbles scatter to represent the individual States.
3. To better understand the central tendency of the data, we have also added a **Median axis** as Reference Line. This can be easily done by right-clicking on the **Sales / Profit Axis** - > **Adding Reference Line** and choosing **Median** over the default Average Reference.
4. Finally, for some more insight, drag **States** again, but this time onto **Label** in the Marks Pane, and get:



The findings from the **Map chart** become more prominent with the following **Scatter plot inferences** :

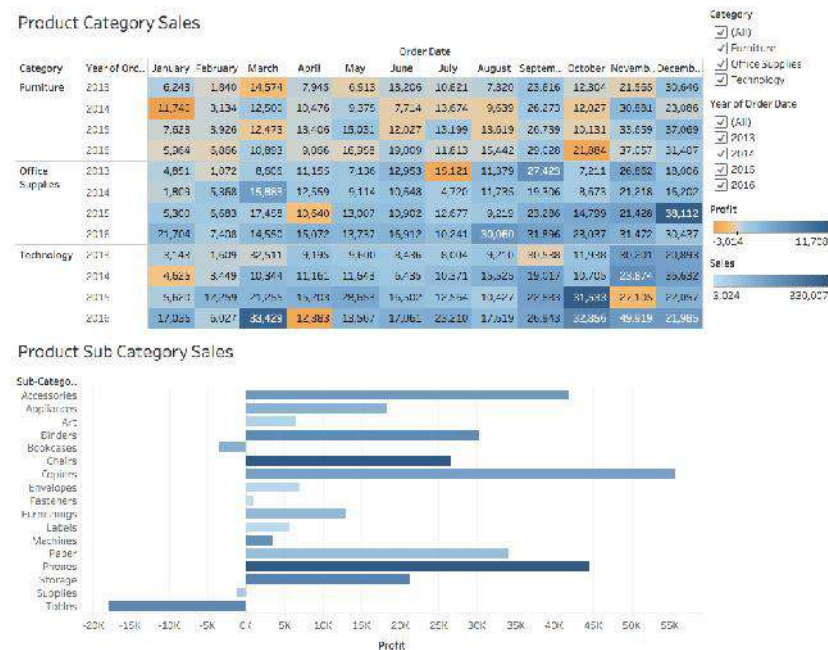
- The states in the top right, with high Sales and high Profits, mean good business for the organization.
- States with positive Sales and Profits, but near the two respective axis are the ones where there is some scope of improvement.
- Whereas the states that belong to the 2nd or 3rd quarter are the ones which are not generating much revenue.

One of the great things about Tableau is that it lets you interact with the visuals. Have a look at an example :



When we clicked on the Central Region, it highlighted and showed the Central States of the US, along with their respective Sales and Profit scatter. Here we used the chart as a Filter itself which is a feature of a Dashboard. We shall learn how to make one at a later stage.

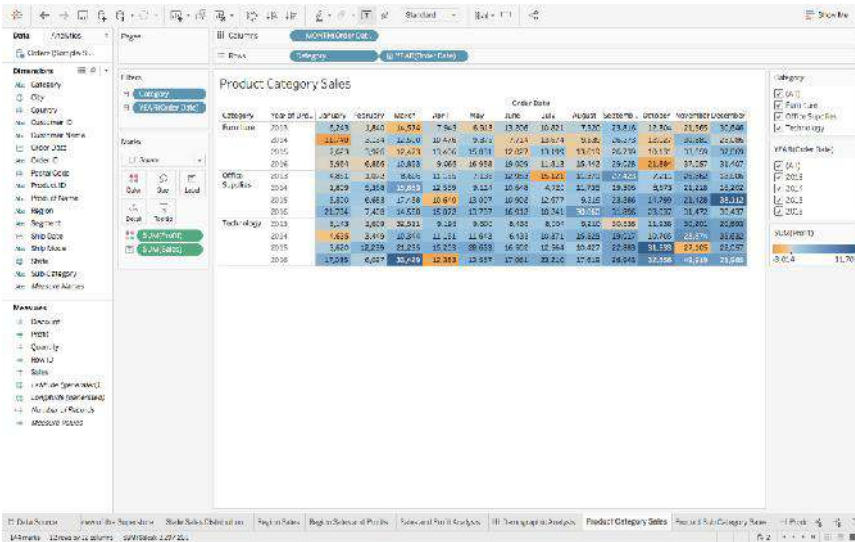
There is one pretty important analysis that we have yet to touch, and that is Product Statistics. High Sales could be easily attributed to the high cost of the products being sold. Also, when you are considering expansion, you will want to know the Sales distribution of the Products too:



Here we have visualized not just the Sales but also the Profits.

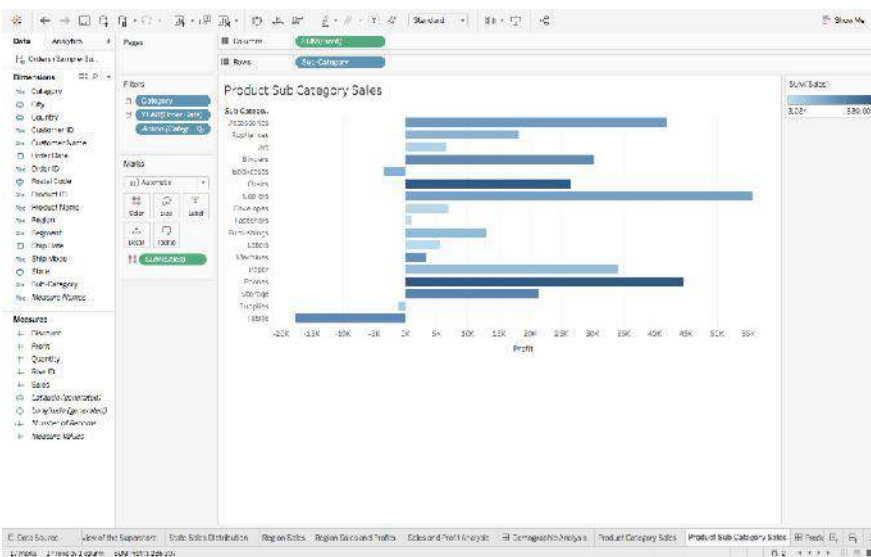
It's quite surprising to see Categories that have high Sales, generating negative profits, like Technology in November 2015, or Furniture in October 2016 and this is inferred from the first chart, which is also called a **Highlight Table**. As the name suggests, it highlights the relative proportion of the Measure Values of our data. So let's learn how to make one :

1. Drag **Category** and **Order Date (Year)** in Rows.
2. Drag **Order Date (Month)** over Columns, and **Sales** over the empty 'abc' fields
3. Select **Highlight Table** from Show Me, and drag **Order Date (Year)** back to Rows, in case it got re-shuffled.
4. Finally drag **Profits** over **Colour** in the Marks Pane, to get :



The **Product Sub Category Sales** is a **Bar Chart**, which is also quite easy to make :

1. Just drag **Sub - Category** over to the Rows
2. Drag **Profit** onto the Columns.
3. Go to Show Me and choose the **Horizontal Bars**
4. For some customization, drag **Sales** over **Colour** in the Marks Pane to attain this final visualization:



From the above graph, we are getting a good idea of the Net Sales and Profit margins of the various products. Notice that even though Tables' Sales are quite high on the scale, it's the only product with the least profit.

Now, just like before, consider interaction with the visualization:



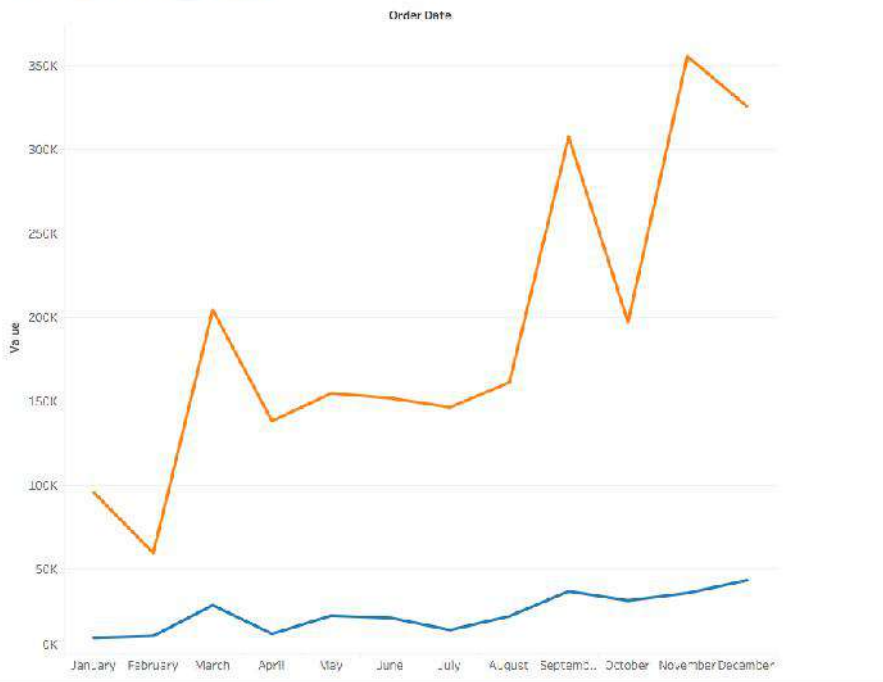
We are now able to view each Category’s Products’ Sales and Profits, at a low-level granularity of Year and Month!

12.5 Filters

Till now we have only made simple charts, that actually provide cumulative data, which is combined data over the lifetime of the Superstore. To look at Sales of a particular Year, a Month, for a certain Product, or to basically view the distinct aspects of the data, **Filters** are the way to go.

Let’s head back to the first-ever Chart that we had made, of **Peak Sales and Profit Months** :

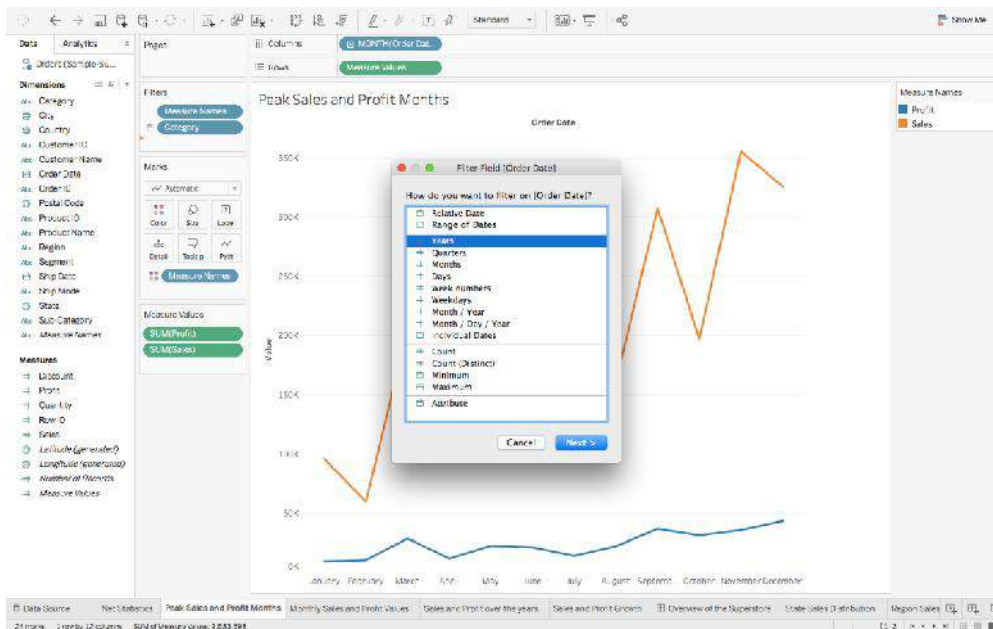
Peak Sales and Profit Months



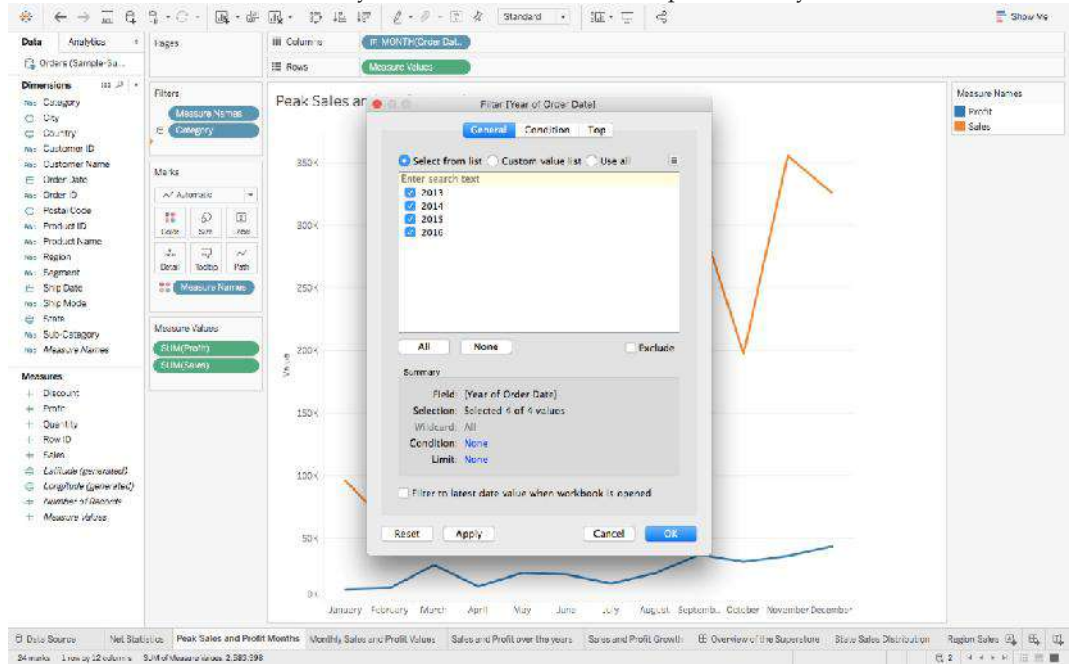
The visual here is an accumulation of all 4 years of data, for all Regions, States, Categories and Sub Categories.

The steps of turning any Dimension into a Filter are the same. Let's first experiment with the Order Date (formatted to Year) :

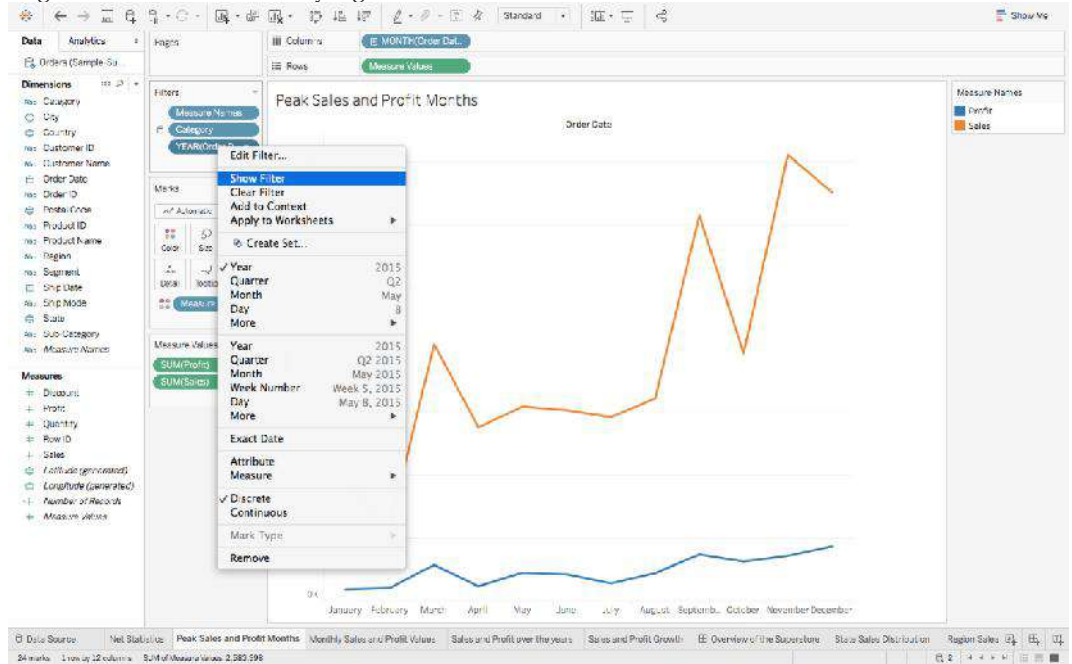
1. Drag the Dimension to the **Filters' Shelf**, to see the following pop up. Here we will be choosing Years :



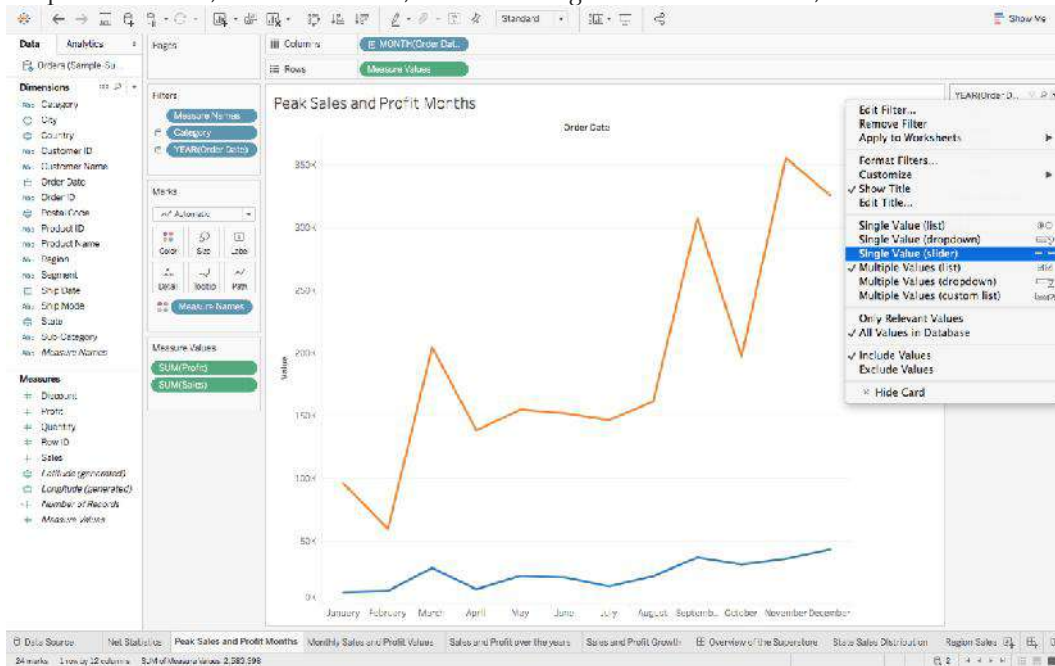
2. Choose the values that you want to be a part of your Filter :



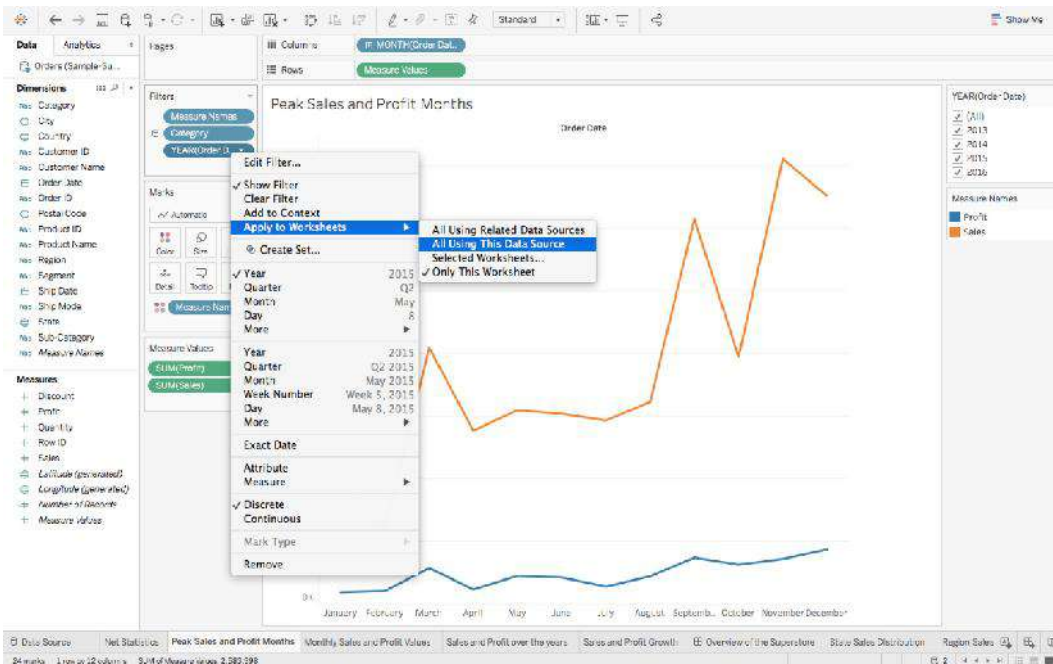
3. Right-click on the newly generated Filter, and then choose Show Filter :



4. You can also change the format of your Filter, for example, whether you wish for a Dropdown list, a Slider, a Single Value List, etc :



5. If you feel that some of your filters can be applied to other sheets as well, then rather than repeating the steps, you can simply **Apply the Filter** to all other relevant Worksheets :



Summary

- Tableau Public Server. Tableau Public server is a free server in the internet. ...
- Tableau Public Desktop. Tableau Public Desktop is a free desktop application. ...
- Tableau Mobile. Tableau mobile is a mobile application.

- Tableau can handle millions of rows of data with ease. Different types of visualization can be created with a large amount of data without impacting the performance of the dashboards.
- Also, there is an option in Tableau where the user can make “live” to connections to different data sources like SQL etc.

Keywords

- Visualization helps people to understand things clearly and have a better insight into the topic.
- Visualization helps to predict the future easily and take better decisions
- Data of large volumes can also be spotted easily and quickly
- Data visualization conveys the information in a universal manner
- It makes it simple to share ideas with others

Self-assessment questions

1. How do you identify a continuous field in Tableau?

- A. It is identified by a blue pill in the visualization
- B. It is identified by a green pill in a visualization
- C. It is preceded by a # symbol in the data window
- D. When added to the visualization, it produces distinct values

2. How do you identify a discrete field in Tableau?

- A. It is identified by a blue pill in the visualization
- B. It is identified by a green pill in a visualization
- C. It is preceded by a # symbol in the data window
- D. When added to the visualization, it produces distinct values

3. The icon associated with the field that has been grouped is a _____

- A. Paper Clip
- B. Set
- C. Hash
- D. Equal To

4. What are the file extensions in Tableau?

- A. Tableau Bookmark (.tdm)
- B. Tableau Map Source (.tms)
- C. Tableau Preferences (.tps)
- D. All of the above

5. How to view underlying SQL Queries in Tableau?

- A. Create a Performance Recording
- B. Reviewing the Tableau Desktop Logs
- C. Both A and B
- D. None

6. Tableau was introduced in the year of

- A. 2000
- B. 2002
- C. 2003
- D. 2005

7. What different products Tableau provide?

- A. Tableau Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

8. _____ is an online platform that allows you to host and manage Tableau data sources.

- A. Tableau Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

9. _____ helps to create reports, dashboards, and stories using different charts and graphs.

- A. Tableau Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

10. _____ does not need to connect to any source, but it can read reports built on top of any and all of the listed data sources that Tableau Supports.

- A. Tableau Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

11. Your data is out in the public once your report is published on to the _____.

- A. Tableau Public Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

12. _____ is for somebody that only needs to monitor the analytics

- A. Tableau Public Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

13. For creating variable size bins we use _____

- A. Sets
- B. Groups
- C. Calculated fields
- D. Table Calculations

14. For writing own calculation we use _____

- A. Sets
- B. Groups
- C. Calculated fields
- D. Table Calculations

15. For writing separation of two categories we use _____

- A. Sets
- B. Dimensions
- C. Show me
- D. Table Calculations

Answers for Assessment

1 b	2 a	3 a	4 d	5 c	6 c	7 d	8 a
9 b	10 c	11 a	12 c	13 c	14 c	15 a	

Review Questions

- What makes data visualization good?
- How can you visualize more than three dimensions in a single chart?
- Is Tableau good for data visualization?
- What are the strengths and limitations of Tableau when it comes to data visualization?
- What Are the Data Types Supported in Tableau?
- How Will You Understand Dimensions and Measures?
- What is Meant by 'discrete' and 'continuous' in Tableau?



Further Readings

"Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few

"Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"



Web Links

<https://www.tableau.com/>

<https://intellipaat.com/blog/what-is-tableau/>

Unit 13: Interactive Dashboard Tableau

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- 13.1 What is Data Visualization?
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- 13.3 What are the common challenges?
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- 13.5 What are its major processes?
- 13.6 What are the best tools?
- 13.7 What is the purpose of Big-Data Visualization tools?
- 13.8 Top 5 Data Visualization Techniques and Strategies
- 13.9 Tableau Pareto Chart
- 13.10 Mapping Concepts in Tableau:

Summary

Keywords

Self Assessment

Answers for Self Assessment

Review Questions

Objectives

After studying this unit, you will be able to:

- Understand concept of Advance tableau graphs.
- install software for data visualization.
- Understand Show me tab of tableau.
- Understand concept of green and yellow pills (discrete data and continuous data).

Introduction

Tableau Desktop is a part of the tableau suite for Business Intelligence used for data analytics and visualization. It's a visual analytics solution that allows the user to explore complex datasets from varied sources and perform various operations to drive valuable insights out of them.

On Tableau Desktop, even a non-programmer can connect with a myriad of data sources and transform the data into dashboards. These dashboards can then be shared with multiple users through Tableau Server to make data-driven decisions.

Advanced Charts in Tableau

Tableau is a powerful Business Intelligence tool and thus, provides a number of visualizations to represent different business scenarios. It also features the Visualization Query Language or VIZQL that enables you to run queries and interact with the SQL database

Tableau features more than 25 different types of visualizations in terms of charts, maps, and graphs. From a simple bar chart to advanced stacked bar and gauge charts, tableau has it all.

13.1 What is Data Visualization?

It uses charts and graphs to visualize large amounts of complex data. Visualization provides a quick, easy way to convey concepts and summarize and present large data in easy-to-understand and straightforward displays, which enables readers insightful information. With the help of its techniques, enterprises are able to see the overview of their unstructured enterprise data in a better way.

What are its key features?

- Identify areas that need attention or improvement.
- Clarify which factors influence customer behavior.
- Decision-making Ability.
- Integration Capability.
- Predict sales volumes.

What are the best techniques?

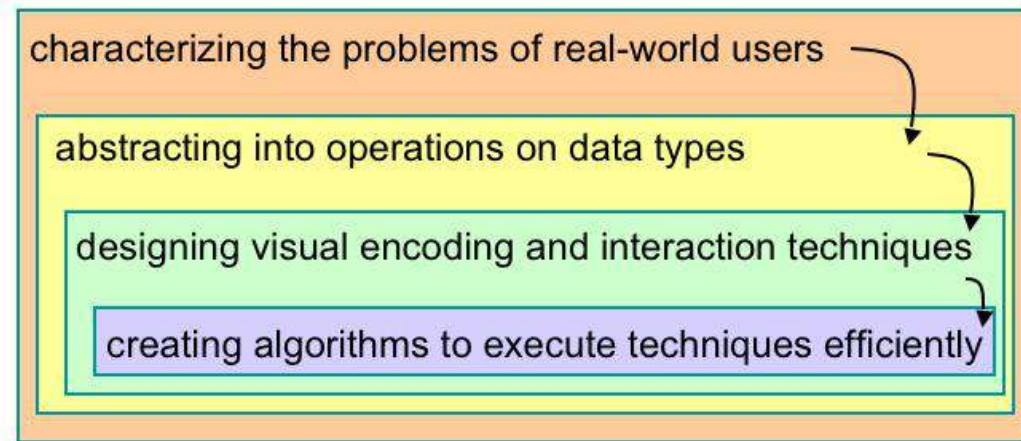
For growing companies, it is the essential part of the business to make business strategies. They follow various visualization techniques listed below:

Understanding the motive of the Visualization

- Know your data.
- Getting to know the structure of your data.
- Which Variables are we trying to plot?
- How x-axis and y-axis will be used for the representation.
- How different colors symbolize visualization.

13.2 Identify the Purpose of the Visualization

1. Identifying the purpose of creating a chart is necessary as this helps define the structure of the process.
2. Select the right chart type.
3. Selecting the right type of chart is very crucial as this defines the overall functionality of the chart.
4. Attention to Detail using colors, shapes, and sizes.
5. Choosing the correct type of color, shape, and size is essential for representing the chart.



13.3 What are the common challenges?

Big Data is a large volume, complex dataset. So, such data cannot visualize with the traditional method as the traditional method has many limitations.

- **Perceptual Scalability:** Human eyes cannot extract all relevant information from a large volume of data. Even sometimes desktop screen has its limitations if the dataset is large. Too many visualizations are not always possible to fit on a single screen.
- **Real-time Scalability:** It is always expected that all information should be real-time information, but it is hardly possible as processing the dataset needs time.
- **Interactive scalability:** Interactive help to understand what is inside the datasets, but as big data volume increases exponentially, visualizing the datasets take a long time. But the challenge is that sometimes the system may freeze or crash while trying to visualize the datasets.

What are the Data Visualization techniques and strategies?

It strategy is another on the rundown. You may have the information scrubbed and the bits of knowledge removed, yet you ought to likewise make sense of how to manage all the fortune.

Better Preparation and Investigation

Information system guesses numerous means, from examining the business sector and industry, picking and organizing information streams – constant or heritage, inner or outer, or both, and so on., to choosing apparatuses and hotspots for information preparing and investigation – manual information researcher examination, front line AI calculations.

Identify Areas that need Attention.

As indicated by an Experian report, 95% of U.S. associations state that they use the data to control business openings. Another 84 percent accept information is an essential piece of shaping a business system. With an exponentially developing volume of data, chiefs might appear wealthy and ought to get ready to receive liberal rewards from their increasing resources. Nonetheless, more isn't, in every case, better.

Quick Action

Managing much information can be overpowering and bring about "suffocating" if the organizations don't settle specific difficulties before venturing into an information-driven period.

13.4 Interactive Representation of Data

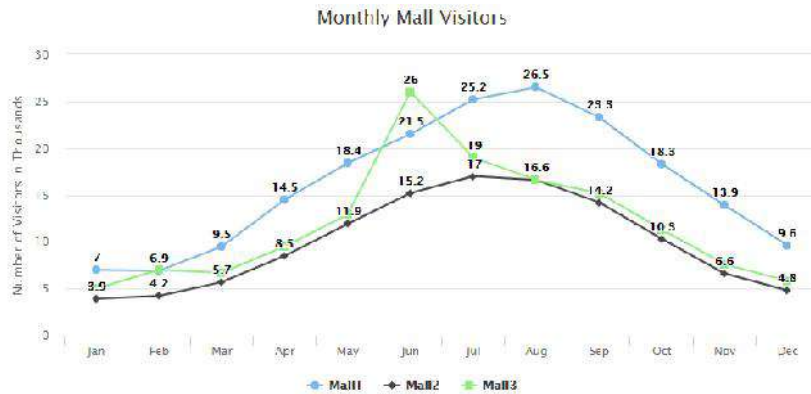
The way we presented information significantly impacts information investigation and deciphers a large amount of information in a continuous structure by using complex arrangements of numerical or verifiable figures. With the vast surges of information promptly accessible to the present organizations across ventures, the test lies in information understanding, essential to the individual association, just as its points, objectives, and long-term targets. Best use of Data The information is essential for the accompanied performance of your business and to help you get the most imaginable incentive. From this, I attempted and tried methods for dissecting and introducing crucial data.

What are the key components?

Its component helps to give more details and alternative views to look after the data. Listed below are the components of it.

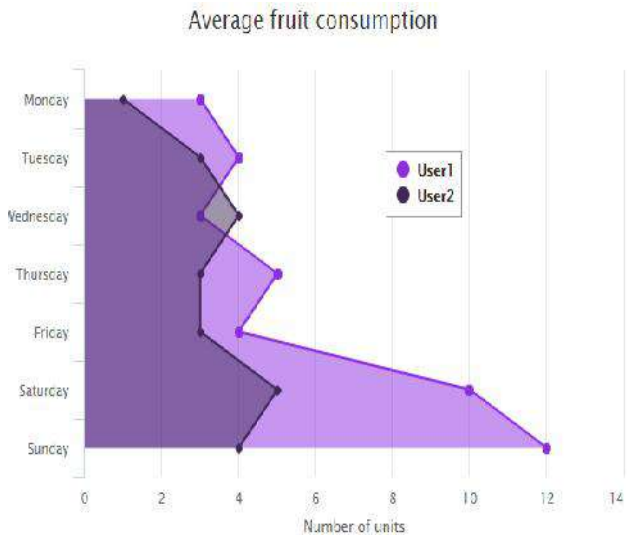
Line Charts

Line Charts involves Creating a graph in which data is represented as a line or a set of data points joined by a line.



Area chart

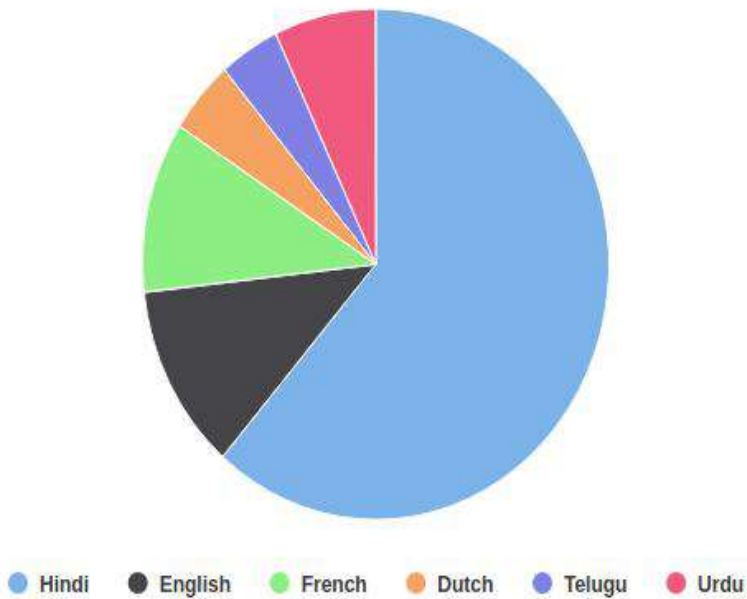
Area chart structure is a filled-in area that requires at least two groups of data along an axis.



Pie Charts

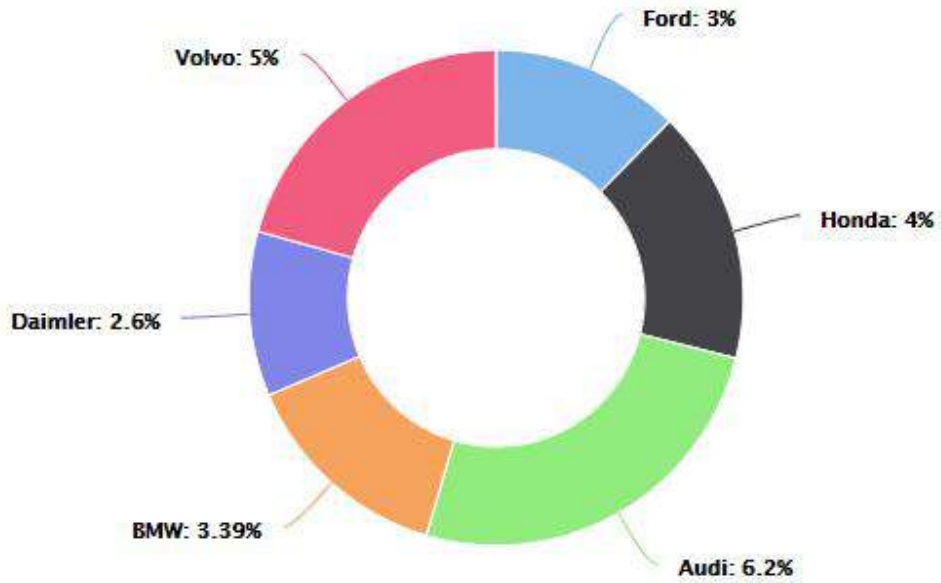
Pie charts represent a graph in the shape of a circle. The whole chart is divided into subparts, which look like a sliced pie.

Languages in the World



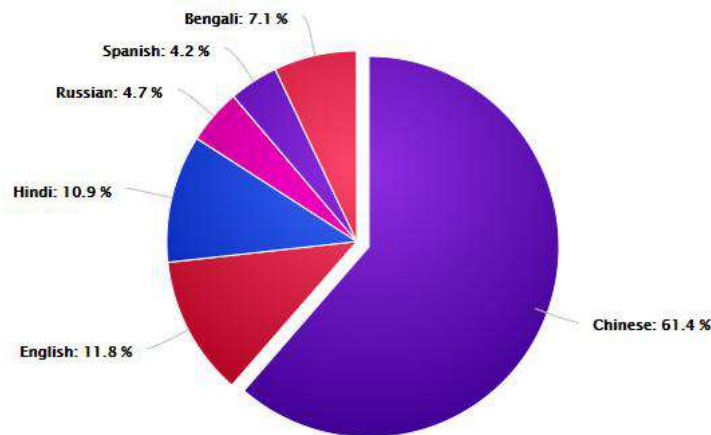
Donut Chart

Doughnut Charts are pie charts that do not contain any data inside the circle.



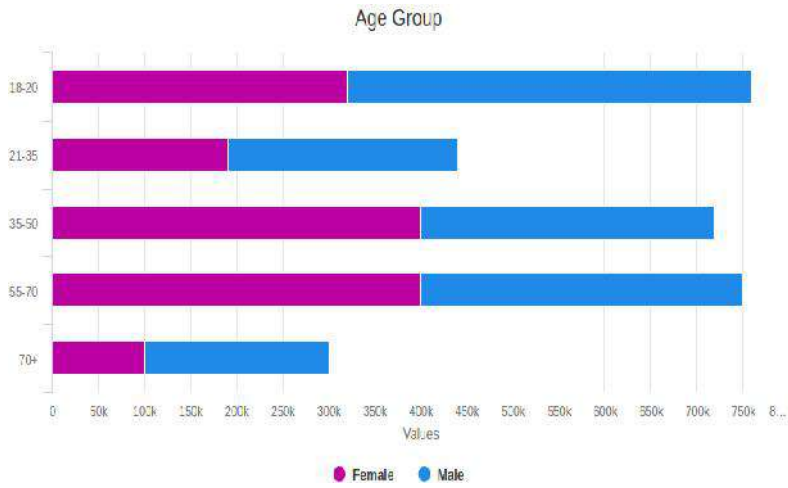
Drill Down Pie charts

Drill down Pie charts are used for representing detailed description for a particular category.
Languages in the World



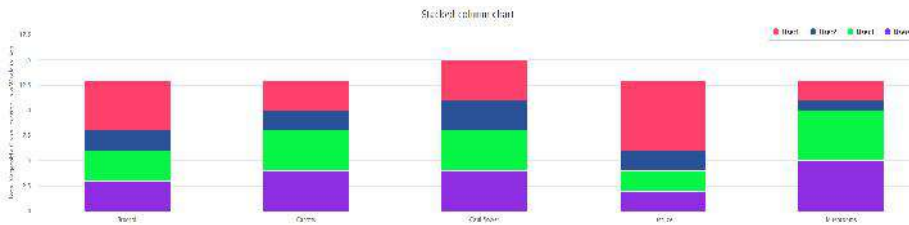
Bar Charts

A bar chart is the type of chart in which data is represented in vertical series and used to compare trends over time.



Stacked Bar

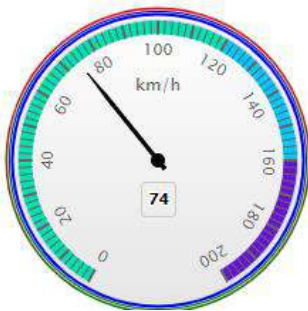
In a stacked bar chart, parts of the data are adjacent to each bar and display a total amount, broken down into sub-amounts.



Gauges

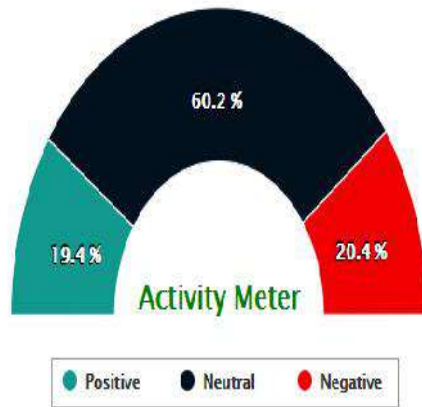
The gauge (gauge) component renders graphical representations of data.

Gauge Speedometer



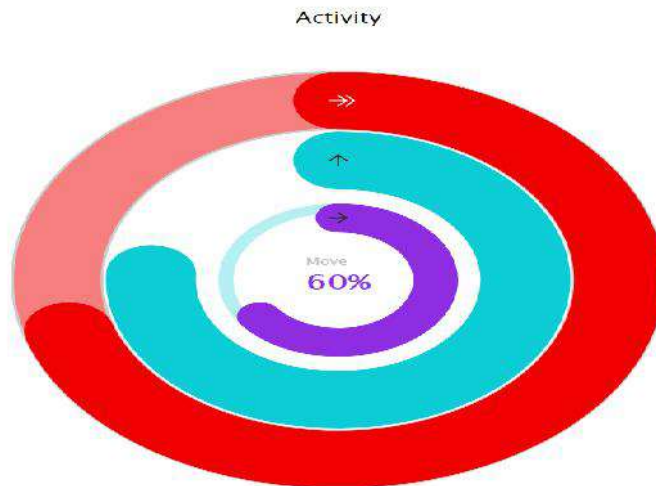
Solid Gauge

Creates a gauge that indicates its metric value along a 180-degree arc.



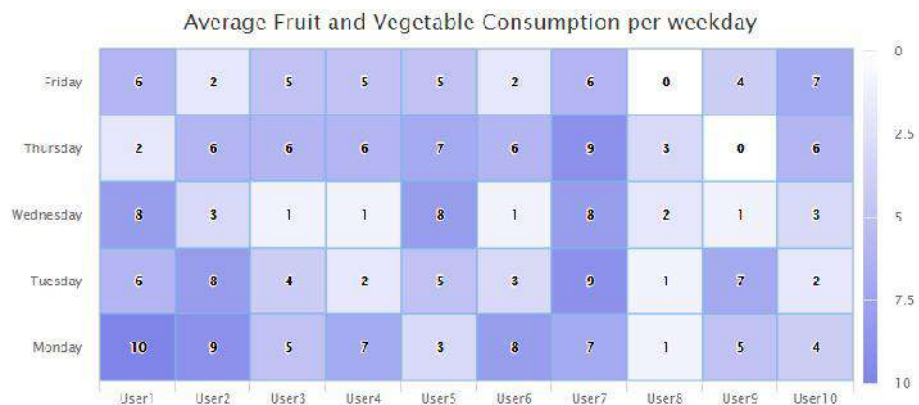
Activity Gauge

Creates a gauge that shows the development of a task. The inner rectangle shows the current level of a measure against the ranges marked on an outer rectangle.



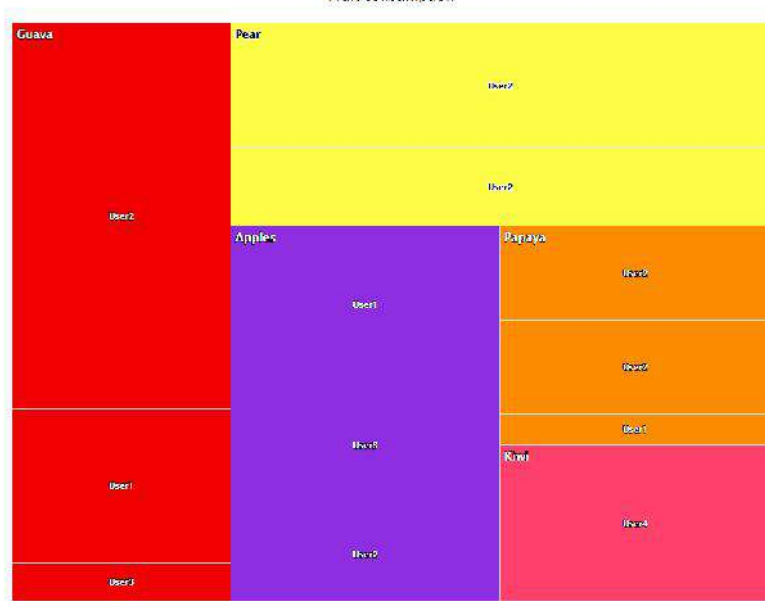
Heat and Treemaps

Heatmaps are useful for presenting variation across different variables, revealing any patterns, displaying whether any variables are related to each other, and identifying if any associations exist in-between them



Treemap with Levels

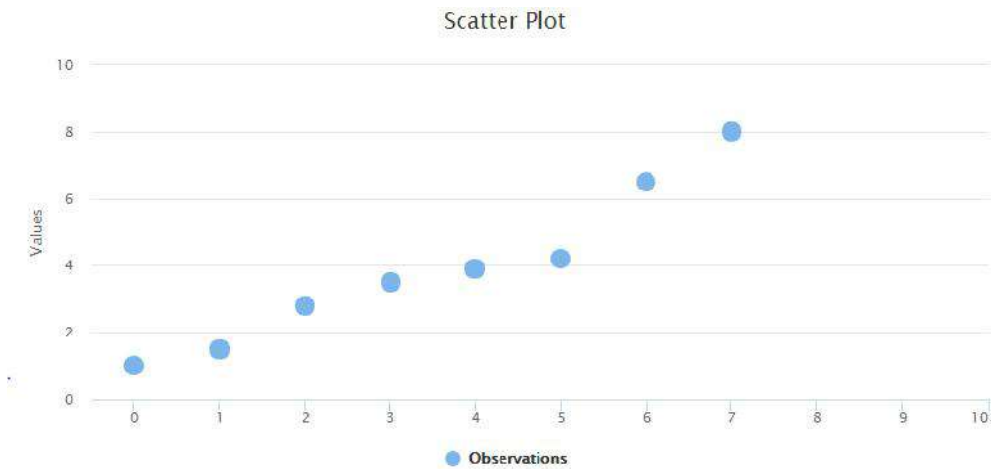
The treemap component displays quantitative hierarchical data across two dimensions, represented visually by size and color. Treemaps use a shape called a node to reference the data in the



hierarchy.

Scatter and Bubble Charts

Creates a chart in which the position and size of bubbles represent data. Use to show similarities among types of values, mainly when you have multiple data objects, and you require to see the general relations.



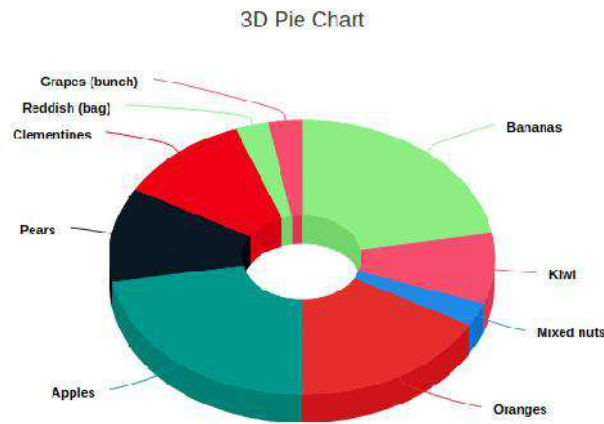
Combinations

Creates a graph that uses various kinds of data labels (bars, lines, or areas) to represent different sets of data items.



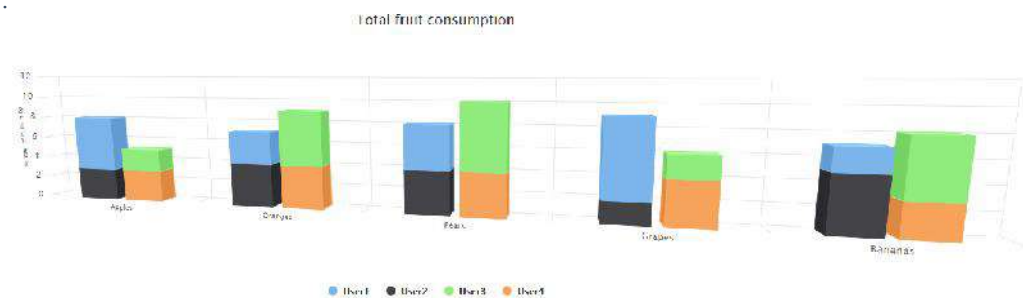
3D Charts

Creating a 3D chart helps rotate and view a chart from different angles, which supports in representing data.



3D Column

A 3D chart of type columns will draw each column as a cuboid and create a 3D effect



13.5 What are its major processes?

Each and every data has its particular need to illustrate data. Listed below are the stages and process flow for it.

Acquire

Obtaining the correct data type is a crucial part as the data can be collected from various sources and can be unstructured.

Parse

Provide some structure for the data's meaning by restructuring the received data into different categories, which helps better visualize and understand data.

Filter

Filtering out the data that cannot serve the purpose is essential as filtering out will remove the unnecessary data, further enhancing the chart visualization.

Mining

Building charts from statistics in a way that scientific context is discrete. It helps viewers seek insights that cannot be gained from raw data or statistics.

Represent

One of the most significant challenges for users is deciding which chart suites best and represents the right information. The data exploration capability is necessary to statisticians as this reduces the need for duplicated sampling to determine which data is relevant for each model.

Refine

Refining and Improving the essential representation helps in user engagement.

Interact

Add methods for handling the data or managing what features are visible.

13.6 What are the best tools?

Nowadays, there are many tools. Some of them are:

- **Google Chart:** Google Chart is one of the easiest tools for visualization. With the help of google charts, you can analyze small datasets to complex unstructured datasets. We can implement simple charts as well as complex tree diagrams. Google Chart is available cross-platform as well.
- **Tableau:** The tableau desktop is a very easy-to-use its tool. Two more versions are available of Tableau. One is "Tableau Server," and the other is cloud-based "Tableau Online." Here we can perform visualization operations by applying drag and drop methods for creating visual diagrams. In Tableau, we can create dashboards very efficiently.
- **Microsoft Power BI:** This tool is mainly used for business analysis. Microsoft Power BI can be run from desktops, smartphones, and even tablets. This tool also provides analysis results very quickly.
- **D3:** D3 is one of the best tools. D3.js is an open-source visualization tool.
- **Datawrapper:** Data wrapper is a simple tool. Even non-technical persons can use the Datawrapper tool. Data representation in a table format or responsive graphs like a bar chart, line chart, or map draws quickly in the Datawrapper.
- **Databox:** Databox is another visualization tool. It is an open-source tool. The whole data set can store in one location in the Databox tool. Then discover the insight data and perform visualization operations. In dashboard can view or match data from different datasets.

Many more tools are available per requirements and based on datasets, and visualization tools are chosen.

13.7 What is the purpose of Big-Data Visualization tools?

Its tools' purpose is to read complex unstructured data with the help of visual diagrams to benefit our business. One relevant example is the covid 19 affected report. That is a large dataset. Only data scientists can read and find out the pattern and predict the percentage of affected patients.

Approach to Visualize Big Data

Big data is unstructured, and such data can be very easily stored on a NoSql database like MongoDB or relevant information needed to extract from the data and stored on a SQL database. Then from that dataset, with the help of its tools, some charts like bar charts, pie charts, etc., need to plot. Then from those visual chart analyses can be performed.

13.8 Top 5 Data Visualization Techniques and Strategies

This section will list 5 basic techniques and strategies you should know to manage and analyze a large amount of data in a simple manner. So, let's get started!

Design your Visualization keeping the Audience in Mind

When it's all said and done, the World Wide Web and Information Technology as an idea are in their early stages – and information perception is a significantly more active part of advanced development. So, the absolute most cultivated business people and officials think that it is hard to process more than a pie diagram, bar chart, or a neatly introduced visual, nor do they have the opportunity to dig profound into information. Hence, guaranteeing that your substance is both moving and custom-fitted to your crowd is one of the most basic information perception methods possible. A few partners inside your association or customers and accomplices content with a straightforward pie diagram. However, others are looking to you to dig further into the bits of knowledge you've assembled, and this is one of the [best strategies](#). For the most significant effect and achievement, you ought to consistently examine those you're introducing. Before a gathering, and ordering your report to guarantee your visuals and level of detail address their issues precisely.

Have Clear Goals for the Visualization Strategy

- Like any business-based interest, from the brand narrating directly through to computerized selling in the past – with the representation of your information, your endeavors are convincing as the methodology behind them.
- To structure your perception endeavors, make a legitimate story, and drill down into the bits of knowledge that issue the most. It's critical to set a distinct arrangement of points, targets, and objectives preceding the structure of your administration reports, diagrams, outlines, and extra visuals.
- By building up your focuses on a particular crusade of interest. You ought to plunk down in a synergistic situation with others. Put resources into the extend and Define your endpoints regardless of the type of information that helps you reach them.
- One of the [advanced Data Visualization techniques](#) to direct your endeavors is by utilizing a foreordained arrangement of applicable KPIs for your undertaking, efforts, or continuous business endeavors and utilizing these bits of knowledge to create your perceptions.

Number charts

- Real-time number diagrams are exceptionally viable when you're looking to grandstand a quick and intuitive review of a specific key presentation marker, regardless of whether it's a business [KPI](#), site appearances, commitment levels, or a level of advancement.

Maps

- Most importantly, maps look incredible, which implies they move commitment in an executive gathering or introduction. Besides, a guide is a snappy, simple, and

absorbable approach to introducing vast or complex geological data arrangements for various purposes.

Pie charts

- While pie graphs have received a terrible rep lately, we feel that they structure a valuable perception device. That presents essential measurements in a simple-to-follow group. Pie diagrams are especially useful while showing the relative arrangement of a specific variable over a static period. What's more, pie diagrams make an essential thing of your representation.

Gauge Charts

- This model shows the working cost proportion, firmly identified with the benefit and misfortune territory of your fund division's critical exercises, and this shading-coded wellbeing measure causes you to access the data you need, even at a quick look.
- Gauge charts can be successfully utilized with a solitary worth or information point. Regardless of whether they're being used in money-related or official dashboard reports to show progress against key execution markers. Check outlines are an astounding guide to feature a quick pattern sign.

Colors Matter

- The clearest of our chose information representation procedures. Selecting the right shading plan for your presentational resources is one of the best Techniques and Strategies. That will help improve your endeavors fundamentally.
- The standards of shading hypothesis will notably affect the general accomplishment of your perception model. You ought to consistently attempt to keep your shading plan steady through your information perceptions, utilizing clear differentiation. To recognize components (for example, positive patterns in green and negative trends in red).
- As a guide, individuals utilize yellow as it can be perceived and deciphered easily.

Keep visualizations dashboards Simple and appropriate

- To assist you with taking care of your enormous information and separate it. For the most engaged, legitimate, and absorbable representations conceivable, here are some essential hints:
- Find which information is accessible to you and your association, conclude which is the most significant, and mark each part of data obviously. To make it simple to isolate, break down, and interpret.
- Guarantee that the entirety of your partners, staff, and colleagues comprehend where your information originates from and how to get to it. To guarantee the smooth treatment of bits of knowledge across offices.
- Keep your information ensured and your information taking care of frameworks basic, absorbable, and refreshed. To make the representation procedure as direct and natural as humanly conceivable.
- Guarantee that you use business dashboards that present your most significant bits of knowledge in a straightforward. To-get to deep space – quickening the perception procedure while likewise crushing the most considerable incentive from your data.

Tell a Data Story

- Like substance showcasing, when you're introducing your information in a visual configuration. With the point of conveying an important message or objective, recounting your story draws. In your crowd and make it simple for individuals to comprehend with negligible exertion.
- Scientific studies affirm that people, in huge, react better to an all-around recounted story and by adopting this strategy. To your representation interests, you won't just astonish your associates, accomplices, and customers with your reports and introductions. However, you build your odds of passing on your most basic messages, getting the upfront investment and reaction. As per best techniques and Strategies, you have to make the sort of changes. That brings about long-haul development, advancement, and achievement.

- To do as such, you ought to order your data, thinking as far as an essayist. Setting up an obvious start, center, and end, just as contention and goals. Building pressure during your account to add the most extreme effect on your different representations.

What are the common use cases?

- **Sports Analysis:** Based on previous datasets with the help of visualization tools, a winning percentage prediction is possible. Graph plotting for both teams or players is possible, and analysis can be performed.
- **Fraud Detection:** Fraud detection is a famous use case of big data. With the help of visualization tools after analyzing data, a message can be generated to others, and they will be careful about such fraud incidents.
- **Price Optimization:** In any business product, price set is a significant issue with visualizing tools and all the components used; price can be analyzed and finally compared with market price, and then a relevant price can be set.
- **Security Intelligence:** Visualizing criminals' records can predict how much threat they are to society. Each country has its security intelligence, and its task is to visualize information and inform others about a security threat.

13.9 Tableau Pareto Chart

Named after Vilfredo Pareto, it's a type of chart that contains both a line graph and a bar chart. Here, the cumulative total is represented by the line graph and other data values with a bar chart in descending order.

There is a principle developed in the year 1906 called Pareto or 80-20 rule used to check the efficiency of your business plans. Below is a step-by-step guide for creating a Pareto chart in tableau:

Load the Sample_Superstore or any other dataset on the Tableau Desktop software.

Add the Sub-Category and Sales dimension from the Data panels to the Columns and Rows sections.

Select the sort option from the drop-down menu of the Sub-Category column.

A dialog box will appear where you have to select the sort order to Descending and other options as mentioned below screenshot.

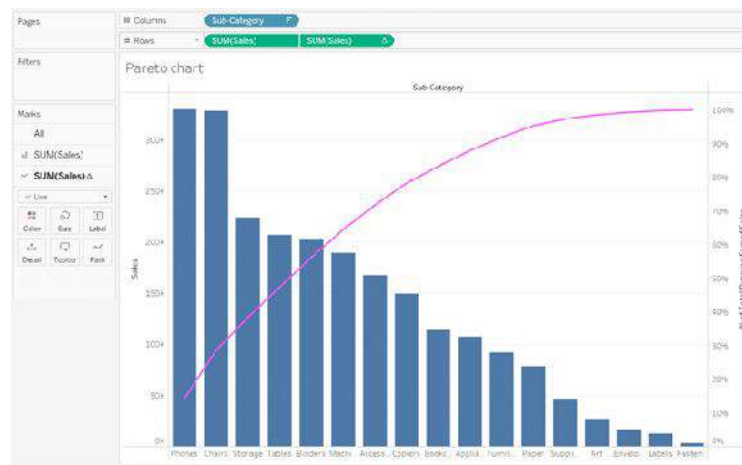


Tableau Maps

Maps have a long history and remain a staple in our daily lives—to navigate on road trips or understand proximity of one location to another. Until recently, maps were static and printed, which limited the potential for business use cases. With technology advancements, content on maps and the maps themselves became digital, interactive, and more appealing as they're incorporated in data analysis and reporting. Seeing location data mapped and included in visualizations has both enhanced understanding by more audiences and offered a valuable, new context. Several best-in-class interactive maps exist, but these ten notable examples cover different topics, span the globe, and demonstrate the power of location data when paired with business intelligence.

Here in tableau, we have different types of maps, which are:

Tableau Proportional symbol maps

Tableau Choropleth maps (filled maps)

Tableau Point distribution maps

Tableau Heatmaps (density maps)

Tableau Flow maps (path maps)

Tableau Spider maps (origin-destination maps)

13.10 Mapping Concepts in Tableau:

It is very difficult to understand the insights of data even though the data is clearly processed and arranged in tables. To tackle this issue or to have a clear understanding of data you must use "Maps" which have occupied an important role in [data visualization](#). We have multiple maps available in the table which plays a unique role in visualizing the data.

There may be several reasons to use maps or plot your data on the map. Maybe you have some location data or do you think plotting data on a map could help you in making your data pop? These two reasons are good enough to create a map visualization. In Tableau each type of map comes with unique features to cater to the specific needs of data mapping requirements.

Tableau maps answer your spatial questions and need to understand the trends in the data.

But you may have popped up with the question "**what is the spatial question**"?

The below-mentioned list is some of the spatial questions:

- Which state has the highest literacy rate in India?
- Which regions in the U.S. have the highest obesity rates?
- Where did storms move over a period of time?
- Which metro station is highly crowded with people in my city?
- Which state has more farmer's markets in the U.S?

These are some of the Spatial questions, and the map is the best possible way to answer all your questions.

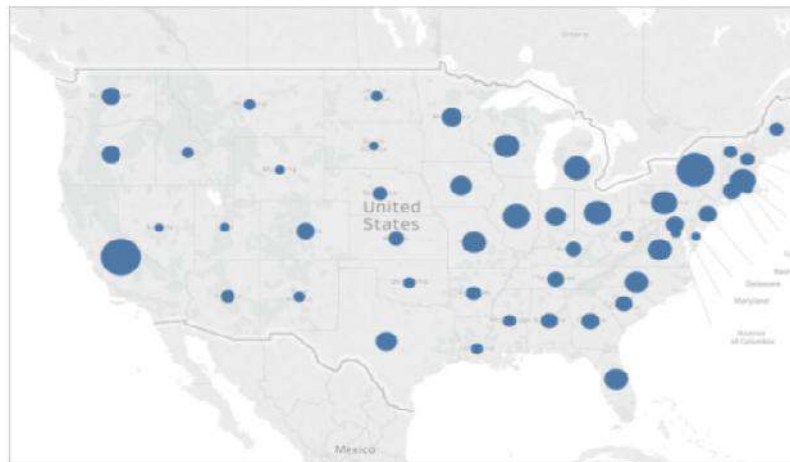
Circumstances to use maps:

Till now we have come to know that if you have spatial question maps would be the perfect way to answer your questions but there may be some exceptions in which you can answer the spatial questions better with other types of charts instead of maps.

Let's consider one of the spatial questions we have asked above.

Take, for example, the last question from the list above: Which state has more farmers markets in the U.S?

Let us assume that you have entire data about the number of farmers markets across the U.S and you wish to know which state has the highest number of farmer markets. The obvious thing that would come to your mind is "Maps" to visualize this data. If you plot the given data related to the US farmers market you will get an image like below.



Summary

- While data visualization often conjures thoughts of business intelligence with button-down analysts, it's usually a lot more creative and colorful than you might think.
- There are many wide-ranging applications from business dashboards to public health visualizations to pop culture trend breakdowns.
- Great and beautiful data visualization requires graphic design and storytelling skills in addition to great analysis skills.
- Data visualization is the graphical representation of different pieces of information or data, using visual elements such as charts, graphs, or maps

Keywords

- Tableau is a powerful data visualization tool that helps you in simplifying the data visualization process.
- Tableau uses a different type of charts which includes Bar Chart, Line Chart, Pie Chart, Maps, Scatter Plot, Gantt Chart, Bubble Chart, etc. Each Chart is unique and preferable for specific purposes.
- Maps are among the few frequently used charts in Tableau. Let's get to know more about Maps.

Self Assessment

1. 1 dimension and 1 measure required in which type of graph

- A. Heat map
- B. Scatter plot
- C. Maps
- D. Text chart

2. Geo dimension required in which type of graph

- A. Heat map
- B. Scatter plot
- C. Maps
- D. Text chart

3. Geo dimension required in which type of graph

- A. Symbol maps
- B. Scatter plot
- C. Maps
- D. Both A and C

4. 2 to 4 measures required in which type of graph

- A. Heat map
- B. Scatter plot
- C. Maps
- D. Text chart

5. Dimensions contain _____ values

- A. Qualitative
- B. Quantitative
- C. Both
- D. None of these

6. Measures contain _____ values

- A. Qualitative
- B. Quantitative
- C. Both
- D. None of these

7. Individually separate and distinct is

- A. Continuous data
- B. Discrete data
- C. Random Data
- D. None of these

8. _____ data means "forming an unbroken whole, without interruption"

- A. Continuous data
 - B. Discrete data
 - C. Random Data
 - D. None of these
9. Green pills in tableau means
- A. Continuous data
 - B. Discrete data
 - C. Random Data
 - D. None of these
10. Blue pills in tableau means
- A. Continuous data
 - B. Discrete data
 - C. Random Data
 - D. None of these
11. Creating graph options are available in
- A. Measures
 - B. Dimensions
 - C. Show me
 - D. All of these
12. _____ helps to create reports, dashboards, and stories using different charts and graphs.
- A. Tableau Server
 - B. Tableau Desktop
 - C. Tableau Reader
 - D. All of these
13. _____ does not need to connect to any source, but it can read reports built on top of any and all of the listed data sources that Tableau Supports.
- A. Tableau Server
 - B. Tableau Desktop
 - C. Tableau Reader
 - D. All of these
14. Your data is out in the public once your report is published on to the _____.
- A. Tableau Public Server
 - B. Tableau Desktop
 - C. Tableau Reader
 - D. All of these

15. _____ is for somebody that only needs to monitor the analytics

- A. Tableau Public Server
- B. Tableau Desktop
- C. Tableau Reader
- D. All of these

Answers for Self Assessment

1 d	2 c	3 d	4 b	5 a	6 b	7 b	8 a
9 a	10 b	11 c	12 b	13 c	14 a	15 c	

Review Questions

- Explain any 5 types of charts available in Tableau?
- What is the difference between dual axis and blended axis in Tableau?
- What is process to create scatter plot in Tableau?
- Explain process to create maps in tableau using geographical data?
- Explain difference between green and blue pills description?

 **Further Readings**

"Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few
 "Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"

 **Web Links**

- <https://www.tableau.com/>
- <https://intellipaat.com/blog/what-is-tableau/>

Unit 14: Sharing your Dashboard

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Objectives

After studying this unit, you will be able to:

- Understand concept of Tableau Maps.
- define geographical role.
- Understand Show me tab of tableau.
- Understand concept of different symbol maps.

Introduction

Understanding the Key Features of Tableau

Some of the key features of Tableau are as follows:

Data Sources: Tableau offers seamless integration with a large number of widely used platforms for data storage such as File Systems like Microsoft Excel, CSV, etc., Relational Databases like Microsoft SQL Server, Oracle, IBM DB2, etc., Cloud-based Systems such as Google Big Query, Windows Azure, etc., or other sources such as ODBC/JDBC.

Attractive Visualizations: Tableau gives users the ability to create different types of data visualizations. For example, users can easily create the simplest visualizations such as a Pie Chart or Bar Chart or some of the most complex visualizations such as Bullet Chart, Gantt Chart, Boxplot, etc. Tableau also comes with information on geographical data such as Countries, Cities, Postal Codes, etc. that allows users to build visualizations using informative maps.

Wildcard Union and Cross-Data Join: Users have the ability to perform Cross-Data Join and Union in Tableau. This helps in removing the barriers and time-consuming workarounds that were required due to the massive use of numerous data sources.

Cross-Data Source Filtering: For data with common dimensions, Tableau gives users the ability to perform the filter operation across multiple data sources at the same time. This also results in all necessary edits or changes being made to all worksheets with the same data sources using the same set of filters automatically.

Mobile Dashboards: Tableau allows users to format all their Reports and Dashboards in such a manner that it is compatible with mobile devices as well. It lets users create custom mobile layouts for their Reports or Dashboard specific to their device.

Maps are one of the best ways to represent the data in Tableau. Data visualizations using maps look very attractive and appealing. Map charts suites better when you want to show the demographic data such as Population census, income, housing, household rates, etc. Maps give an easy-to-infer advantage over the other charts available in Tableau and are highly interactive when you want to plot demographic or geographical data on a plot.

14.1 Different types of maps.

- Tableau Proportional symbol maps
- Tableau Choropleth maps (filled maps)
- Tableau Point distribution maps
- Tableau Heatmaps (density maps)
- Tableau Flow maps (path maps)
- Tableau Spider maps (origin-destination maps)

14.2 Building a Simple Tableau Custom Map

To build a Simple Tableau Custom Map, you need a data source, like Sample-Superstore data, consisting of location data, location names, latitude, longitude coordinates. Without geographical coordinates, you can't prepare map visualization in Tableau. A simple Tableau Custom Map can be created by implementing the following steps:

- **Step 1:** Open Tableau Desktop, connect to the Sample-Superstore data source, and the worksheet will open in front of your screen.



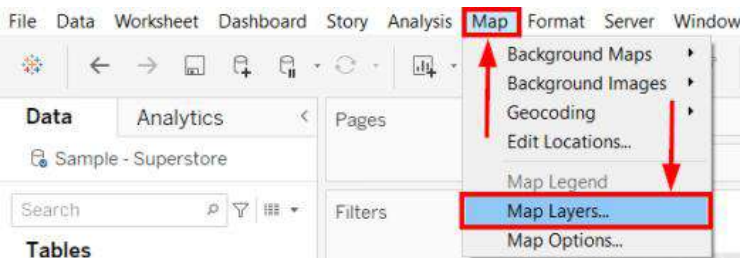
- **Step 2:** Move your cursor to the **Location** option, select the **Country & State** parameter under it, drag both of them to the **worksheet**.
- **Step 3:** Right-click over the **State** and select the **Dimension** from the drop-down list.



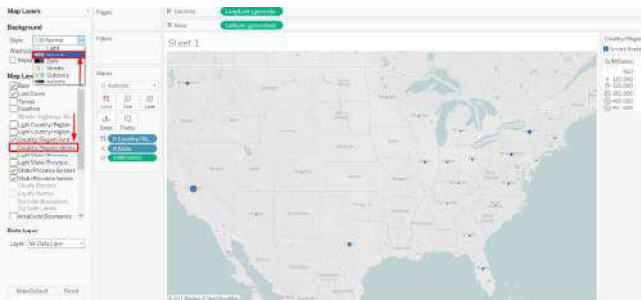
- **Step 4:** Drag the **Sales** table to the **Mark** sheet as shown below.



Step 5: Move your cursor to the **Maps** tab and choose **Map Layers** from the drop-down list.



- **Step 6:** On the **Map Layers** pane, unselect the **Country/Region Names** and select **Normal** from the drop-down list of style.

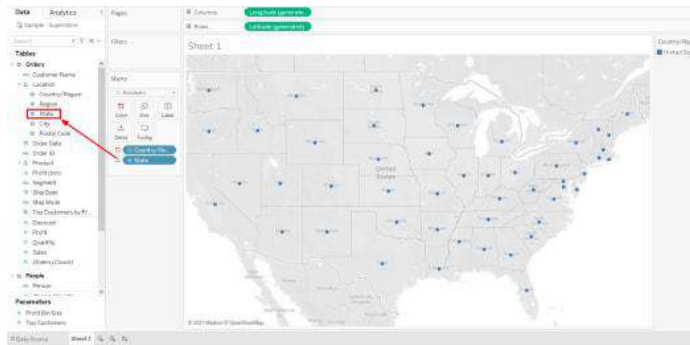


This is how you can design simple Tableau Custom Maps to perform a basic geographical analysis of your data.

Creating a Polygon Tableau Custom Map

A simple Polygon or Filled Tableau Custom Map helps you understand the basic mapping concepts in Tableau. The following steps can be implemented to create a Polygon Tableau Custom Map:

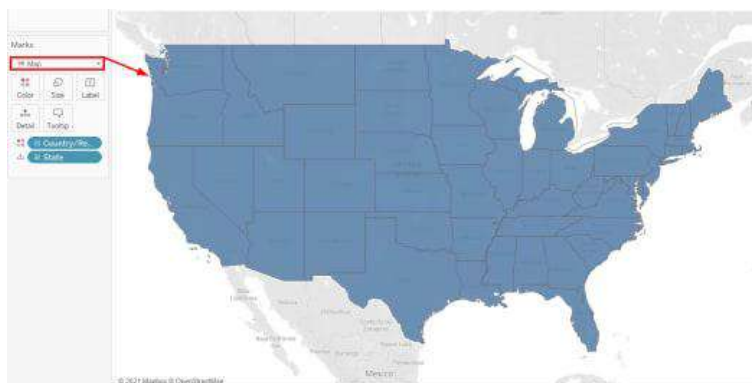
- **Step 1:** Drag the **State** parameter from the **Data** pane to the worksheet.



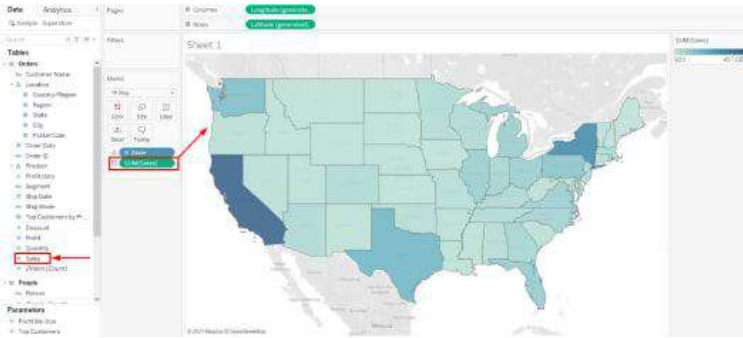
- **Step 2:** Move your cursor to the **Marks** pane, choose the **Map** option from the drop-down list.



- **Step 3:** The worksheet will show the following visualization of the map.



- **Step 4:** Select the **Sales** parameter from the **Data** pane and place it over the map.



You can see the **Number of Sales** from the polygons in the updated map.

14.3 Building Different Types of Tableau Custom Maps

Tableau Desktop enables you to design the following types of maps depending upon your business needs and visualization requirements. The different kind of custom maps that can be created on Tableau are as follows:

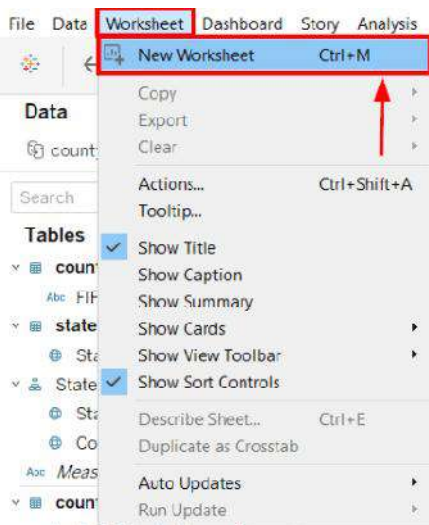
- Choropleth or Filled Tableau Custom Maps
- Flow or Path Tableau Custom Maps
- Proportional Symbol Tableau Custom Maps
- Point Distribution Tableau Custom Maps
- Heat or Density Tableau Custom Maps
- Spider or Origin-Destination Tableau Custom Maps

1) Choropleth or Filled Tableau Custom Maps

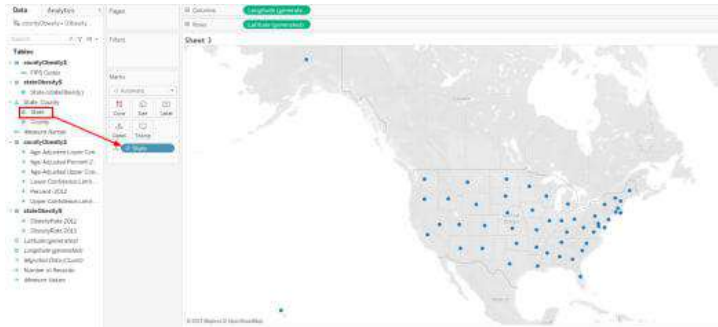
Choropleth Maps, also known as Filled Maps, are perfect to represent ratio and aggregated data. Users can use ratio or aggregated data for polygons that can be related to locations, such as countries, regions, states, or any area.

For simplicity, download Tableau [Example Workbook](#) and implement the following steps to show ratio or combined data in Tableau Desktop:

- **Step 1:** Go to **Worksheet Tab** and select the **New Worksheet** from the drop-down list or press CTRL+M. A New Sheet will open.



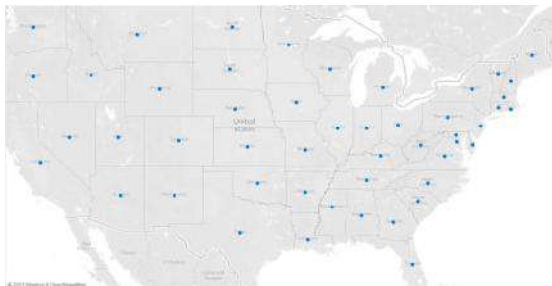
- **Step 2:** Under the State, Country dimension, select the **State** option and move to the sheet.



- **Step 3:** Now select the **Datapoint of Alaska, United States.**
- **Step 4:** Click over it and choose the **Exclude** option.
- **Step 5:** Repeat the same steps for **Hawaii.**



You'll see a better version of the map.



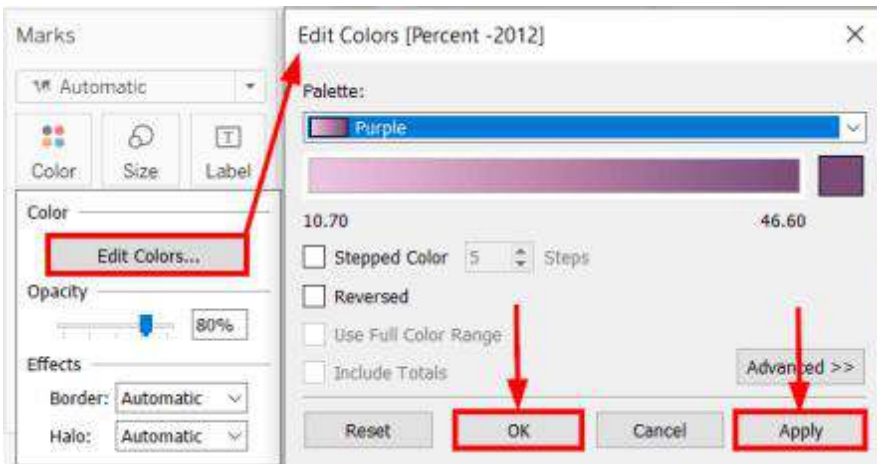
- **Step 6:** Click on the plus symbol of **State** to get details of all countries, as shown below.



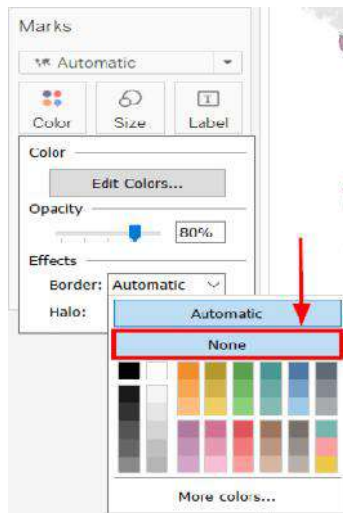
- **Step 7:** Place your cursor over **Percent- 2012** and drop it over the color option.



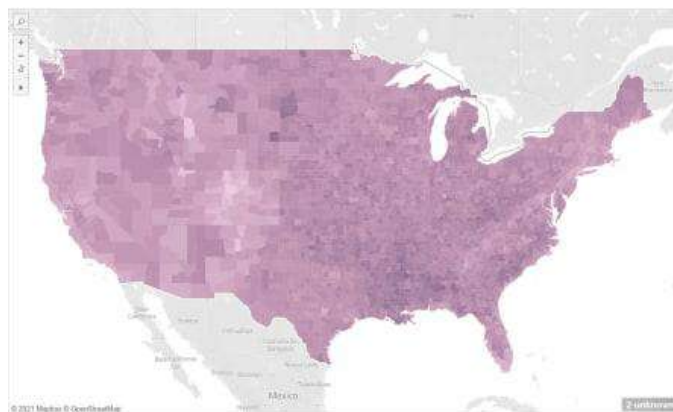
- **Step 8:** To get the obesity percentage range, select the **Edit Colors** option from the **Color** icon.
- **Step 9:** Select the **Purple** color and click **Apply**.



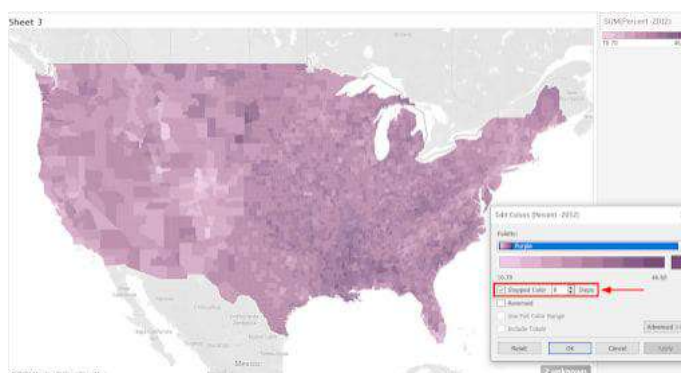
- **Step 10:** Open the **Effect** option from the **Color** icon.
- **Step 11:** Select the **None** option from the **Border** list.



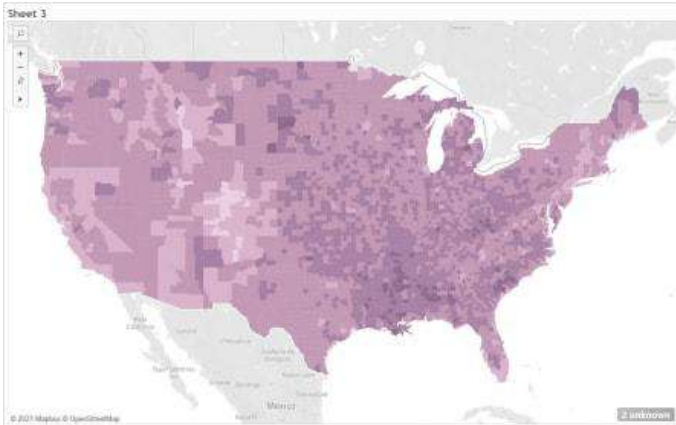
The output of the Choropleth will appear in front of your screen.



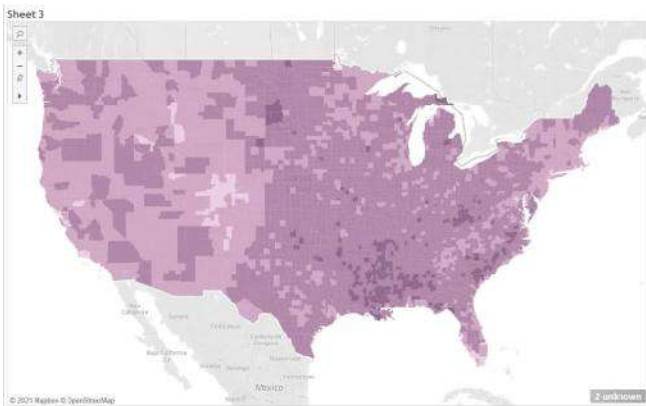
- **Step 12:** In the above map, Tableau selected the default color distribution. However, if you want to change it, go to the **Edit Color** menu again. Mark the **Stepped** color and enter 8. Click on the **Apply** button and close it.



- **Step 13:** Repeat the same steps, but this time select 5.

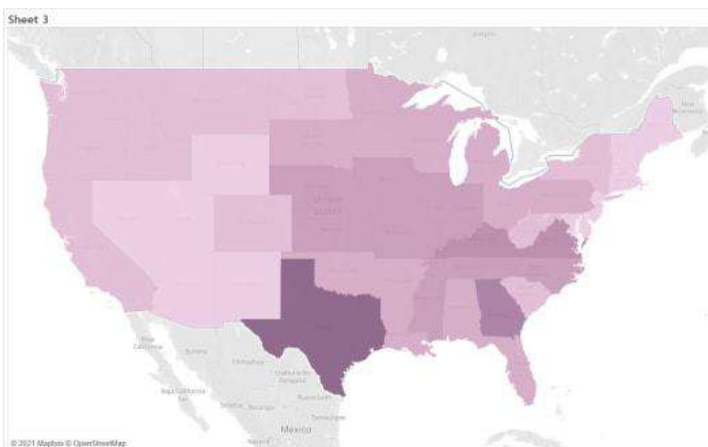


- **Step 14:** The map view for **4 Stepped** Color might look like this.



By selecting 4 instead of 5, you will understand that obesity rates are higher in the South. However, prior maps were showing even distribution of colors or obesity rates in the United States (US). All the maps are great to show aggregate data, yet each is giving you prominent information on obesity rates in different countries.

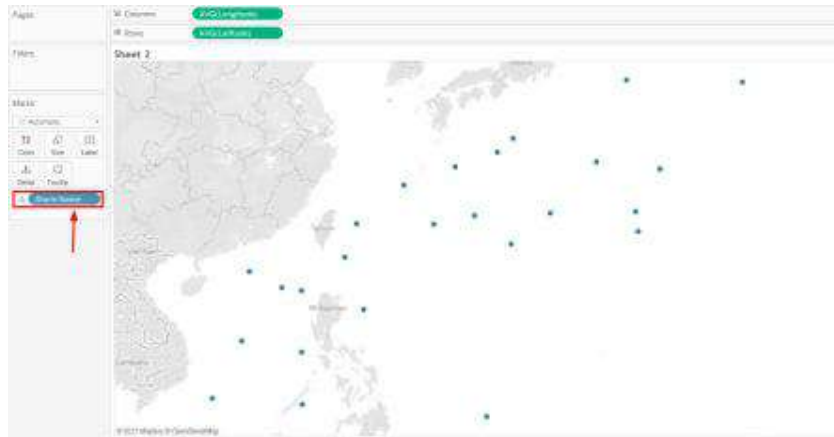
Similarly, if you want to plot the map for a **State Level** detail, remove the County from the **Marks** chart. You can analyze that Texas has higher obesity rates, followed by Georgia.



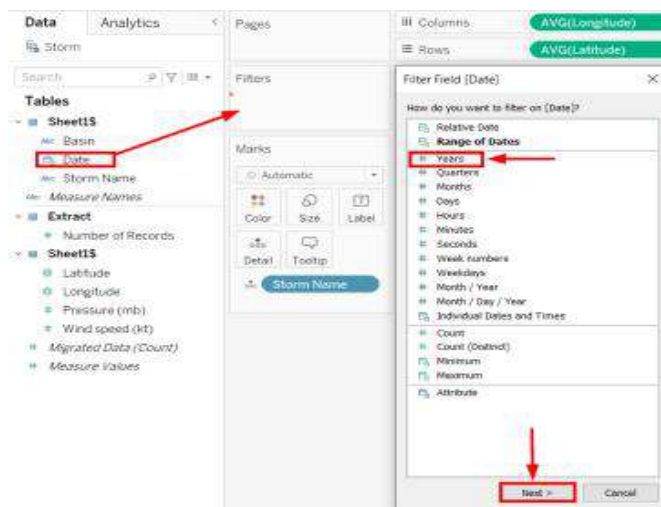
2) Flow or Path Tableau Custom Maps

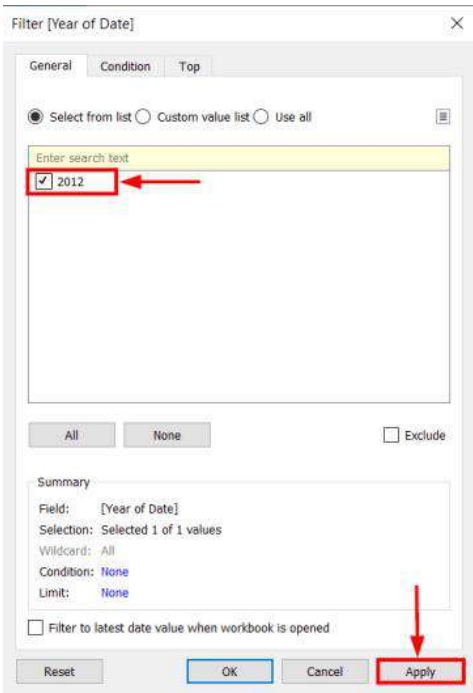
Tableau Business Intelligence tool allows users to determine the flow of path over time, e.g., the path of the storm, through Flow or Path Maps. To create Flow Maps in Tableau, download [Example Workbook](#) and implement the following steps:

- **Step 1:** Open the downloaded example in **Tableau Desktop**.
- **Step 2:** Open a **New Worksheet**.
- **Step 3:** Move **Latitude** and **Longitude** coordinates using the drag-and-drop method.
- **Step 4:** Choose the **Storm Name** and place it over the **Details** icon in the Marks pane.

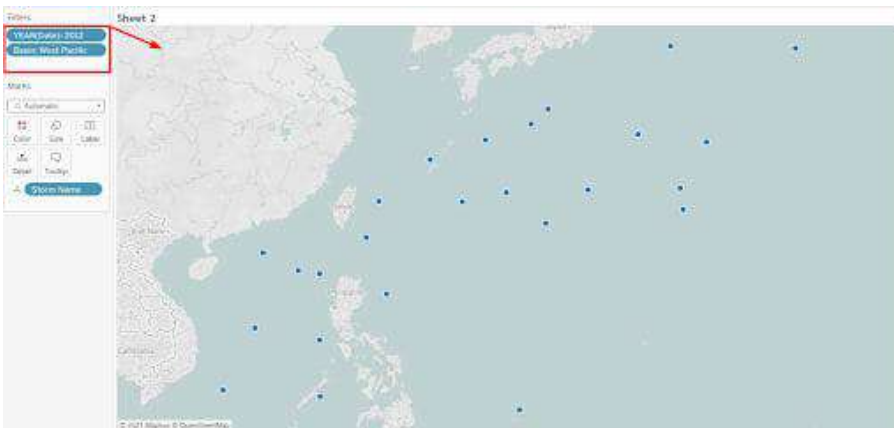


- **Step 5:** To apply filters, select the **Date** from the **Data** pane and place it over the **Filters** area.
- **Step 6:** Choose Year, such as 2012.
- **Step 7:** Click on **Apply** and close the screen.

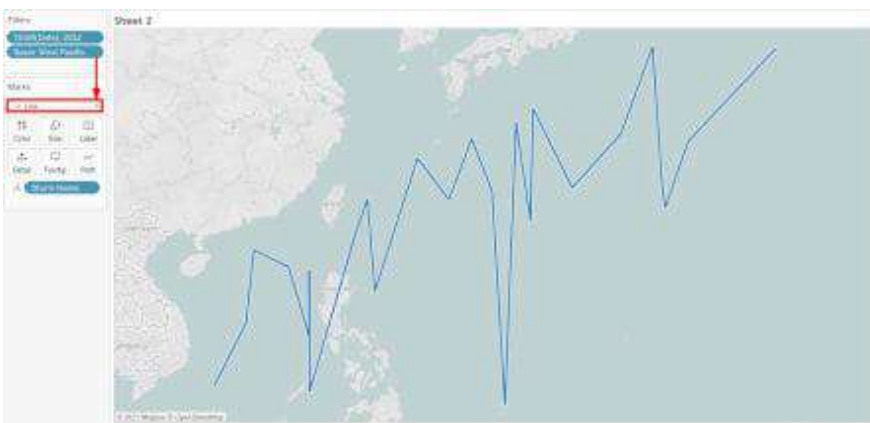




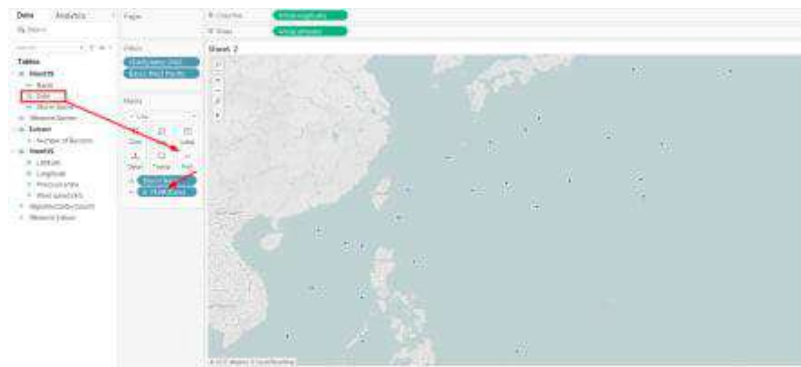
- **Step 8:** Repeat the same steps for **Bhasin** and select the **West Pacific** region.
- **Step 9:** Select **Normal Background** from the **Map** tab. The final map might look like this.



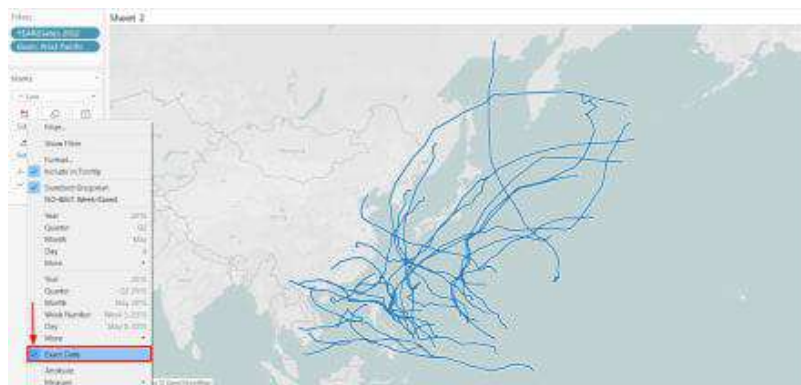
- **Step 10:** Select a **Line** from the **Marks** pane.



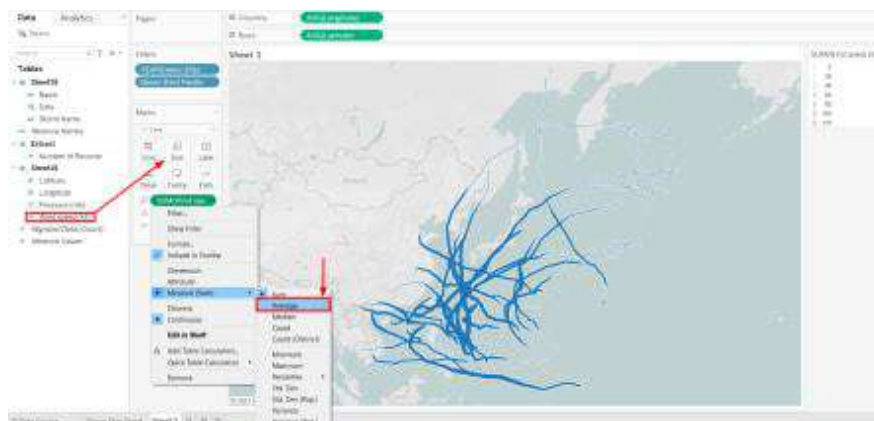
Step 11: Drag the **Date** from the **Data** pane and place it over the **Path** icon. This will remove the line due to the absence of an exact date.



- **Step 12:** Click on the **Date** parameter, select an **Exact Date** option.



- **Step 13:** Drag the **Wind Speed (kt)** from the **Data** pane and place it over the **Size** icon.
- **Step 14:** Right-click over the **Wind Speed (kt)** and choose the **Average** parameter.



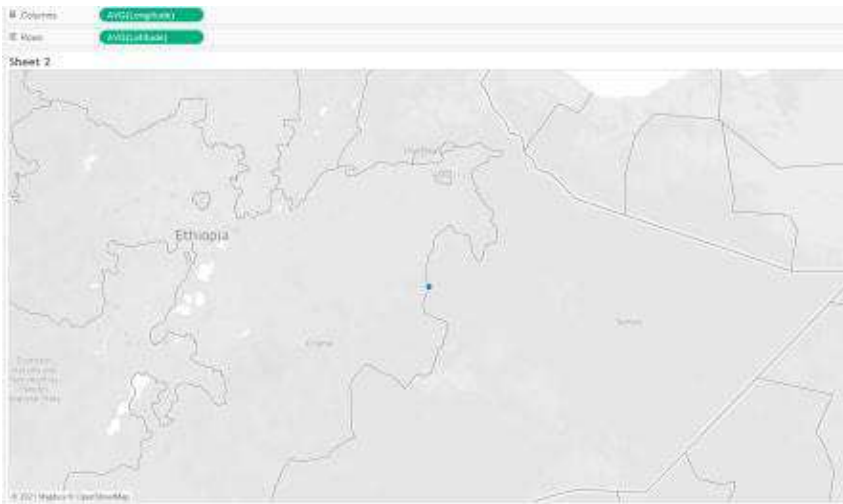
- **Step 15:** Place **Storm Name** over the **Colors** icon to complete the **Flow Map**.



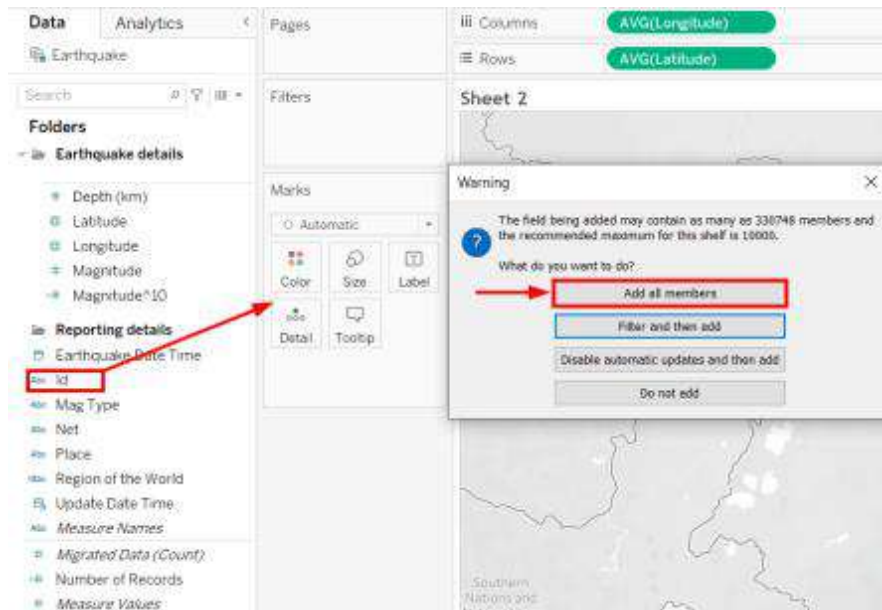
3) Proportional Symbol Tableau Custom Maps

A Proportional Symbol Map is a great start to acquire quantitative values for individual locations. Nevertheless, your data source should contain quantitative values, longitude and latitude coordinates to create Proportional Symbol Maps. Download [Example Workbook](#) to learn more in detail.

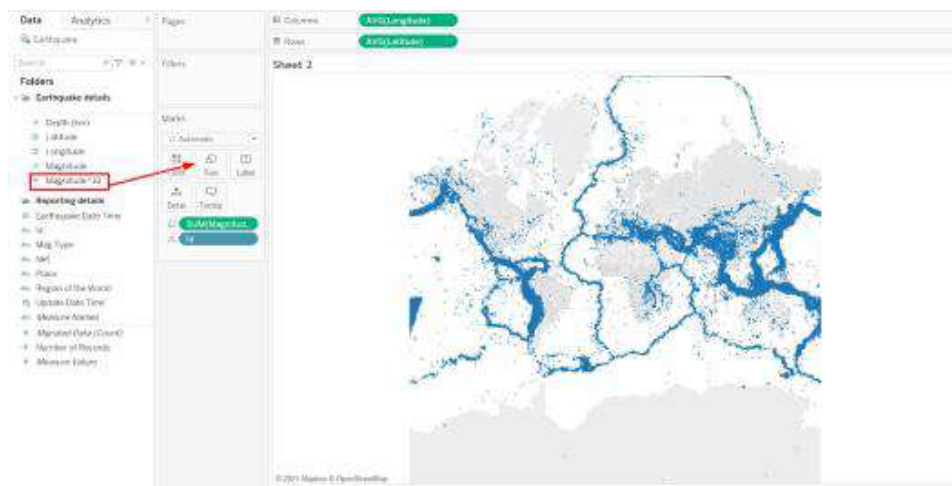
- **Step 1:** Download **Example Workbook**.
- **Step 2:** Open the downloaded file on **Tableau Desktop**.
- **Step 3:** Open a **New Worksheet**.
- **Step 4:** Drag **Latitude** and **Longitude** to the sheet.



- **Step 5:** Select the **ID** from the **Data** pane and place it over the **Details** icon.
- **Step 6:** A dialog box will appear, select **Add All Members**.



- Step 7: Select **Magnitude^10** and place it over **Size** in Marks.

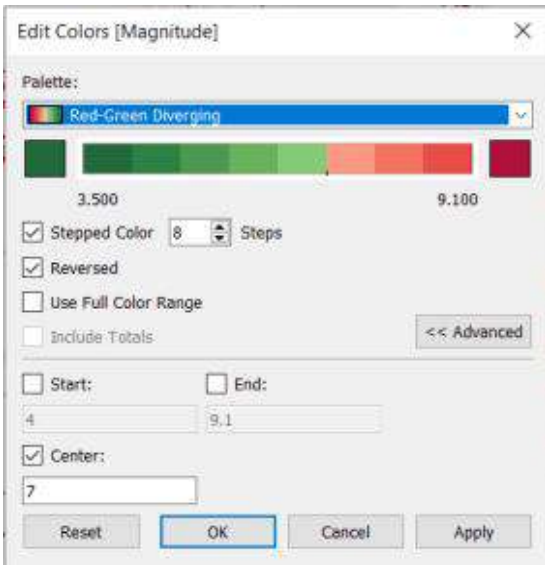


- Step 8: Grab the **Magnitude** to **Color** option.

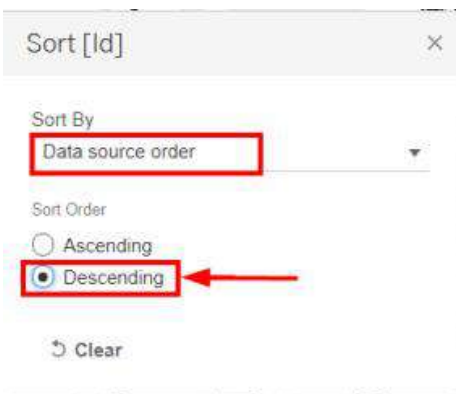


- Step 9: Click on **Edit Colors** from the **Color** icon.
- Step 10: Select your preferred color, opacity (70%), and Border.
- Step 11: Click on **Stepped Color** and choose 8.

- **Step 12:** Click the **Reversed** checkbox.
- **Step 13:** Click on **Advanced**, click **Center**, and enter 7.



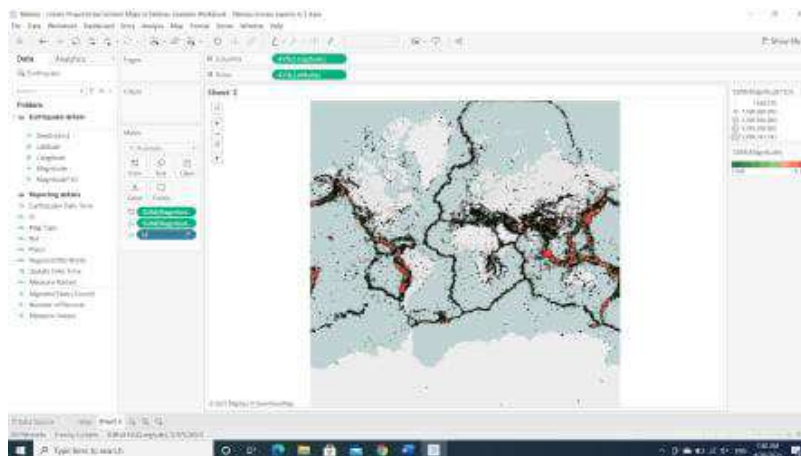
- **Step 14:** Right-click over the **ID** and select the **Sort** option.
- **Step 15:** Choose **Descending** for **Sort Order** option.



- **Step 16:** Choose **Fields** for **Sort By** option and then choose **Magnitude**.
- **Step 17:** Click **OK**.



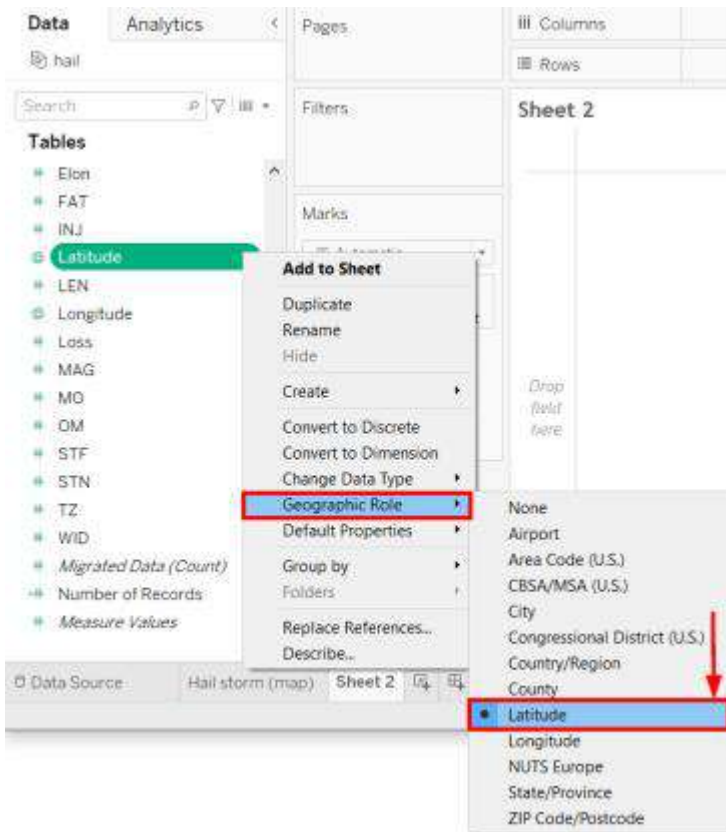
Step 18: Select any appropriate background for your map. The final image of the map might look like this.



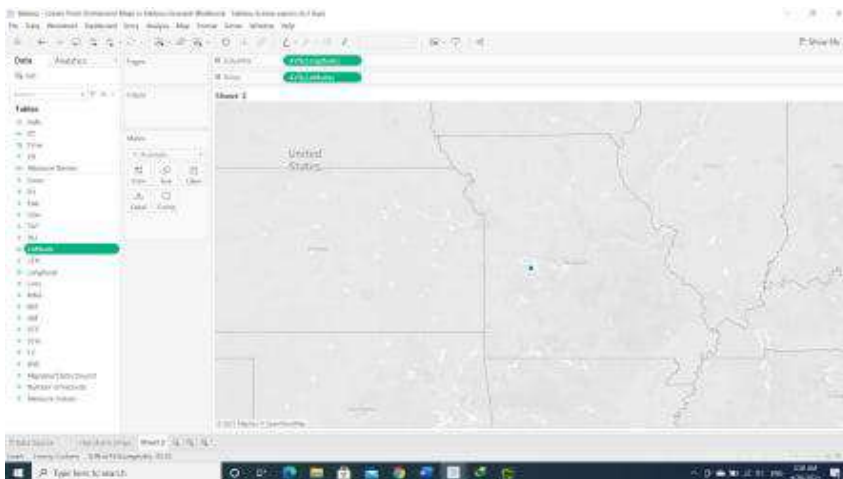
14.4 Point Distribution Tableau Custom Maps

Everyone loves to spot visual clusters, and Tableau Desktop makes this process super easy through Point Distribution Maps. But your data source should have longitude and latitude coordinates to map visual clusters. Download the [Example Workbook](#) right now and implement the following steps:

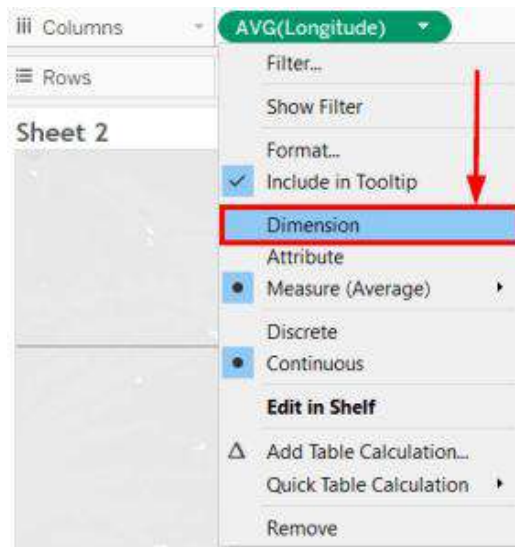
- **Step 1:** Open Tableau Desktop and select a **New Worksheet**.
- **Step 2:** Click on the **Latitude** dimension.
- **Step 3:** Select the **Geographic Role**.
- **Step 4:** Choose the **Latitude** parameter.



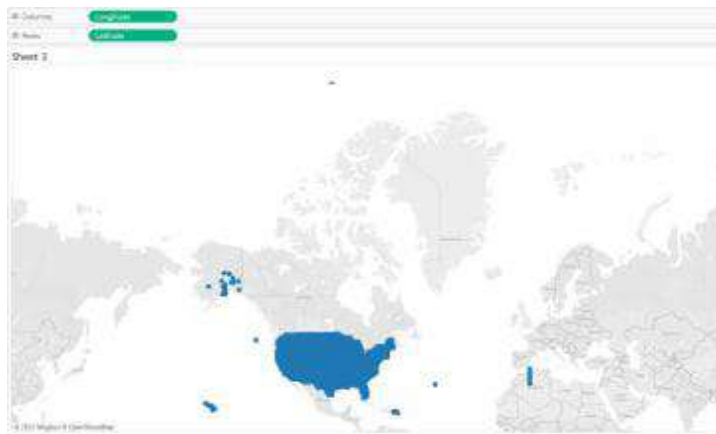
- **Step 5:** Click on the **Longitude** dimension.
- **Step 6:** Select the **Geographic** role.
- **Step 7:** Choose the **Longitude** parameter.
- **Step 8:** Double-click over both **Longitude** and **Latitude** dimensions.



- **Step 9:** Click on the **AVG(Longitude)** and select **Dimension**.
- **Step 10:** Click on the **AVG(Latitude)** and select **Dimension**.

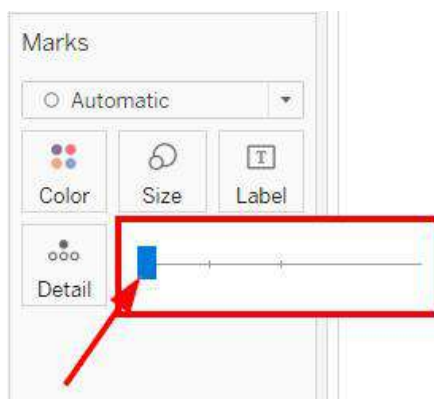


The map might look like something as follows:



To make it clearer, move your cursor to the **Marks** card.

- **Step 11:** Click on the **Size**.
- **Step 12:** Move the bar to the left edge.



- **Step 13:** Zoom the graph to get the entire picture.



Maps are one of the most inherent and useful features in Tableau. The visualizations that contain maps in Tableau look very appealing and is interactive as well. Most demographic data like income, census based population, housing and household rates are in-built. It is also possible to use custom geocodes to add geographic roles such as zip code, street names, etc.

Maps give an easy-to-infer advantage over the other charts that are available in Tableau. If the available population data is consumed on the map, we can comprehend which regions are densely/scarcely populated at a glance.

If your data set contains any kind of spatial data viz. State-wise or Country-wise data, Tableau auto-generates the respective latitude and longitude for the spatial fields that are available in the data set. However, the latitude and longitude fields that are auto-generated by Tableau can only be used for generating the maps and cannot be used in any of the calculation fields or parameters of the report. Tableau generates a map with the generated longitude and latitude by just a click of that particular spatial field, which we will be discussing later in the blog.

Tableau provides two types of maps by default:

Symbol map

Filled map

Some of the basic scenarios that we might come across is just to view the spatial distribution of data. Here, the coordinates of the geographic location do not play a significant role. In such cases, a map may not even be the right choice of visualization of the data.

Summary

- Geographic Analysis of business and customer data is essential for revenue growth.
- By visualizing data on a map, businesses can answer numerous questions such as which regions bring more sales, which countries are more profitable, which countries require more Marketing efforts, etc.
- All in all, the mapping features of Tableau Desktop gives business the ability to get all the answers to spatial questions.
- Tableau is a popular Business Intelligence and Data Analytics tool that was developed to help organizational decision-makers visualize, analyze and understand complex business data and make data-driven decisions.

Keywords

- There are many reasons to put your data on a map. Perhaps you have some location data in your data source? Or maybe you think a map could really make your data pop? Both of those are good enough reasons to create a map visualization, but it's important to keep in mind that maps, like any other type of visualization, serve a particular purpose: they answer spatial questions.
- You make a map in Tableau because you have a spatial question, and you need to use a map to understand the trends or patterns in your data.
- But what is a spatial question? Some examples might be:
- Which state has the most farmers markets?
- Where are the regions in the U.S. with the high obesity rates?

Self-Assessment

1. Default Aggregation Used for Tree Map
 - A. **Sum**
 - B. Avg
 - C. Count
 - D. Countd

2. What Are the File Extensions In Tableau?
 - A. Tableau Workbook (.twb)
 - B. Tableau Packaged Workbook (.twbx)
 - C. Tableau Data Source(.tds)
 - D. **All of the above**

3. What Type of Join Is Used in Blending?
 - A. Right join
 - B. **Left join**
 - C. Full join
 - D. Inner join

- 4.The _____keyword returns all records from the right table (table2), and the matching records from the left table (table1).
 - A. **Right join**
 - B. Left join
 - C. Full join
 - D. Inner join

- 5.The _____keyword returns all records from the left table (table1), and the matching records from the right table (table2).
 - A. Right join

- B. Left join**
- C. Full join
- D. Inner join

6. _____ returns all the rows from both joined tables, whether they have a matching row or not.

- A. Right join
- B. Left join
- C. Full join**
- D. Inner join

7. The INNER JOIN keyword selects records that have matching values in both tables.

- A. Right join
- B. Left join
- C. Full join
- D. Inner join**

8. Power BI is a product of

- A. Oracle
- B. Facebook
- C. Microsoft**
- D. SAP

9. What are the components of a dashboard?

- A. Horizontal
- B. Vertical
- C. Image Extract
- D. All of the above**

10. How many maximum tables can you join in Tableau?

- A. 2
- B. 8
- C. 16
- D. 32**

11. For creating variable size bins we use _____

- A. Sets
- B. Groups
- C. Calculated fields**
- D. Table

12. For differentiating two dimensions we use

- A. Sets
- B. Measures
- C. Fields
- D. Table

13. Geo dimension required in which type of graph

- A. Heat
- B. Scatter plot
- C. **Maps**
- D. Text chart

14. Geo dimension required in which type of graph

- A. Symbol maps
- B. Scatter plot
- C. Maps
- D. **Both A and C**

15. 2 to 4 measures s required in which type of graph

- A. Heat map
- B. Scatter plot
- C. Maps
- D. Text chart

Answers for Self Assessment

1 A	2 D	3 B	4 A	5 B	6 C	7 D	8 C
9 D	10 D	11 C	12 A	13 C	14 D	15 B	

Review Questions

- What are the map types in Tableau?
- Which is the easiest way to create a map on Tableau?
- What are the options for maps in Tableau?
- How to define geographical role in Tableau maps?
- What are advantages of Tableau maps?

 **Further Readings**

"Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few

"Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"



Web Links

<https://www.tableau.com/>

<https://intellipaat.com/blog/what-is-tableau/>

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