METHODIST COLLEGE OF ENGINEERING AND TECHNOLOGY

Estd:2008

(Affiliated to Osmania University & Approved by AICTE, NewDelhi)

LABORATORY MANUAL DATA VISUALISATION LAB

BE VI Semester (AICTE Model Curriculum): 2023-24

NAME:

ROLLNO:

BRANCH: **SEM:**

DEPARTMENT OF ARTIFICIAL INTELLIGENCE &DATA SCIENCE

Estd:2008

METHODIST COLLEGE OF ENGINEERING AND TECHNOLOGY

(Affiliated to Osmania University & Approved by AICTE, NewDelhi)

VISION:

To produce ethical, socially conscious and innovative professionals who wouldcontribute to sustainable technological development of the society.

MISSION:

To impart quality engineering education with latest technological developments andinterdisciplinary skills to make students succeed in professional practice.

To encourage research culture among faculty and students by establishing state of artlaboratories and exposing them to modern industrial and organizational practices.

To inculcate humane qualities like environmental consciousness, leadership, socialvalues, professional ethics and engage in independent and lifelong learning for sustainablecontribution to the society.

METHODIST COLLEGE OF ENGINEERING AND TECHNOLOGY

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

LABORATORY MANUAL OF DATA VISUALISATION LAB

PreparedBy
MS. P. NANDINI
Assistant Professor.

METHODIST COLLEGE OF ENGINEERING AND TECHNOLOGY

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

VISION & MISSION

VISION:

To become a leader in providing Computer Science & Engineering education withemphasis on knowledge and innovation.

MISSION:

- To offer flexible programs of study with collaborations to suit industry needs.
- To provide quality education and training through novel pedagogical practices.
- To expedite high performance of excellence in teaching, research and innovations.
- To impart moral, ethical values and education with social responsibility.

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

PROGRAM EDUCATIONAL OBJECTIVES

After 3-5 years of graduation, the graduates will be able to

PEO1: Apply technical concepts, Analyze, Synthesize data to Design and create novel products and solutions for the real life problems.

PEO2: Apply the knowledge of Computer Science Engineering to pursue higher education with due consideration to environment and society.

PEO3: Promote collaborative learning and spirit of team work through multidisciplinary projects

PEO4: Engage in life-long learning and develop entrepreneurial skills.

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

PROGRAM OUTCOMES

Engineering graduates will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problemsand design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader

in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

(At the end of 4 years, Computer Science and Engineering graduates at MCET will be able to)

PSO1: Apply the knowledge of Computer Science and Engineering in various domains like networking and data mining to manage projects in multidisciplinary environments.

PSO2: Develop software applications with open-ended programming environments**.**

PSO3: Design and develop solutions by following standard software engineering principles and implement by using suitable programming languages and platforms.

DATA VISULAISATION LAB SYLLABUS

Semester – VI	L	T	P	Credits
Subject code – 1PC662AD	0	0	2*2	2

Prerequisite: Excel Skills.

COURSE OBJECTIVES:	COURSE OUTCOMES:
• Learn the basics of data visualization and Tableau Desktop. • To Create common visualizations such as bar charts, line charts, and pie charts. • Create simple calculations in Tableau. • Add interactivity to your visualizations with text and visual tooltips. • Create more advanced chart types such as maps, scatter plots, and tree maps.	• Understand the basics of data visualization and the best practices for creating effective visualizations. • Be able to connect to data sources and create basic visualizations in Tableau Desktop. • Be able to create more advanced visualizations and dashboards using table calculations, filters, and actions. • Be able to tell data stories using Tableau by creating interactive visualizations and dashboards that communicate insights to an audience. • 5. Be familiar with the Tableau ecosystem and be able to find further learning opportunities.

Module-1: Introduction to Tableau

- Dataviz best practices
- Getting started with Tableau Desktop
- Connecting to the tutorial dataset
- Creating the first charts
- Filtering and sorting data

Module--2: Common charts

- Creating common visualizations (bar charts, line charts etc.)
- Assembling a dashboard layout
- Using dashboard filters

Module--3: Transform the data

- Dataviz best practices
- Creating simple calculations in Tableau
- Using table calculations

Module--4: Interactions

- Interactivity with text and visual tooltips
- Interactivity with actions (filter, highlight, URL)
- Drilldown between dashboards

Module--5: Advanced visualizations

- Dataviz best practices
- Creating more advanced chart types
- Using multiple source tables

Module--6: Data Storytelling

- Intro to data storytelling
- Creating a data story in Tableau
- Overview of the Tableau ecosystem
- Further learning opportunities

System Requirements:

System requirements are listed here under Tableau Desktop and Tableau Prep: https://www.tableau.com/products/techspecs The latest version of Tableau Desktop as well as Tableau Prep should be downloaded and installed from here: **https://www.tableau.com/tft/activation**.

TEXTBOOK

1. Visualization Analysis & Design by Tamara Munzner (2014) (ISBN 9781466508910)

REFERENCES BOOKS:

1. Interactive Data Visualization for the Web by Scott Murray II Edition (2017)
2. D3.js in Action by Elijah Meeks II Edition (2017)
3. Semiology of Graphics by Jacques Bertin (2010)
4. The Grammar of Graphics by Leland Wilkinson
5. ggplot2 Elegant Graphics for Data Analysis by Hadley Wickham.

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE OUTCOMES (CO'S)

SUBJECT NAME: DATA VISUALIZATION LAB CODE: 1PC662AD
SEMESTER: VI

CO No.	Course Outcomes	Taxonomy Level

GENERAL LABORATORY INSTRUCTIONS

1. Students are advised to come to the laboratory at least 5 minutes before (to starting time), those who come after 5 minutes will not be allowed into the lab.
2. Plan your task properly much before to the commencement, come prepared to the lab with the program / experiment details.
3. Student should enter into the laboratory with:
    a. Laboratory observation notes with all the details (Problem statement, Aim, Algorithm, Procedure, Program, Expected Output, etc.,) filled in for the lab session.
    b. Laboratory Record updated up to the last session experiments.
    c. Formal dress code and Identity card.
4. Sign in the laboratory login register, write the TIME-IN, and occupy the computer system allotted to you by the faculty.
5. Execute your task in the laboratory, and record the results / output in the lab observation note book, and get certified by the concerned faculty.
6. All the students should be polite and cooperative with the laboratory staff, must maintain the discipline and decency in the laboratory.
7. Computer labs are established with sophisticated and high end branded systems, which should be utilized properly.
8. Students / Faculty must keep their mobile phones in SWITCHED OFF mode during the lab sessions. Misuse of the equipment, misbehaviors with the staff and systems etc., will attract severe punishment.
9. Students must take the permission of the faculty in case of any urgency to go out. If anybody found loitering outside the lab / class without permission during working hours will be treated seriously and punished appropriately.
10. Students should SHUT DOWN the computer system before he/she leaves the lab after completing the task (experiment) in all aspects. He/she must ensure the system / seat is kept properly.

Head of the Department **Principal**

CODE OF CONDUCT FOR THE LABORATORY

- All students must observe the dress code while in the laboratory
- Footwear is NOT allowed
- Foods, drinks and smoking are NOT allowed
- All bags must be left at the indicated place
- The lab timetable must be strictly followed
- Be PUNCTUAL for your laboratory session
- All programs must be completed within the given time
- Noise must be kept to a minimum
- Workspace must be kept clean and tidy at all time
- All students are liable for any damage to system due to their own negligence
- Students are strictly PROHIBITED from taking out any items from the laboratory
- Report immediately to the lab programmer if any damages to equipment

BEFORE LEAVING LAB:

- Arrange all the equipment and chairs properly.
- Turn off / shut down the systems before leaving.
- Please check the laboratory notice board regularly for updates.

Lab In – charge

LIST OF EXPERIMENTS

Sl. No.	Name of the Experiment	Date of Experiment	Date of Submission	PageNo	Faculty Signature
1	**Module-1: Introduction to Tableau** • Dataviz best practices • Getting started with Tableau Desktop • Connecting to the tutorial dataset • Creating the first charts • Filtering and sorting data				
2	**Module--2: Common charts** • Creating common visualizations (bar charts, line charts etc.) • Assembling a dashboard layout • Using dashboard filters				
3	**Module--3: Transform the data** • Dataviz best practices • Creating simple calculations in Tableau • Using table calculations				
4	**Module--4: Interactions** • Interactivity with text and visual tooltips • Interactivity with actions (filter, highlight, URL) • Drilldown between dashboards				
5	**Module--5: Advanced visualizations** • Dataviz best practices • Creating more advanced chart types • Using multiple source tables				

MCET Data Visualization Lab Manual

6	**Module--6: Data Storytelling** • Intro to data storytelling • Creating a data story in Tableau • Overview of the Tableau ecosystem • Further learning opportunities				

INTRODUCTION

Data:

Data refers to raw facts, statistics, or information collected or stored in a structured or unstructured form. Data can take various forms, such as text, numbers, images, videos, and more. It is the foundation of all information and knowledge and is used in various fields for analysis, decision-making, and understanding trends and patterns.

Data can be categorized into two main types:

- **Structured Data:** This type of data is organized into a specific format, such as tables or databases, and is easily searchable and analyzable. Examples include spreadsheets, relational databases, and CSV files.
- **Unstructured Data:** Unstructured data lacks a specific format and can include text documents, social media posts, images, audio recordings, and more. Analyzing unstructured data often requires advanced techniques like natural language processing and image recognition.

Where to Find Data:

You can find data from various sources, depending on your specific needs.

- **Open Data Portals:** Many governments and organizations provide free access to a wide range of data through open data portals. Examples include Data.gov (United States) and data.gov.uk (United Kingdom).
- **Data Repositories:** Academic institutions, research organizations, and data enthusiasts often share datasets on platforms like Kaggle, GitHub, and the UCI Machine Learning Repository.
- **APIs (Application Programming Interfaces):** Some websites and services offer APIs that allow you to programmatically access and retrieve data. Examples include Twitter API, Google Maps API, and financial market APIs.
- **Web Scraping:** You can extract data from websites using web scraping tools and libraries like BeautifulSoup and Scrapy. However, be mindful of the website's terms

of use and legal restrictions.

- **Surveys and Surveys:** You can conduct your own surveys or collect data through questionnaires and interviews.
- **IoT Devices:** Internet of Things (IoT) devices generate vast amounts of data that can be used for various purposes.
- **Commercial Data Providers:** Some companies specialize in selling datasets for specific industries, such as market research, finance, and healthcare.

Data Visualization

Data visualization is the graphical representation of data and information. It uses visual elements like charts, graphs, and maps to help viewers understand trends, outliers, and patterns in data. Data visualization is important because it allows people to see and understand data more easily than they would with raw numbers.

There are many types of data visualizations, including:

1. **Bar charts:** Used to compare different categories of data.
2. **Line charts:** Show trends over time or relationships between variables.
3. **Pie charts:** Display parts of a whole and are useful for showing percentages.
4. **Scatter plots:** Show the relationship between two variables.
5. **Heat maps:** Use color to represent data values in a matrix.
6. **Tree maps:** Display hierarchical data using nested rectangles.
7. **Dashboards:** Combine multiple visualizations into a single interface for comprehensive data analysis.

Effective data visualization involves choosing the right type of visualization for the data and the audience, using appropriate colors and labels, and providing context to help viewers interpret the data correctly.

Applications of Data Visualization:

Data visualization has a wide range of applications across various industries and fields. Some common uses include:

1. **Business Intelligence:** Data visualization is used to analyze business data, identify trends, and make informed decisions. It helps businesses understand their performance, customer behavior, and market trends.

2. **Financial Analysis:** In finance, data visualization is used to analyze stock prices, market trends, and financial performance. It helps investors and financial analysts make informed decisions about investments.
3. **Healthcare:** Data visualization is used in healthcare to analyze patient data, track disease outbreaks, and monitor public health trends. It helps healthcare professionals make informed decisions about patient care and public health interventions.
4. **Marketing:** Marketers use data visualization to analyze customer behavior, track marketing campaigns, and measure the effectiveness of marketing strategies. It helps them make data-driven decisions to improve marketing performance.
5. **Education:** In education, data visualization is used to track student performance, identify learning trends, and improve educational outcomes. It helps educators tailor their teaching methods to individual student needs.
6. **Research:** Researchers use data visualization to analyze research data, visualize scientific findings, and communicate research results. It helps researchers communicate complex ideas and findings to a wider audience.
7. **Operations Management:** Data visualization is used in operations management to track production processes, analyze supply chain data, and optimize operations. It helps organizations improve efficiency and reduce costs.
8. **Urban Planning:** Urban planners use data visualization to analyze population trends, traffic patterns, and environmental data. It helps them make informed decisions about urban development and infrastructure planning.

These are just a few examples of the many applications of data visualization. Its versatility and effectiveness make it a valuable tool in almost every industry for making sense of complex data and driving informed decision-making.

Foundations for Building Data Visualizations:

Creating effective data visualizations requires a strong foundation in several key areas:

- **Data Analysis:** Before creating visualizations, you should thoroughly analyze your data to understand its structure, relationships, and any patterns or trends. Exploratory data analysis (EDA) techniques can help with this.
- **Statistical Knowledge:** Understanding basic statistics is essential for making meaningful interpretations of data. Concepts like mean, median, standard deviation, and correlation are commonly used in data visualization.
- **Domain Knowledge:** Having knowledge of the specific domain or subject matter related to your data is crucial for creating contextually relevant visualizations. It helps you ask the right questions and provide valuable insights.
- **Visualization Tools:** Familiarize yourself with data visualization tools and libraries such as matplotlib, Seaborn, ggplot2, D3.js, and Tableau. Each tool has its strengths and can be used for different types of visualizations.
- **Design Principles:** Study design principles, including color theory, typography, and visual hierarchy, to create visually appealing and effective visualizations. Avoid common pitfalls like misleading visualizations.
- **Interactivity:** Learn how to add interactive elements to your visualizations to engage users and allow them to explore the data. This can be achieved using tools like JavaScript, Python libraries, or dedicated visualization software.

Creating Your First Visualization:

To create your first data visualization, follow these general steps:

- **Select Your Data:** Choose a dataset that aligns with your goals and interests. Ensure that the data is clean and well-structured.
- **Define Your Objective:** Clearly define what you want to communicate or explore with your visualization. Are you looking to show trends, comparisons, or distributions?
- **Choose the Right Visualization Type:** Select a visualization type that suits your data and objectives. Common types include bar charts, line charts, scatter plots, histograms, and pie charts.
- **Prepare and Transform Data:** Preprocess your data as needed. This may involve aggregating, filtering, or transforming the data to fit the chosen visualization.

- **Create the Visualization:** Use a suitable tool or library to create your visualization. Customize it with labels, colors, and other design elements.
- **Interactivity (Optional):** If appropriate, add interactive features to your visualization to allow users to interact with the data.
- **Test and Iterate:** Review your visualization for accuracy and clarity. Seek feedback from others and make improvements as necessary.
- **Publish or Share:** Once you are satisfied with your visualization, publish it on a platform, embed it in a report, or share it with your intended audience.
- **Document and Explain:** Provide context and explanations for your visualization. Clearly communicate what the viewer should take away from it.
- **Maintain and Update:** If the data changes or new insights emerge, update your visualization accordingly.

MODULE 1
INTRODUCTION TO TABLEAU

TABLEAU:

Tableau is a visual analytics platform that is revolutionizing the way we use data to solve problems by enabling individuals and organizations to make the most of their data.

Tableau is a great data visualization and business intelligence application that can be used to report and analyze massive amounts of data. Salesforce purchased Tableau in June 2019, an American firm founded in 2003. It enables users to build various charts, graphs, maps, dashboards, and stories for visualizing and analyzing data in order to aid in business choices. Tableau offers several unique and fascinating features that make it one of the most popular business intelligence (BI) applications.

Use of Tableau:

Tableau is the fastest and most powerful visualization tool. It is very easy to use. There are no complex formulas like Excel and other visualization tools. It provides the features like cleaning, organizing, and visualizing data, it easier to create interactive visual analytics in the form of dashboards. These dashboards make it easier for non-technical analysts and end-users to convert data into understandable ones.

Tableau Features

1. Tableau supports powerful data discovery and exploration that enables users to answer important questions in seconds
2. No prior programming knowledge is needed; users without relevant experience can start immediately with creating visualizations using Tableau
3. It can connect to several data sources that other BI tools do not support. Tableau enables users to create reports by joining and blending different datasets
4. Tableau Server supports a centralized location to manage all published data sources within an organization

Values in Tableau

There are two types of values in the tableau:

- **Dimensions:** Values that are discrete(which can not change with respect to time) in nature called Dimension in tableau. Example: city name, product name, country name.
- **Measures:** Values that are continuous(which can change with respect to time) in nature called Measure in tableau. Example: profit, sales, discount, population.

Advantages of Tableau

- Quick calculation- All the calculations on the tableau done by the backend, so it is relatively faster than any other tool.
- Interactive dashboards– Tableau dashboards are very interactive and easy to draw.
- No manual calculation- All the calculations are done by the tableau only. There is no manual calculation, but in some specific cases, we used calculated fields for calculation.
- A large amount of data- Tableau can handle a large amount of data. Different types ofvisualization can be created with a large amount of data without impacting the performance of the dashboards.

Disadvantages of Tableau

- High Cost- tableau is a paid tool for visualization, and it is a reason why people are not using tableau so much.
- Static and single value parameters- Tableau's parameters are static and always single value can be selected using a parameter. Whenever the data gets changed, these parameters need to be updated manually every time.
- Limited Data Preprocessing- Tableau is strictly a visualization tool. Tableau Desktop allows you to do very basic preprocessing.

DATA VISUALIZATION BEST PRACTICES:

Data visualization best practices can help you create more effective and engaging visualizations. Here are some key principles:

1. **Simplicity:** Keep your visualizations simple and focused. Avoid clutter and unnecessary elements.
2. **Clarity:** Ensure that your visualizations are easy to understand. Use clear labels, titles, and legends.
3. **Consistency:** Use consistent colors, fonts, and styles across your visualizations for a cohesive look.
4. **Accuracy:** Ensure that your data is accurate and correctly represented in your visualizations. Avoid distorting or misrepresenting data.
5. **Relevance:** Choose the most appropriate type of visualization for your data and the message you want to convey.
6. **Interactivity:** Use interactive elements like tooltips and filters to allow users to explore the data in more detail.
7. **Accessibility:** Ensure that your visualizations are accessible to all users, including those with disabilities. Use appropriate color schemes and provide alternative text for images.
8. **Storytelling:** Use your visualizations to tell a story and guide the viewer through the data, highlighting key insights and trends.
9. **Feedback:** Seek feedback from others to improve your visualizations. Pay attention to how users interact with your visualizations and make adjustments accordingly.
10. **Iteration:** Don't be afraid to iterate on your visualizations. Experiment with different approaches to find the most effective way to present your data.By following these best practices, you can create visualizations that are not only visually appealing but also informative and impactful.

GETTING STARTED WITH TABLEAU:

Getting started with Tableau software is a great way to create data visualizations quickly and efficiently. Here are the steps to get started, including connecting your data to Tableau, creating basic charts..

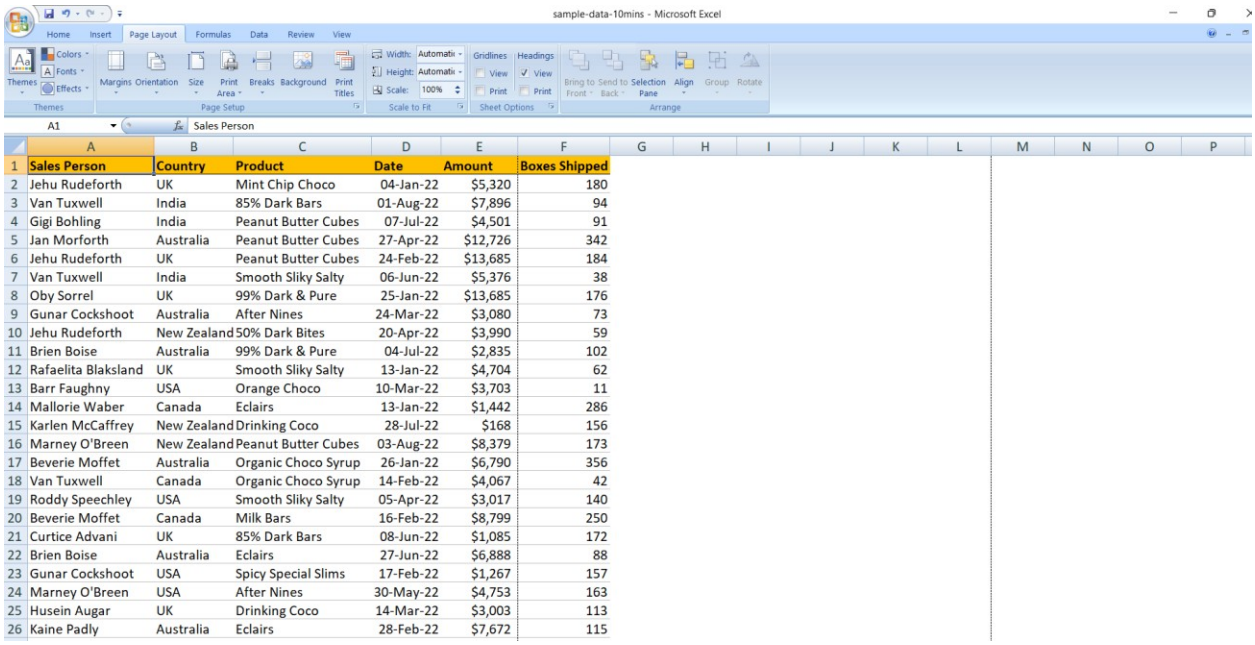
Download and Install Tableau:

First, you'll need to download and install **Tableau Desktop** or **Tableau Public** (a free version). Follow the installation instructions provided on the Tableau website for your specific operating system.

Link: **https://www.tableau.com/products/public/download**

Prepare Your Data:

Before connecting your data to Tableau, ensure that your data is in a suitable format. Common data file formats that Tableau supports include **Excel (.xlsx), CSV (.csv), and text files (.txt)**. Make sure your data is organized with headers for each column.

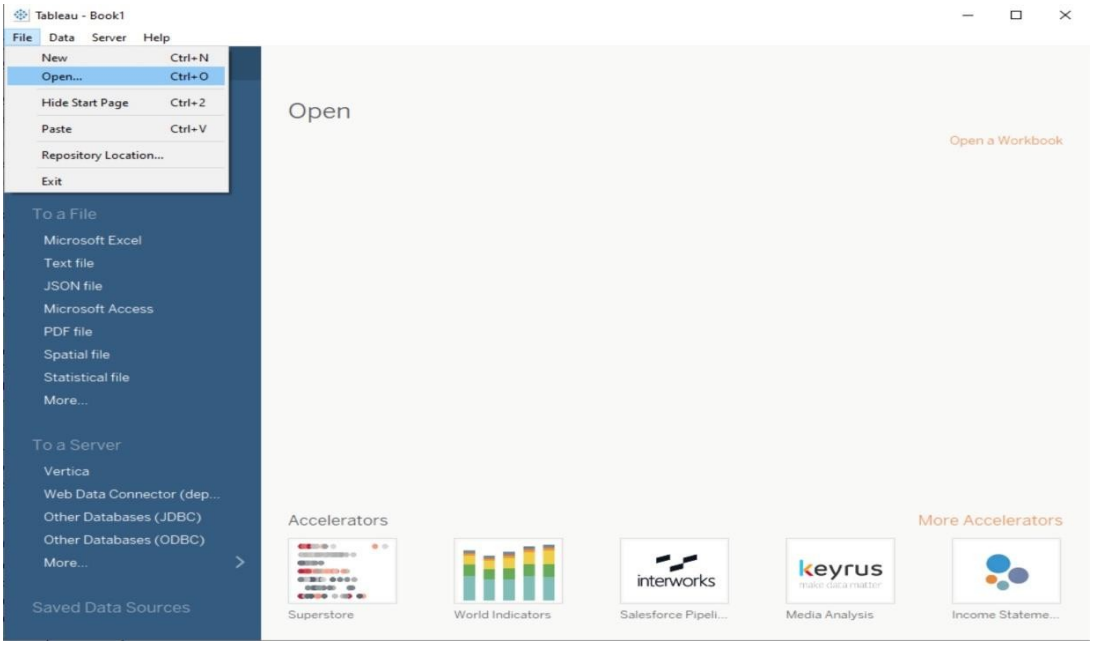


	A	B	C	D	E	F
1	Sales Person	Country	Product	Date	Amount	Boxes Shipped
2	Jehu Rudeforth	UK	Mint Chip Choco	04-Jan-22	$5,320	180
3	Van Tuxwell	India	85% Dark Bars	01-Aug-22	$7,896	94
4	Gigi Bohling	India	Peanut Butter Cubes	07-Jul-22	$4,501	91
5	Jan Morforth	Australia	Peanut Butter Cubes	27-Apr-22	$12,726	342
6	Jehu Rudeforth	UK	Peanut Butter Cubes	24-Feb-22	$13,685	184
7	Van Tuxwell	India	Smooth Sliky Salty	06-Jun-22	$5,376	38
8	Oby Sorrel	UK	99% Dark & Pure	25-Jan-22	$13,685	176
9	Gunar Cockshoot	Australia	After Nines	24-Mar-22	$3,080	73
10	Jehu Rudeforth	New Zealand	50% Dark Bites	20-Apr-22	$3,990	59
11	Brien Boise	Australia	99% Dark & Pure	04-Jul-22	$2,835	102
12	Rafaelita Blaksland	UK	Smooth Sliky Salty	13-Jan-22	$4,704	62
13	Barr Faughny	USA	Orange Choco	10-Mar-22	$3,703	11
14	Mallorie Waber	Canada	Eclairs	13-Jan-22	$1,442	286
15	Karlen McCaffrey	New Zealand	Drinking Coco	28-Jul-22	$168	156
16	Marney O'Breen	New Zealand	Peanut Butter Cubes	03-Aug-22	$8,379	173
17	Beverie Moffet	Australia	Organic Choco Syrup	26-Jan-22	$6,790	356
18	Van Tuxwell	Canada	Organic Choco Syrup	14-Feb-22	$4,067	42
19	Roddy Speechley	USA	Smooth Sliky Salty	05-Apr-22	$3,017	140
20	Beverie Moffet	Canada	Milk Bars	16-Feb-22	$8,799	250
21	Curtice Advani	UK	85% Dark Bars	08-Jun-22	$1,085	172
22	Brien Boise	Australia	Eclairs	27-Jun-22	$6,888	88
23	Gunar Cockshoot	USA	Spicy Special Slims	17-Feb-22	$1,267	157
24	Marney O'Breen	USA	After Nines	30-May-22	$4,753	163
25	Husein Augar	UK	Drinking Coco	14-Mar-22	$3,003	113
26	Kaine Padly	Australia	Eclairs	28-Feb-22	$7,672	115

Connect Your Data to Tableau or connecting to the tutorial dataset:

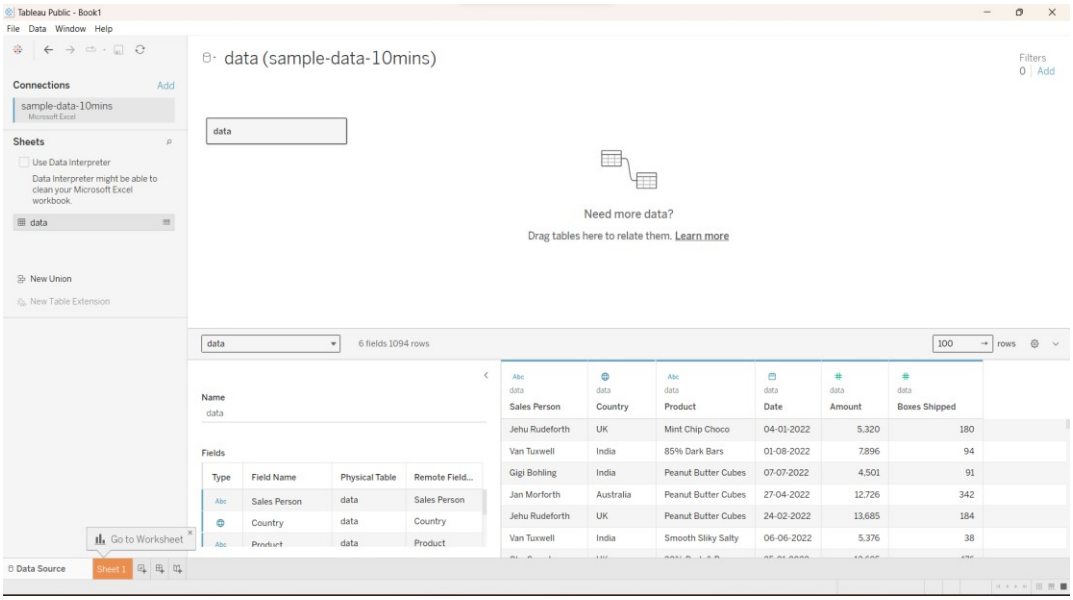
1. Launch **Tableau Desktop.**

2. Go to "**File**" Menu and then click on "**Open**".

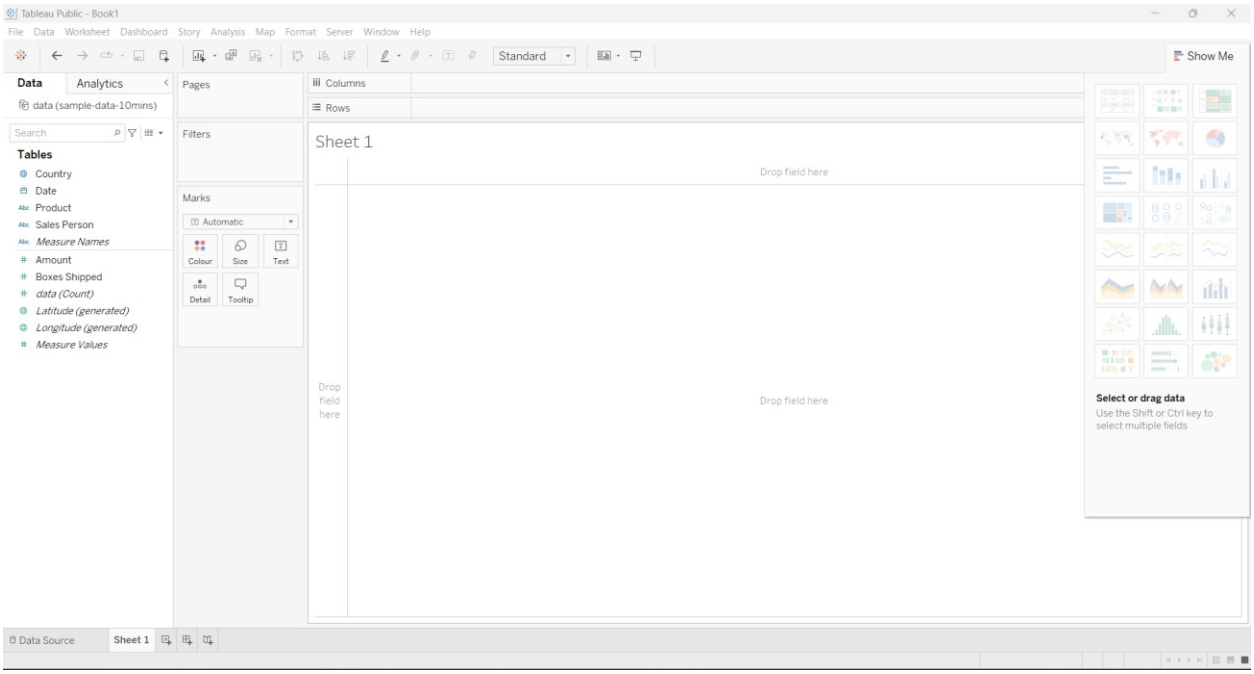


3.Choose the data source type (e.g., Excel, CSV, text file) and Select the data file and click "Open".

4. Drag any table into working area.



5. Click on Worksheet(**Sheet1**).

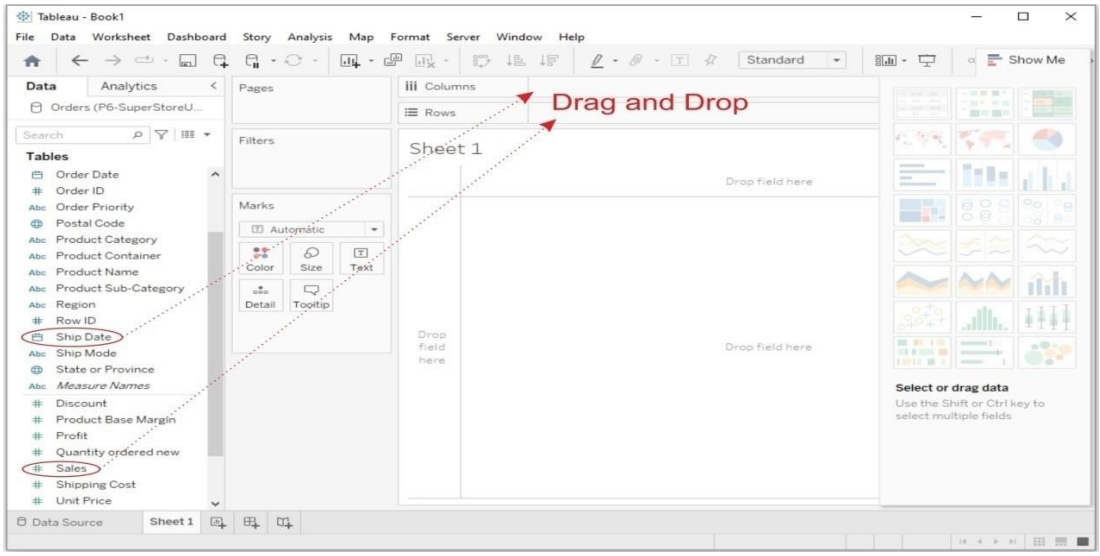


CREATING BASIC CHARTS:

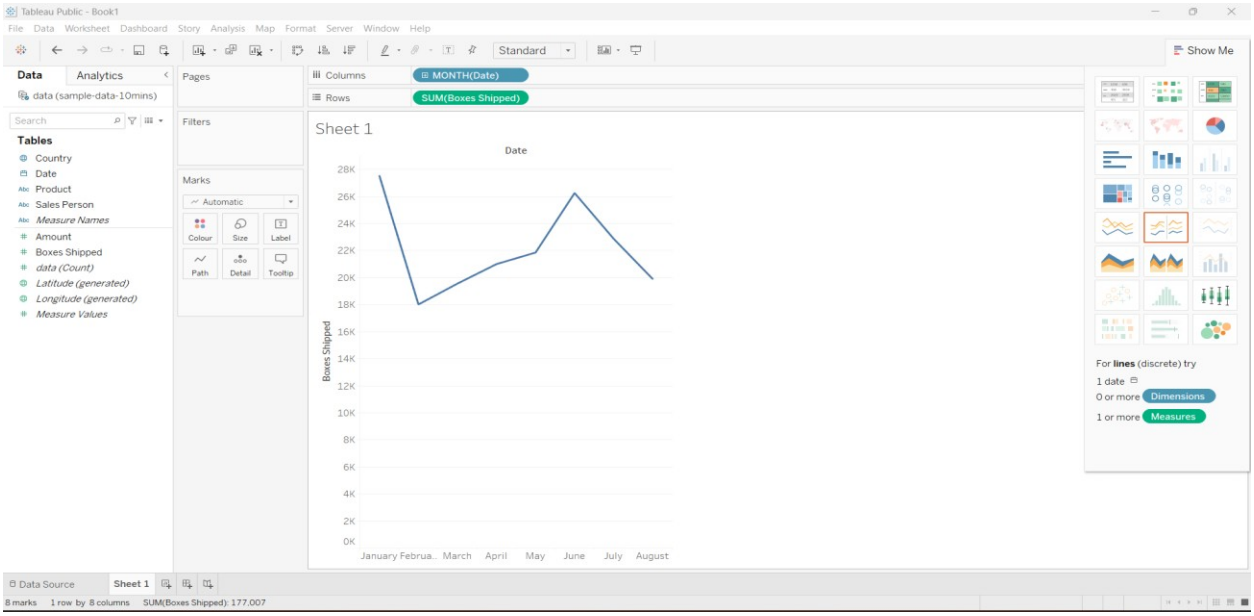
Now, let's create some basic charts using Tableau:

a. Line Chart:

1. From the "**Data Source pane**", drag and drop the date field to the **Columns shelf** and a numeric field (e.g., date, boxesshipped) to the **Rows shelf**.

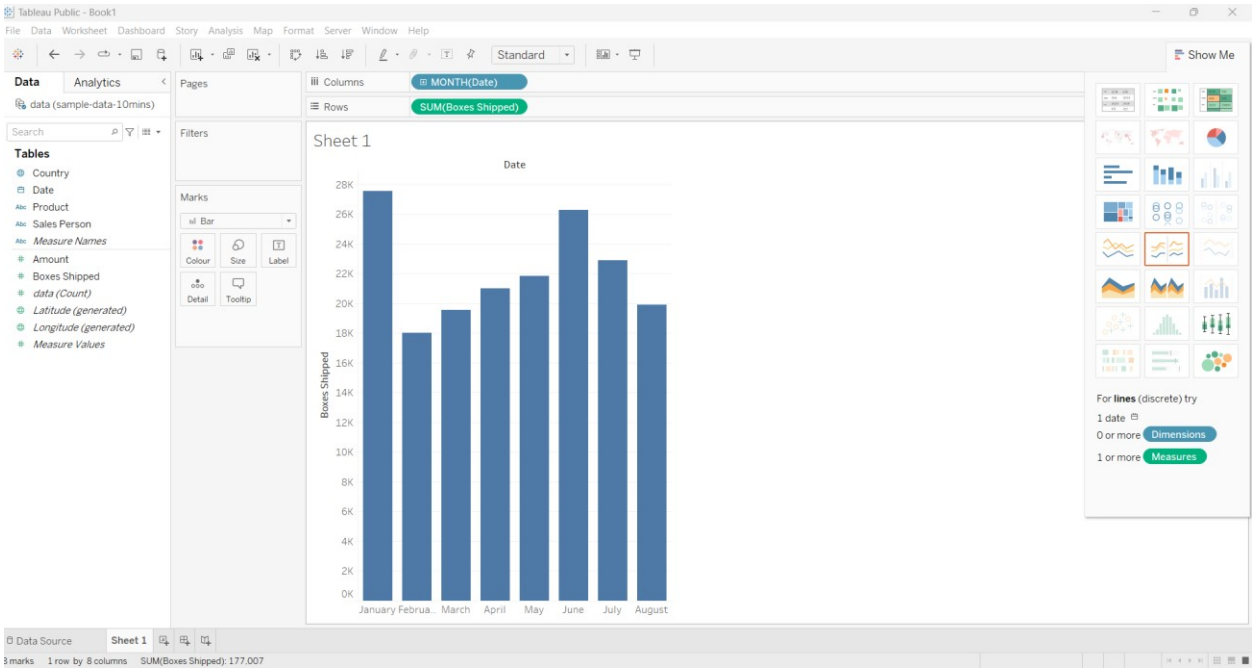


2. Then **Tableau** will automatically create a line chart. You can customize it by adding *labels, titles, and formatting*.



b. Bar Chart:

1. Drag and drop a **categorical field** (e.g., date, boxes shipped) to the Columns shelf and a **numeric field** to the Rows shelf.



FILTERING AND SORTING DATA:

Filtering:

Data filtering is the process of selecting and displaying a subset of data based on specified criteria. It allows you to focus on specific information within a dataset while temporarily hiding the rest. Filtering can be done based on various conditions, such as values, dates, or categories, to extract relevant insights and simplify data analysis. In Tableau, for example, you can apply filters to your visualizations to show only the data that meets certain criteria, helping you to explore and understand your data better.

Sorting:

Sorting is the process of arranging data in a specific order, typically based on the values of one or more columns. It allows you to organize data in a meaningful way, making it easier to analyze and interpret. In sorting, you can arrange data in ascending or descending order, depending on your requirements. For example, you can sort a list of names alphabetically or sort sales data from highest to lowest. Sorting helps in identifying patterns, trends, and outliers in the data, making it an important aspect of data analysis and visualization.

In Tableau, filtering and sorting data are essential techniques for exploring and analyzing your data. Here's how you can do it:

Filtering Data:

1. **Basic Filtering:**
    - Drag a field from the data pane to the Filters shelf.
    - Choose the values you want to include or exclude.
2. **Quick Filters:**
    - Right-click on a field in the view and select "Show Filter."
    - A filter control will be added to the view, allowing users to interactively filter the data.
3. **Filtering with Conditions:**

- Use the "Filter" option in the context menu or drag a field to the Filters shelf.

- Choose "Custom" to define specific conditions for filtering.

4. **Top N Filters:**

   - Use this to filter the view to show the top or bottom N items based on a measure.
   - Right-click on a measure in the view, go to "Quick Table Calculation," and select "Top N."

Sorting Data:

1. **Sorting within a Field:**

   - Right-click on a field in the view and select "Sort."
   - Choose either ascending or descending order.

2. **Sorting by a Different Field:**

   - Drag a field from the data pane and drop it onto the field you want to sort by.
   - Choose the "Sort" option and select the desired sorting order.

3. **Manual Sorting:**

   - Drag a field to the Rows or Columns shelf.
   - Click on the field's drop-down menu and select "Sort."
   - Choose "Manual" and drag items to rearrange them.

4. **Sorting by a Calculation:**

   - Create a calculated field that defines the sorting logic.
   - Use this calculated field to sort the data in your view.

By using these filtering and sorting techniques, you can easily navigate and analyze your data in Tableau to gain valuable insights.

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MODULE 2

COMMON CHARTS

Chart:

A chart is a graphical representation of data, often used to make complex data more understandable and easier to interpret. Charts are used in various fields such as business, economics, science, and engineering to visually represent data trends, relationships, and comparisons.

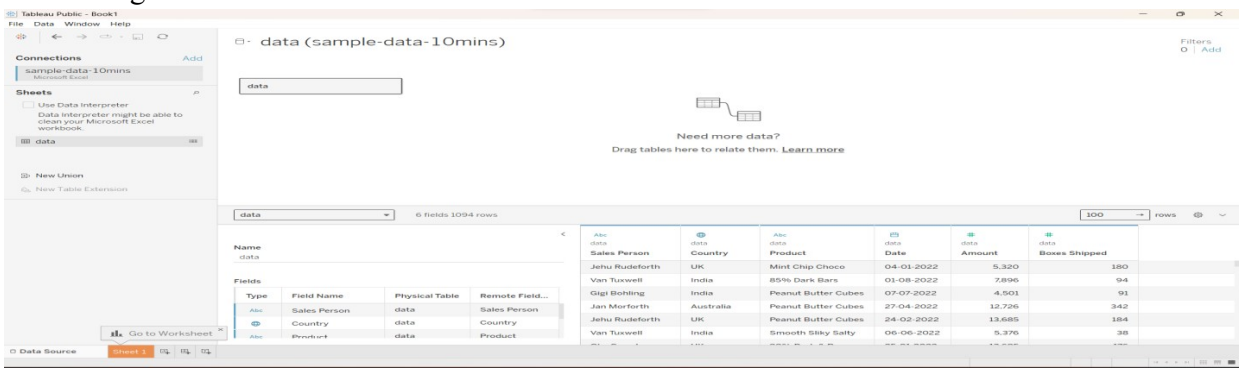
Tableau offers a wide range of charts to visualize data effectively. Some common charts used in Tableau include:

1. **Bar Chart**: Suitable for comparing categorical data.
2. **Line Chart**: Ideal for showing trends over time or continuous data.
3. **Pie Chart**: Useful for displaying parts of a whole, though it's often recommended to use other chart types instead due to potential readability issues.
4. **Scatter Plot**: Great for showing the relationship between two numerical variables.
5. **Map**: Ideal for displaying geographical data.
6. **Histogram**: Useful for displaying the distribution of numerical data.
7. **Heat Map**: Useful for visualizing data density on a map or in a table.
8. **Box Plot**: Ideal for displaying the distribution of data and identifying outliers.
9. **Bullet Graph**: Useful for comparing actual and target values.
10. **Gantt chart**: Ideal for visualizing project schedules and timelines.

These are just a few examples, and Tableau offers many more types of charts to suit various data visualization needs.

CREATING COMMON CHARTS IN TABLEAU:

Before creating charts connect your data to tableau desktop.
Connecting data to tableau:



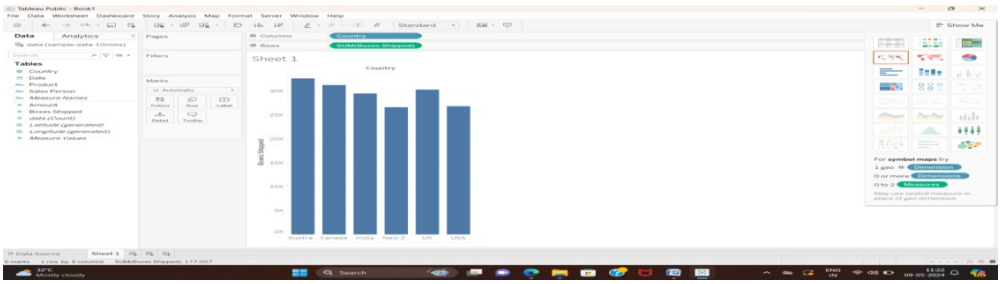
BAR CHART:

- Bar chart represents data in rectangular bar.
- It is used to compare data across categories, highlight trends, differences and outliers.
- More effective when data can be split into multiple categories.

EXAMPLE: Country by sales.

For creating Bar Chart we require one or more measure and one or more dimensions.

From the "**Data Source pane**", drag and drop the country field to the **Columns shelf** and a numeric field Amount to the **Rows shelf**. Then **Tableau** will automatically create a bar chart. You can customize it by adding *labels, titles, and formatting*.



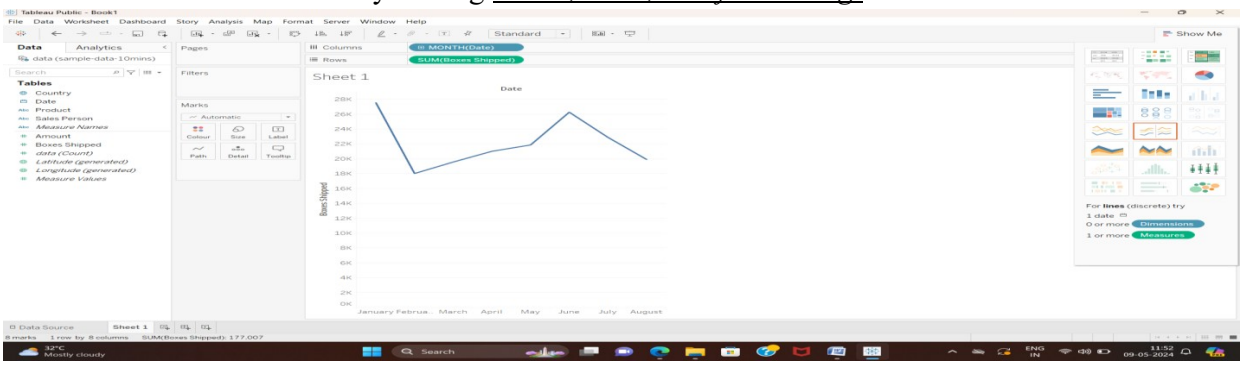
LINE CHART:

- Line chart connects individual numeric data points.
- It is used to compare data over different periods.
- A straight forward way to visualize change in one value relative to another

EXAMPLE: sales in different months.

For creating line chart we require one date and zero or more dimensions or one or more measures.

From the "**Data Source pane**", drag and drop the date field to the **Columns shelf** and a numeric field Amount to the **Rows shelf**. Then **Tableau** will automatically create a line chart. You can customize it by adding *labels, titles, and formatting.*



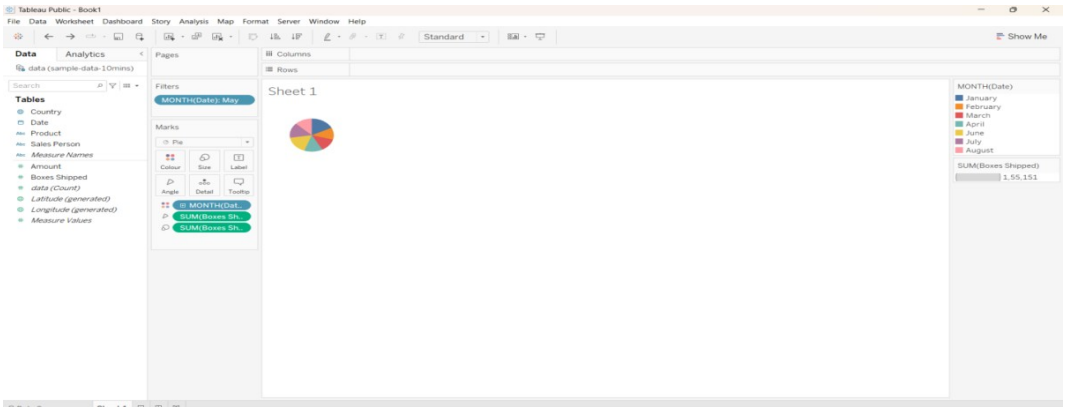
PIE CHART:

- Pie chart represents segment wise data.
- It is used to show relative portion/ percentage of information.
- Powerful for adding detail to other visualizations.
- Distinct colors are used to describe different portions of features.

EXAMPLE: No.of boxes shipped in different months.

For creating pie chart we require one or more dimensions and one or two measures.

From the "**Data Source pane**", drag and drop the date field to the **Columns shelf** and a numeric field Amount to the **Rows shelf**. Then **Tableau** will automatically create a pie chart. You can customize it by adding *labels, titles, and formatting*



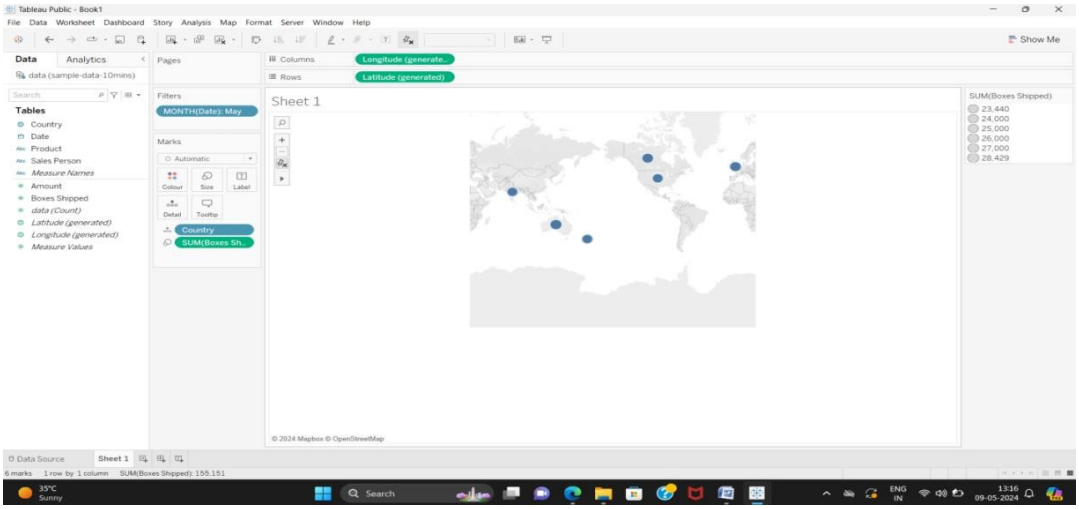
MAP:

- It is used to show geo-coded data like postal code, state and country.
- It highlights the most geographical trends in the most accessible and efficient way.

EXAMPLE: Sales in different countries.

For creating map we require one geo dimension and zero or more dimensions or zero to two measures.

From the "**Data Source pane**", drag and drop the country field to the **Columns shelf** and a numeric field Amount to the **Rows shelf**. Then **Tableau** will automatically create a map. You can customize it by adding *labels, titles, and formatting*



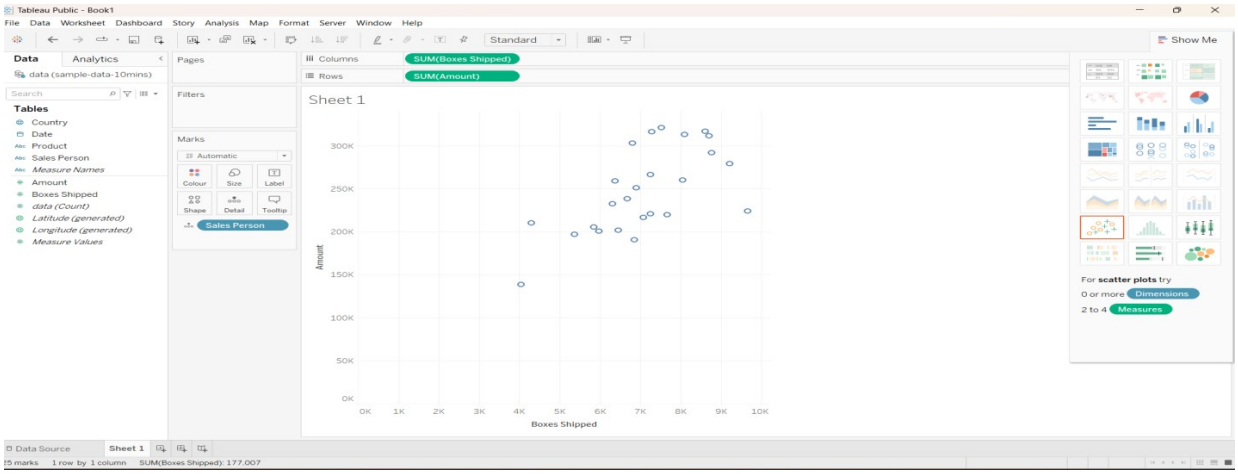
SCATTER PLOT:

- It is used to visualize the relationship between two measures.
- Scatter plot investigates the relationship between different variables.
- The plot is created when both row and column shelf have atleast one measure.

EXAMPLE: No.of boxes shipped by sales person.

For creating scatter plot we require one or more dimensions and two to four measures.

From the "**Data Source pane**", drag and drop the boxes shipped field to the **Columns shelf** and a Amount to the **Rows shelf and add salesperson in marks tab**.
Then **Tableau** will automatically create a scatter plot. You can customize it by adding *labels, titles, and formatting*



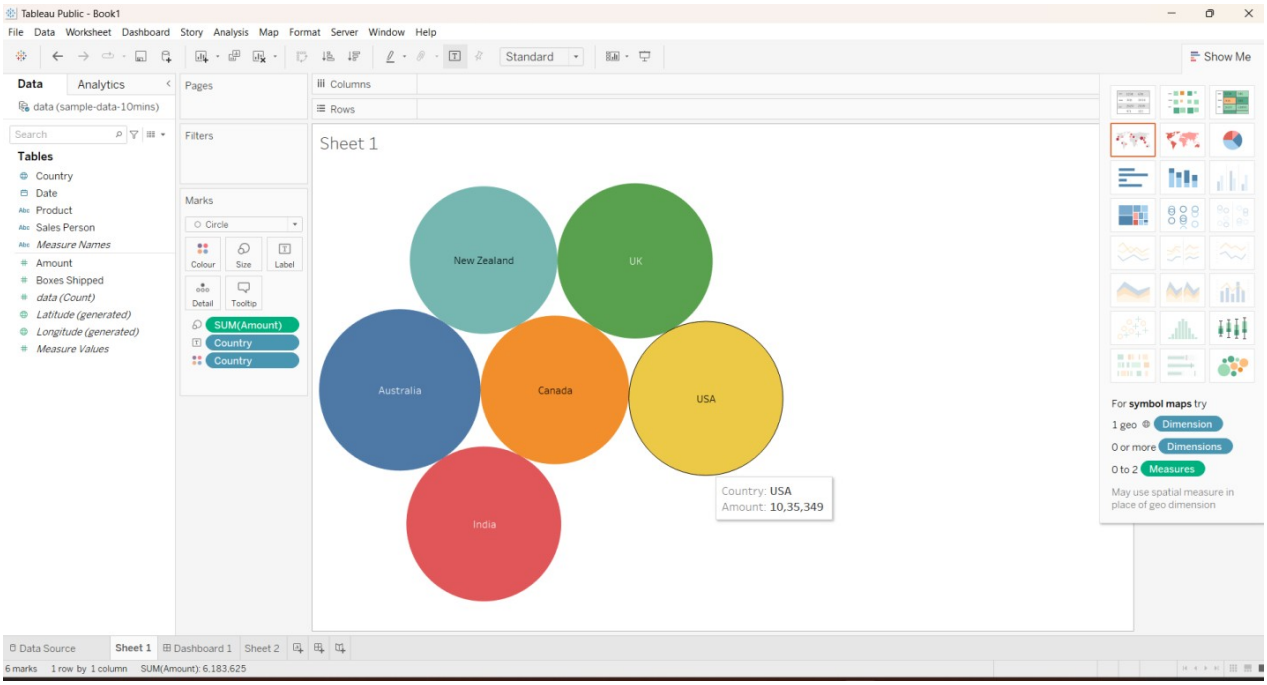
BUBBLE CHART:

- It is used to visualize measure and dimension in bubble form.
- It shows the concentration of data along the axis.
- Having different sizes and colors, it becomes easy to analyze.

EXAMPLE: Country by sales.

For creating bubble chart we require one or more dimensions and zero or two measures.

From the "**Data Source pane**", drag and drop the country field to the **Columns shelf** and a numeric field Amount to the **Rows shelf**. Then **Tableau** will automatically create a bubble chart. You can customize it by adding *labels, titles, and formatting.*



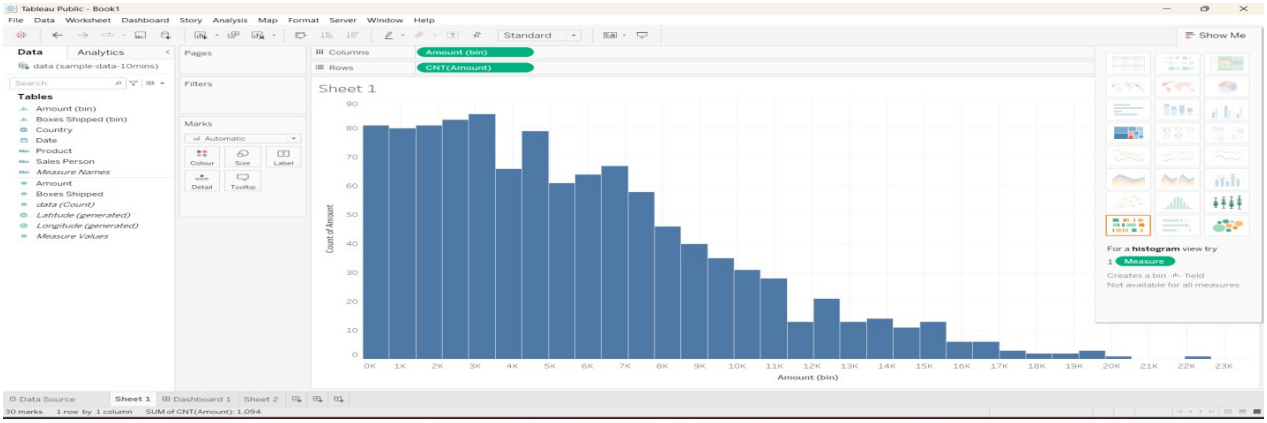
HISTOGRAM CHART:

- A Histogram displays the shape of the distribution.
- Represents how data is distributed across different groups.
- It is used to understand the distribution of the data.

EXAMPLE: sales.

For creating Histogram we require one measure.

From the "**Data Source pane**", drag and drop a numeric field Amount to the **Rows shelf**. Then **Tableau** will automatically create a histogram chart. You can customize it by adding *labels, titles, and formatting*



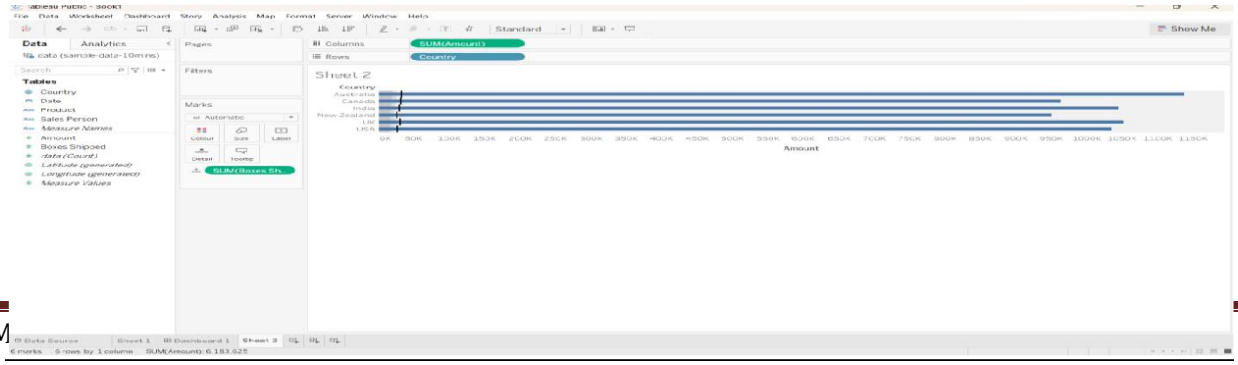
BULLET CHART:

- It is an indicator to show the performance of the measure.
- Compares a primary measure to one or more other measure and present it to define a performance matrix.
- Used to evaluate the performance of a matrix against the goal.

EXAMPLE: No of boxes shipped to different countries by amount.

For creating bullet chart we require one or more dimensions and two measures

From the "**Data Source pane**", drag and drop the country field and boxes shipped to the **Columns shelf** and a numeric field Amount to the **Rows shelf**. Then **Tableau** will automatically create a bullet chart. You can customize it by adding *labels, titles, and formatting.*



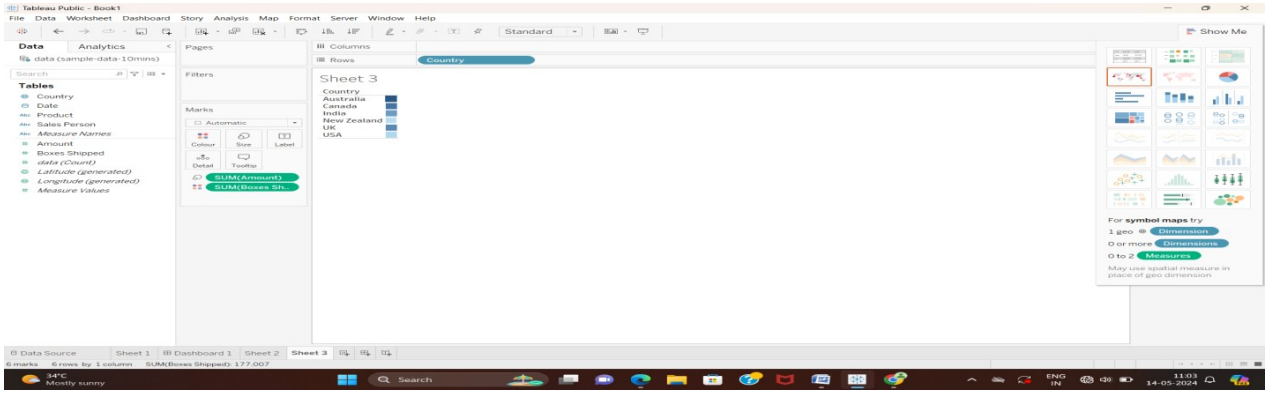
HEAT MAP:

- This is the best way to compare data across different categories is by using colours.
- It shows the relationship between two features.

EXAMPLE: No of boxes shipped to different countries by amount.

For creating heat map we require one or more dimensions and one or two measures

- From the "**Data Source pane**", drag and drop the country field to the **Columns shelf** and a numeric field Amount and boxes shipped to the **Rows shelf**. Then **Tableau** will automatically create a heat map. You can customize it by adding *labels, titles, and formatting.*



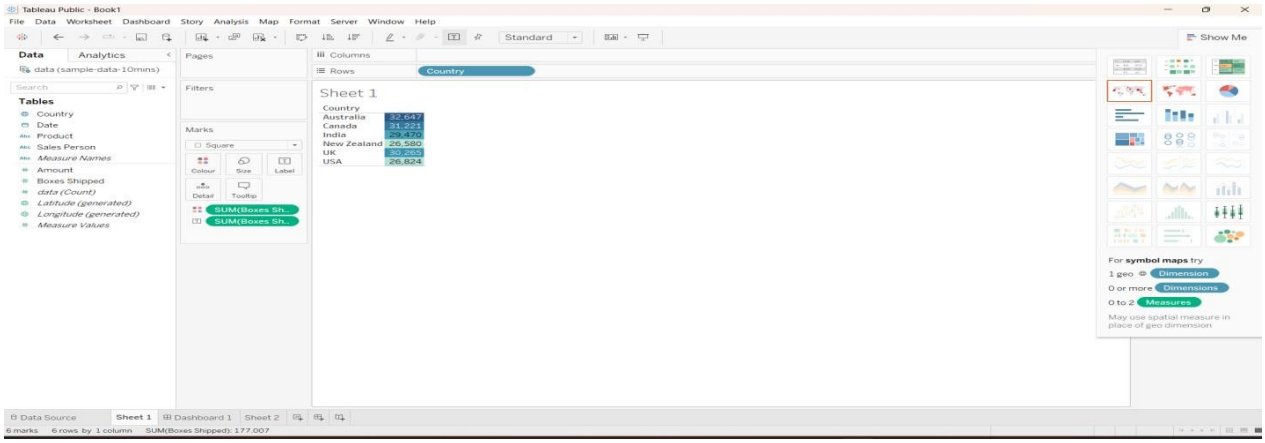
HIGHLIGHTED TABLE:

- It can be considered as an extension of the heat map.
- It provides detail information on the heat map.
- It is similar to the text table and the only difference is data is displayed using different colors.

EXAMPLE: No of boxes shipped to different countries.

For creating highlighted table we require one or more dimensions and one measure.

From the "**Data Source pane**", drag and drop the country field to the **Columns shelf** and a numeric field boxes shipped to the **Rows shelf**. Then **Tableau** will automatically create a highlighted table.. You can customize it by adding *labels, titles, and formatting.*



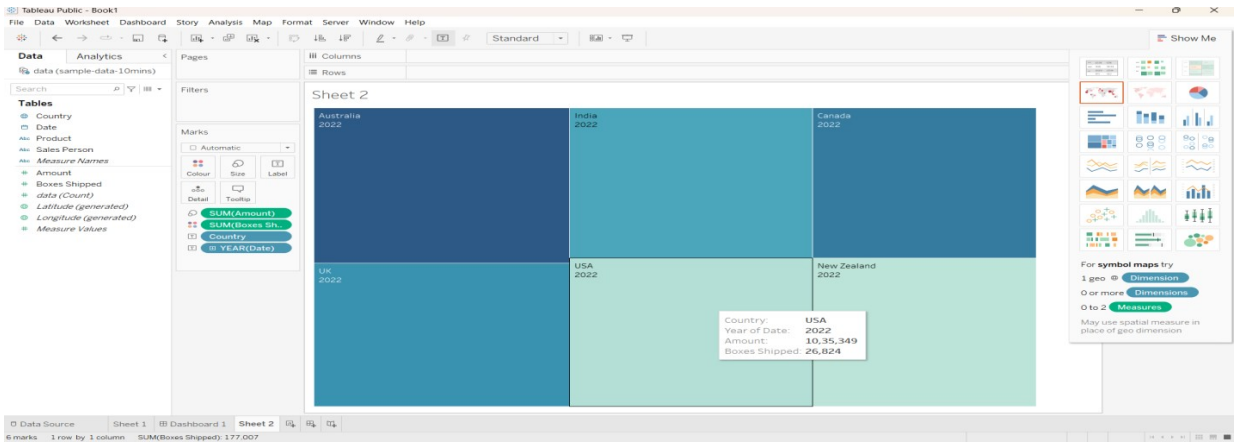
TREE MAP:

- Rectangular chart representing data in nested rectangle.
- It is used to show hierarchical data as a portion of a whole.
- It makes efficient use of space to display the entire data at once.

EXAMPLE: No of boxes shipped to different countries by amount and date.

For creating tree map we require one or more dimensions and one or two measures.

From the "**Data Source pane**", drag and drop the country field and date to the **Columns shelf** and a numeric field Amount and boxes shipped to the **Rows shelf**. Then **Tableau** will automatically create a bullet chart. You can customize it by adding *labels, titles, and formatting.*



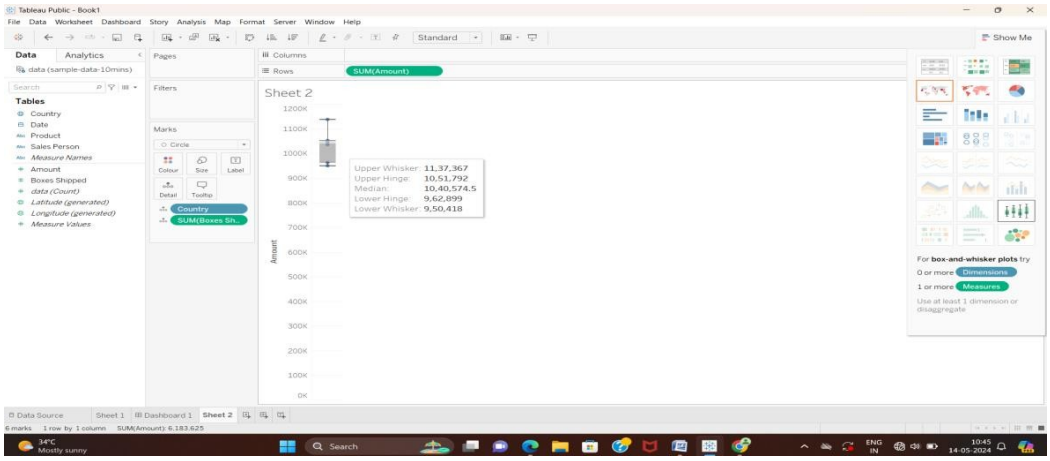
BOX -AND-WHISKER PLOT:

- It is used to show the distribution of a set of data.
- Box-and-Whisker plots are divided in to two parts
  - Box: consists of the median, first and third quartile of the data.
  - Whisker: consists of the data with 1.5 times 1QR (1QR = first quartile - Third quartile).

EXAMPLE: No of boxes shipped to different countries by amount.

For creating box and whisker plot we require zero or more dimensions and one or more measures.

From the "**Data Source pane**", drag and drop the country field and boxes shipped to the **Columns shelf** and a numeric field Amount to the **Rows shelf**. Then **Tableau** will automatically create a box and whisker plot. You can customize it by adding *labels, titles, and formatting*.



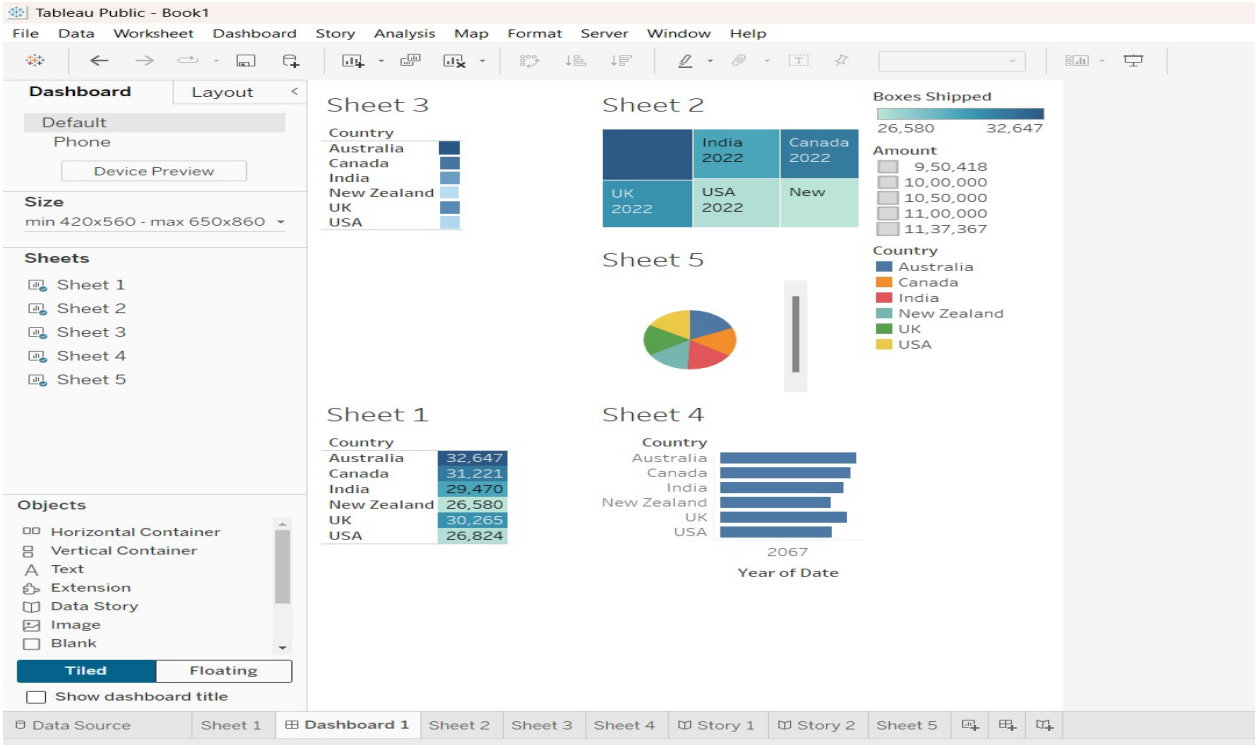
ASSEMBLING THE DASHBOARD

In Tableau a *Dashboard* is a display that brings together the content from multiple sheets. A dashboard may also have additional text and images, and it can be configured with *Actions* to make it more interactive.

Assembling the pieces of a dashboard can take time, especially as you learn to adjust the size, position, formatting, and relationships among the components of your dashboard.

1 Add a dashboard

1. From the top menu select *Dashboard -> New Dashboard*
2. Your sheets are listed on the left; drag them into position in the central dashboard pane.

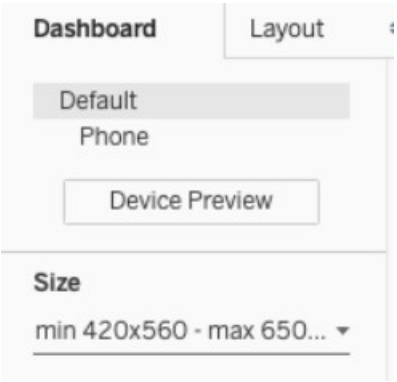


Dashboard tips

The content, formatting, and behavior choices for a dashboard will depend on its audience and purpose. There are many more features than we can cover in this workshop - here are some tips to get you started.

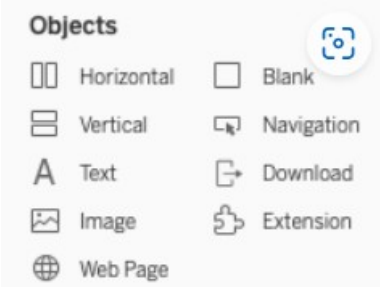
Choosing the size

In the top left of the screen are options for setting the dashboard size and checking how it will display on various interfaces (e.g. phones, tablets, laptops).



Adding text and images:

In the bottom left are other non-sheet *Objects* you can add by dragging them to the desired position on the dashboard. Use a *Text* object to create a dashboard title or add a note about the data source. A *Blank* object is sometimes useful for spacing content.

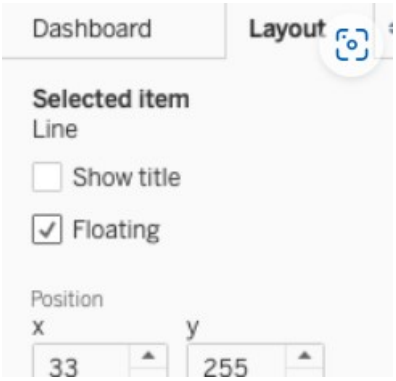


Add legends, filters, and adjust object settings:

When an object on the dashboard is selected a set of icons will appear in the top-right corner. Click the down arrow for a menu with additional formatting options. If you want to include a filter for the user to control, choose it from the *Filter* submenu.

Layout options

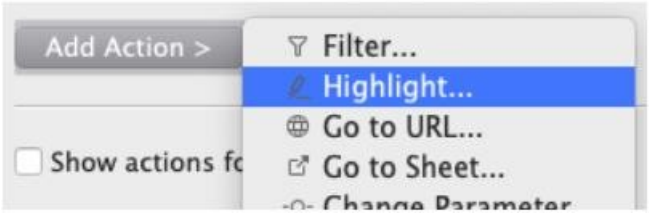
A tab at the top left of the screen leads to other layout options. *Floating* changes how the selected object can be positioned on the dashboard, allowing it to overlap other objects.



Adding *Actions*

Dashboard *Actions* can make your dashboard more interactive. A *Highlight* action, for example, can highlight corresponding content in *all* sheets when a viewer hovers over one of them.

To add an action select *Dashboard -> Actions* from the top menu, then use the pop-up window to add the desired action.



Saving your work

Use the *File -> Save* menu to save your work as a Tableau *workbook*. The saving options depend on which Tableau product you are using.

- **Tableau Public** users must save their work to an online Tableau Public account. Accounts are free, but saving online is not suitable if you are
- **Tableau Desktop** users may save their work locally or to an online Tableau Public account.

USING DASHBOARD FILTERS

To use dashboard filters in Tableau, follow these steps:

1. Create Filters:
    - In a worksheet, right-click on a dimension or measure and select "Show Filter" to

create a filter for that field.

- Customize the filter as needed (e.g., dropdown, slider, multiple values).

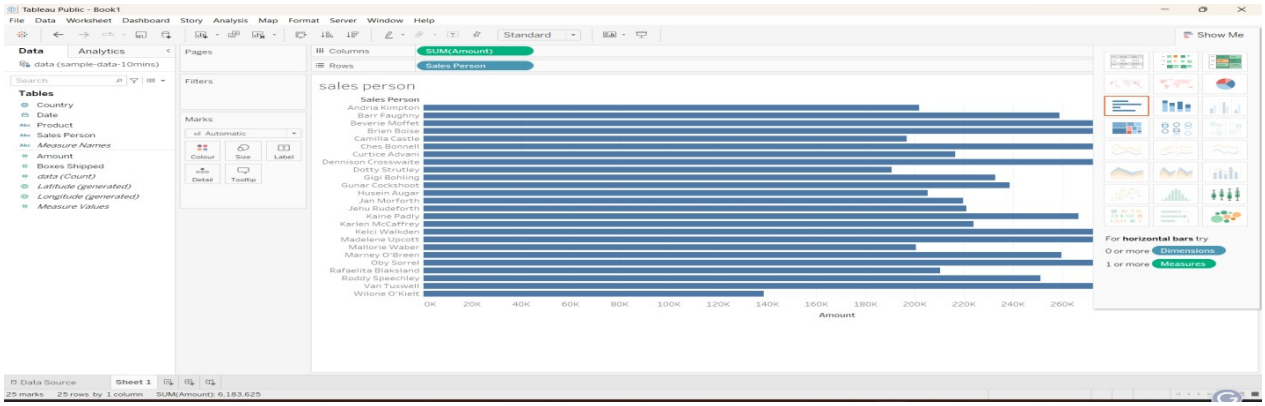
2. Add Filters to Dashboard:
    - Open a dashboard or create a new one.
    - Drag the filter from the "Filters" pane on the left to the dashboard.
3. Apply Filters:
    - Interact with the filter on the dashboard to apply it to the data.
    - The data in all visualizations connected to the filter will update based on the filter selection.
4. Filter Multiple Worksheets:
    - Right-click on the filter in the dashboard and select "Apply to Worksheets" > "Selected Worksheets."
    - Choose the worksheets you want the filter to apply to.
5. Customize Filters:
    - Right-click on the filter on the dashboard and select "Edit Filter" to customize its behavior and appearance.
    - You can also format the filter to match the design of your dashboard.
6. Add Multiple Filters:
    - Repeat the above steps to add multiple filters to your dashboard.
    - Users can interact with these filters independently to refine their analysis.

Using dashboard filters in Tableau can help you create interactive and dynamic dashboards that allow users to explore data and gain insights.

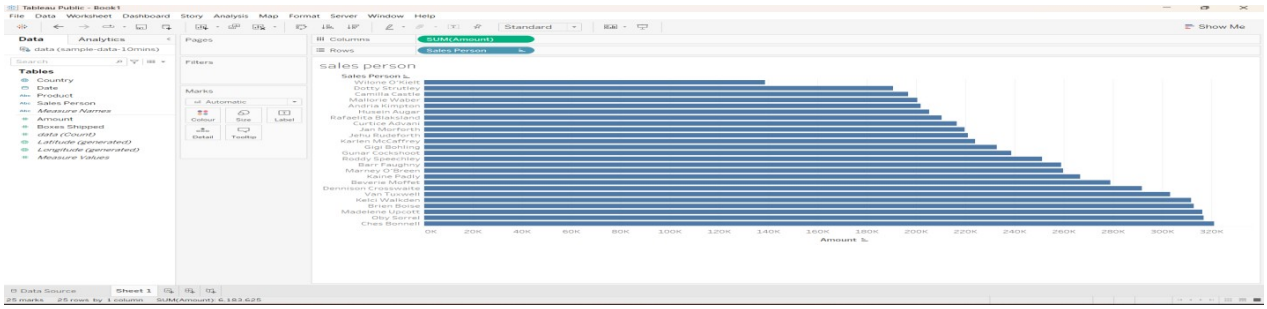
Creating filter to worksheet:

Example: filtering top 10 sales person.

First we have to create a sheet “sales person”, and sort them by using sort option.
Before sorting:



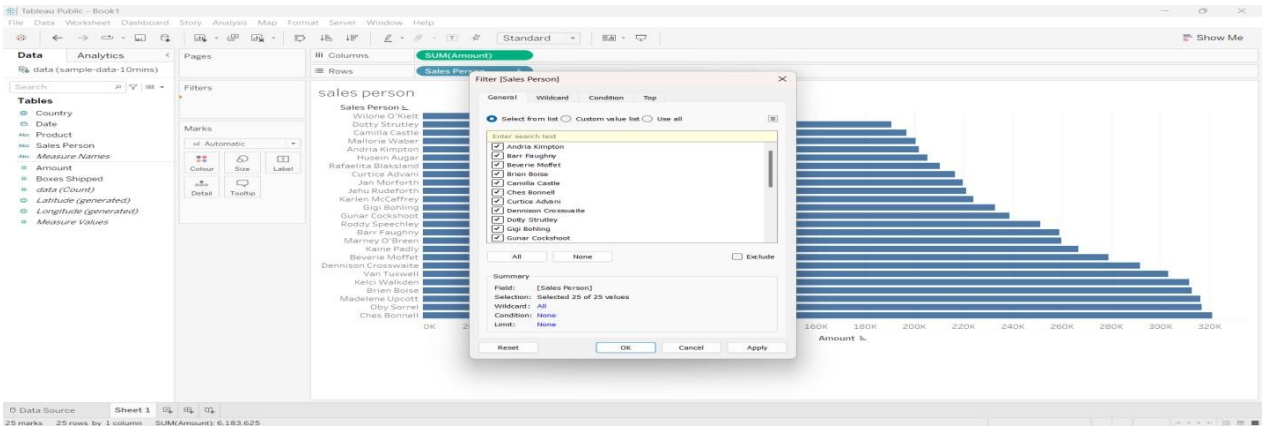
After Sorting:



Sorted in ascending order.

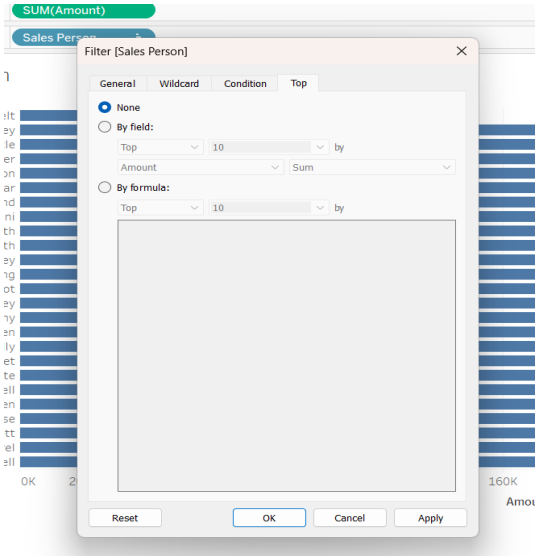
By using this sheet we want to filter top 10 sales persons. For that we have to create filter.

1. Drag and drop salesperson dimension into filters tab. One dialogue box will open

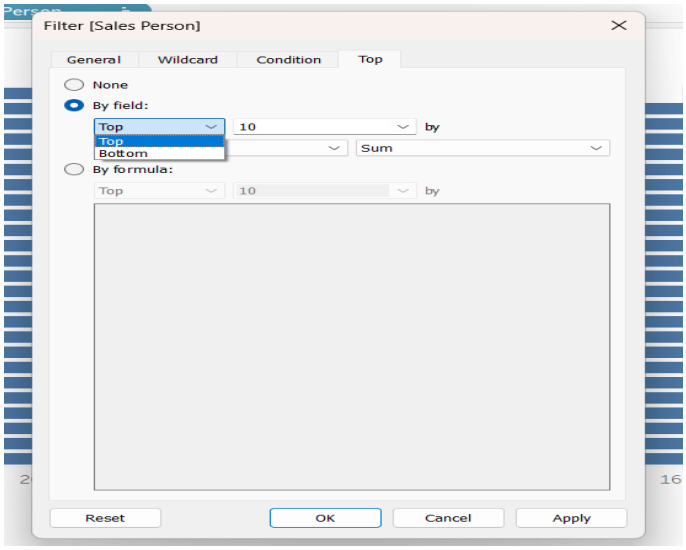


Here we can manually exclude or include sales persons by checking and un-checking the boxes.

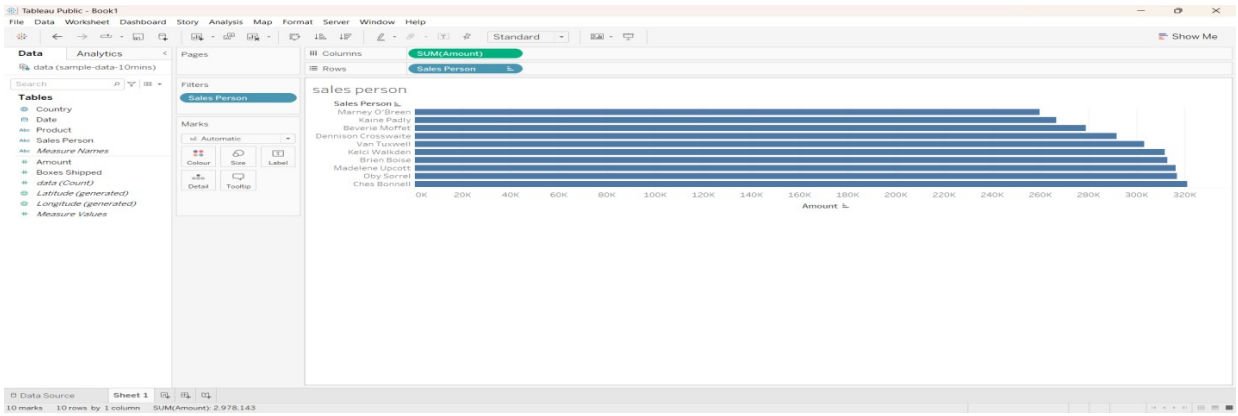
2. Then click on top option



3. Select By field and select top and number as 10.



4. Then click ok, we will get our top 10 sales persons.

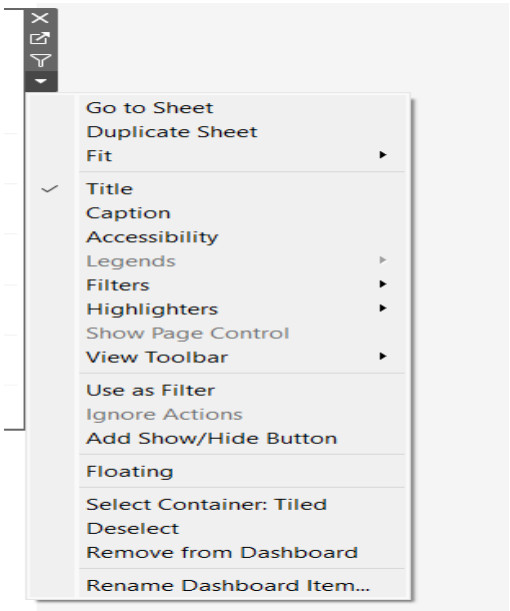


Adding filter to dashboard:

If a filter card is already shown on a worksheet before the worksheet is added to the dashboard, then the filter card will automatically be added to the dashboard as well. Adding additional filters later to either the dashboard in general, or to a specific device layout, can be done with the following steps:

Scenario 1: Add a filter to a dashboard

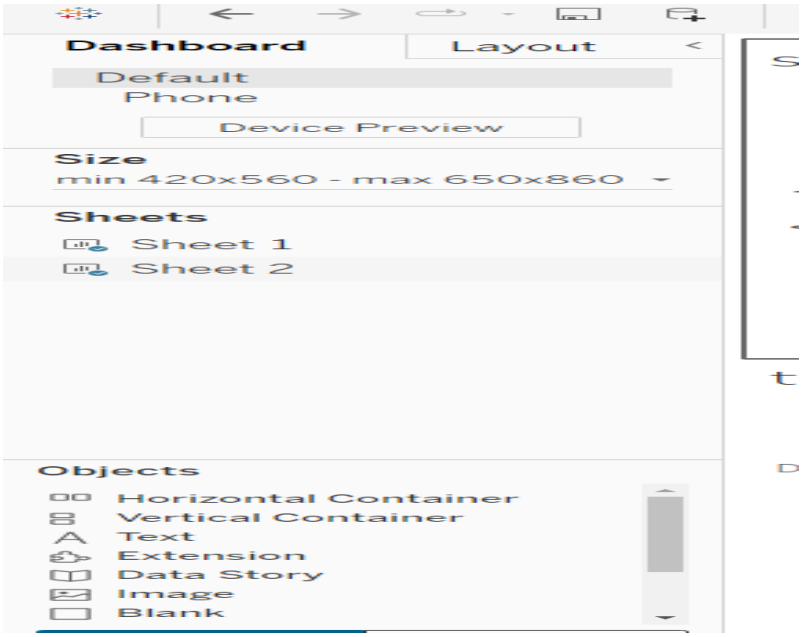
1. Click on the worksheet on the dashboard to select it.
2. You will see 4 icons in the upper corner of the gray outline. Select the down arrow to expose the options shown below.



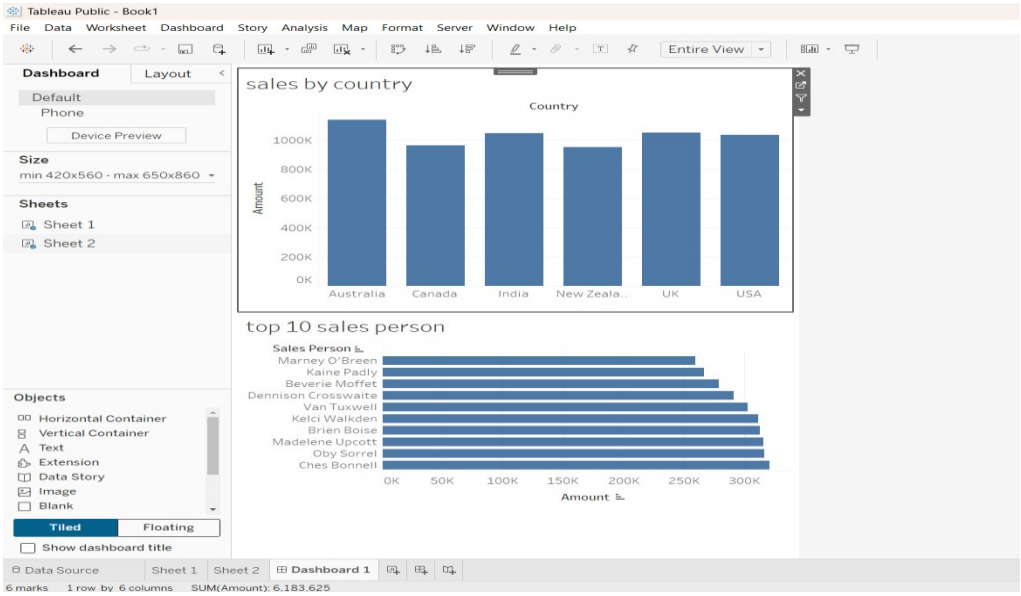
3. Select Filters and add the new field to be added as a filter.

Scenario 2: Add a filter to a custom device layout

1. Use the above method to add the filter to the Default layout. Tableau Desktop will automatically add the filter to all device layouts if they are set to "Default" rather than "Custom" in the Layout section of the left-hand Dashboard pane.
2. In the Dashboard pane, under Layout, drag the desired filter from the list of all possible filters into the view



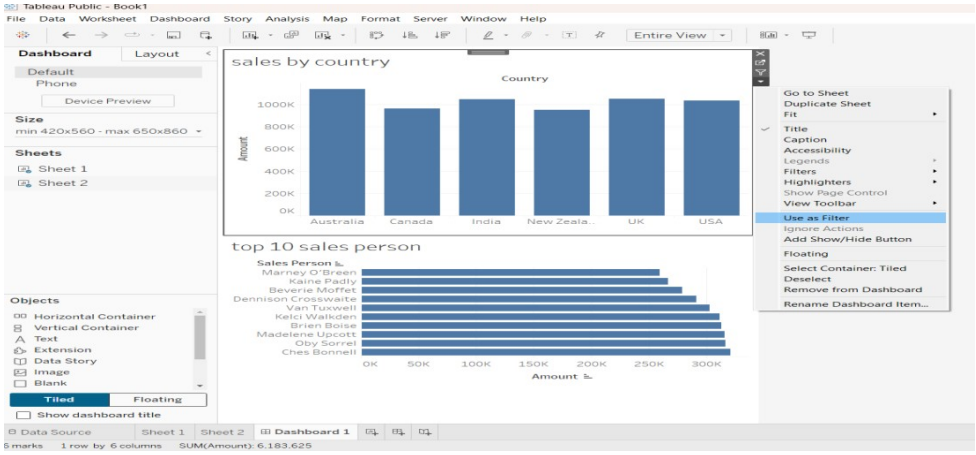
Example:



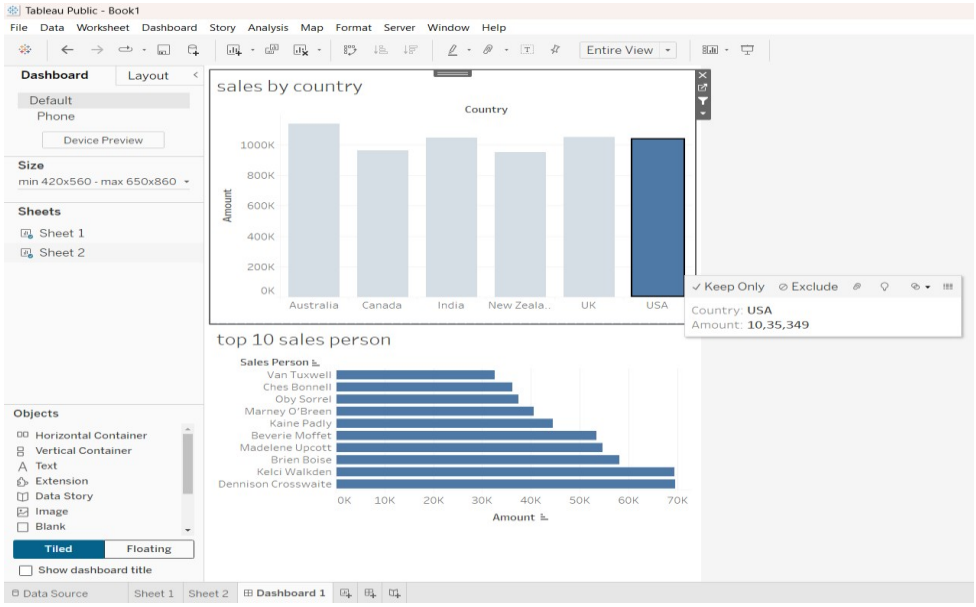
Here the dashboard having two sheets

- ✓ Sales by country and
- ✓ Top 10 sales persons

Here I want to apply top 10 sales person filter to my dashboard by using “use as filter” option then we will get top 10 sales persons in different countries.



Now if I click on one country it will show top 10 sales persons in that particular country. For example I click on USA it will show top 10 sales persons in USA.



MODULE 3

DATA TRANSFORMATION

Data transformation is the process of converting data from one format or structure into another to make it more suitable for analysis, visualization, or other purposes. It involves cleaning, aggregating, merging, and restructuring data to make it more useful and meaningful. Data transformation is a crucial step in the data analysis process, as raw data often needs to be processed and formatted before it can be effectively analyzed or visualized.

Some common data transformation tasks include:

1. Cleaning: Removing or correcting errors, duplicates, and inconsistencies in the data.
2. Filtering: Selecting a subset of data based on specific criteria or conditions.
3. Aggregating: Combining multiple data points into a summary or aggregated value, such as calculating averages or totals.
4. Joining/merging: Combining data from multiple sources into a single dataset based on common keys or fields.
5. Pivoting/un-pivoting: Changing the structure of the data from wide to tall (or vice versa) to make it easier to analyze.
6. Formatting: Converting data into a standard format (e.g., date formatting) for consistency and compatibility with analysis tools.

Data transformation is often performed using tools like Tableau, Excel, Python, or SQL, depending on the complexity of the transformation and the requirements of the analysis.

DATA TRANSFORMATION IN TABLEAU:

To transform data in Tableau, you can use various features like calculated fields, data blending, data pivoting, and custom SQL. Here's a general overview of how you can perform data transformations in Tableau:

1. Calculated Fields: Use calculated fields to create new fields based on existing data. You can perform calculations, string operations, date calculations, and more.
2. Data Blending: Blend data from multiple sources by defining relationships between them. This can help you combine data for analysis.
3. Data Pivoting: Pivot your data to change the layout from wide to tall or vice versa. This can be useful when your data is not in the desired format for analysis.

4. Custom SQL: Write custom SQL queries to extract, transform, and load data into Tableau. This is useful for complex transformations that cannot be achieved using other methods.

5. Tableau Prep: Use Tableau Prep, a separate tool from Tableau, to visually prepare and clean your data before bringing it into Tableau for analysis.

Each of these methods has its strengths and use cases, so the best approach depends on your specific requirements and the structure of your data.

DATA VISUALISATION BEST PRACTICES:

1. Understand Your Audience: Consider who will be viewing your visualization and tailor it to their needs and knowledge level. Use appropriate terminology and simplify complex information for non-experts.

2. Keep it Simple: Avoid clutter and unnecessary elements. Use a clean and intuitive design to convey information effectively.

3. Choose the Right Chart Type: Select a chart type that best represents your data and makes it easy to understand. For example, use a bar chart for comparisons and a line chart for trends over time.

4. Use Color Wisely: Use color to highlight important information and create visual hierarchy. Avoid using too many colors or overly bright colors that can distract from the data.

5. Provide Context: Include labels, titles, and annotations to provide context and help users understand the data. Use tooltips to provide additional information when needed.

6. Ensure Accessibility: Make sure your visualization is accessible to all users, including those with visual impairments. Use accessible colors, provide alternative text for images, and use clear and simple language.

7. Test and Iterate: Test your visualization with real users to ensure it is effective and easy to understand. Iterate based on feedback to improve its usability and clarity.

8. Tell a Story: Use your visualization to tell a story or convey a message. Structure your visualization in a way that guides the viewer through the data and highlights key insights.

9. Consider Interactivity: Use interactive elements like filters, tooltips, and drill-downs to allow users to explore the data and gain deeper insights.

10. Use Consistent Design: Maintain a consistent design across your visualization to create a cohesive and professional look. Use consistent colors, fonts, and styles throughout.

By following these best practices, you can create data visualizations that are engaging, informative, and easy to understand.

CALCULATIONS IN TABLEAU:

In Tableau, calculations are essential for analyzing and presenting data. There are different types of calculations you can create:

1. Basic Calculations

Basic calculations allow you to create new fields based on your existing data.

- **Calculated Fields**: Create new data from your existing data using mathematical operations, logical statements, and other functions.

2. Table Calculations

Table calculations are transformations applied to the values in a visualization. They are computed based on the data in the view.

- **Running Total**: Sum of values up to the current point in the data.
- **Percent of Total**: Computes each value as a percentage of the total.

3. Level of Detail (LOD) Calculations

LOD calculations provide a way to compute values at the data source level and the visualization level. They allow you to control the level of granularity for your calculations.

4. Aggregate Calculations

These calculations involve aggregating your data in some way, like summing, averaging, or finding the maximum or minimum values.

5. String Calculations

String calculations allow you to manipulate text fields.

6. Date Calculations

Date calculations help manipulate date fields to perform tasks like extracting parts of a date or calculating the difference between dates.

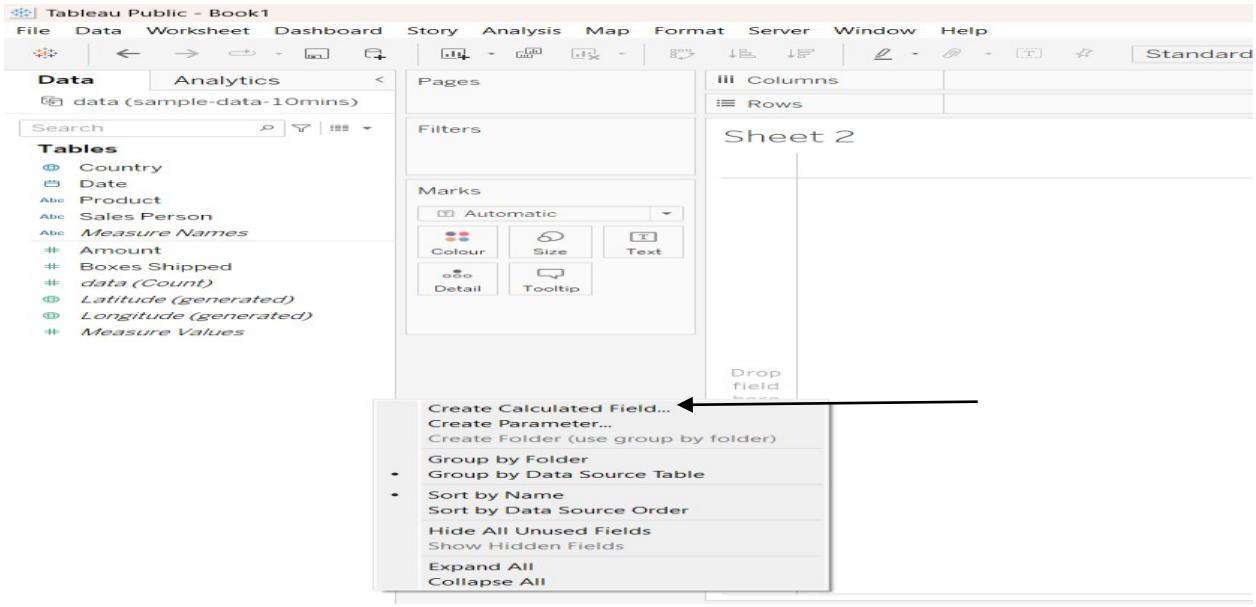
CREATING SIMPLE CALCULATIONS IN TABLEAU:

In Tableau, you can create simple calculations using calculated fields. Calculated fields allow you to perform basic arithmetic operations, string manipulation, date calculations, and more. Here's how you can create a simple calculation in Tableau:

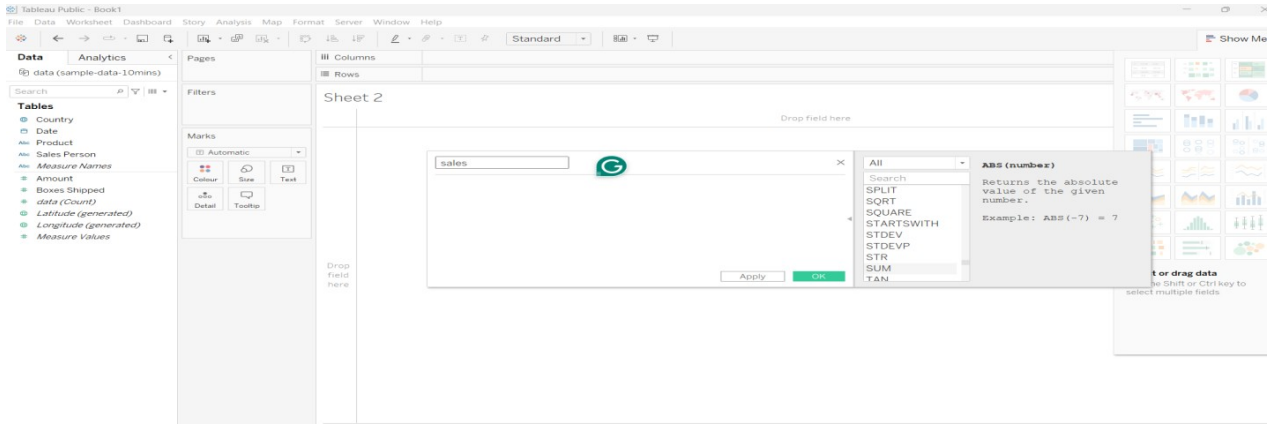
1. Open Tableau: Open Tableau Desktop and connect to your data source.
2. Navigate to the Data Source tab: Click on the Data Source tab at the bottom of the screen to start creating your calculated field.
3. Create a Calculated Field:
    - Right-click on a blank space in the Data Source tab.
    - Select "Create Calculated Field."
    - Enter a name for your calculated field.
    - In the calculation editor, write your calculation using the available functions and fields from your data source.
    - Click OK to save your calculated field.
4. Use the Calculated Field in your Visualizations:
    - Navigate back to a worksheet.
    - Drag the calculated field from the Data pane to the desired shelf (rows, columns, or marks).
    - Tableau will automatically apply the calculation to your visualization.

Here's an example of a simple calculation in Tableau that calculates the total sales amount:
SUM([Amount])

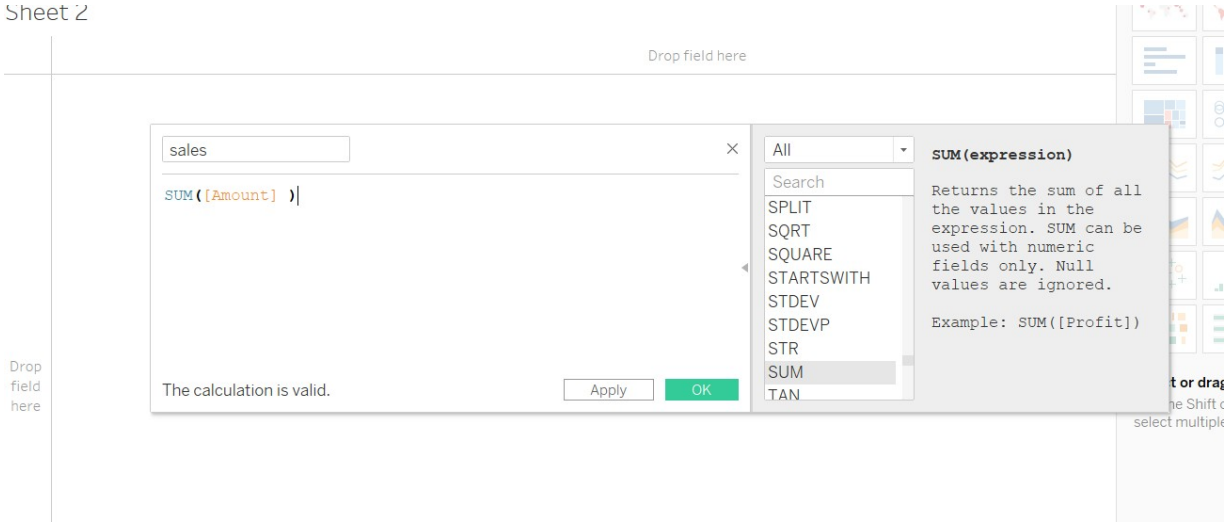
Step 1: click on create calculated field.



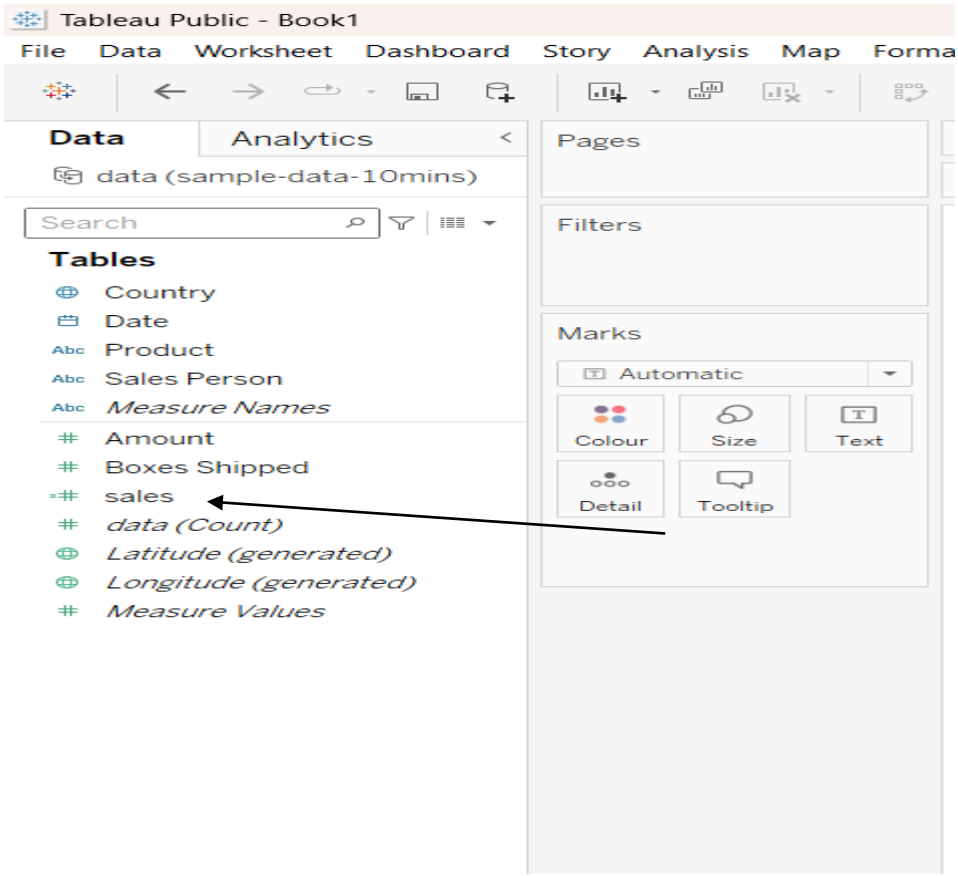
Step 2: Name the calculation as "sales" and select the sum function.



Step 3: sum the amount by adding Amount measure.



Then our calculated field “sales” are created.



In this calculation, SUM([Amount]) calculates the sum of the sales from your data source. You can replace [Sales] with the actual field name from your data source.

You can create more complex calculations using other functions and operators as needed for your analysis.

USING TABLE CALCULATIONS:

Table calculations in Tableau are powerful ways to perform computations on the data in your visualization. They operate on the result of an existing query and allow you to transform and manipulate data within the context of your visualizations. Here’s an example to illustrate the use of table calculations in Tableau:

Example: Calculating Year-over-Year Growth

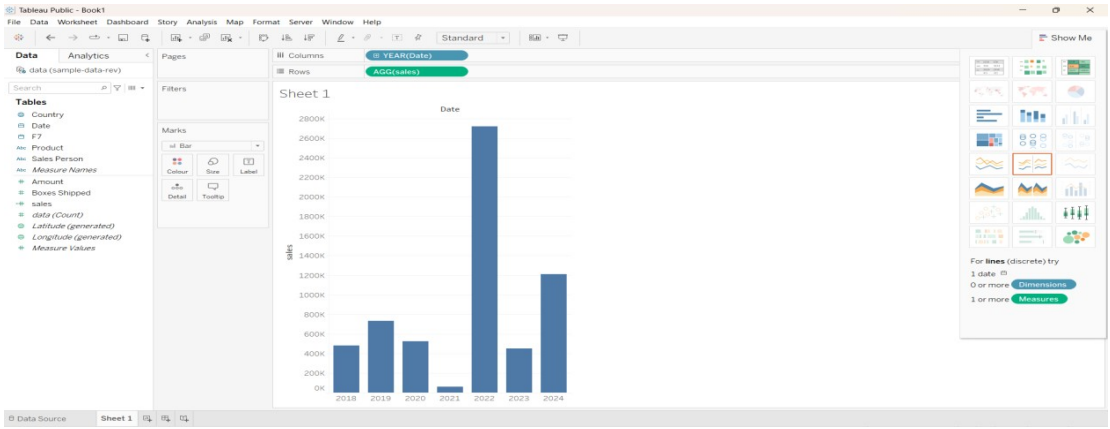
Let's say you have a dataset containing monthly sales data, and you want to calculate the year-over-year (YoY) growth in sales.

1. Connect to your Data: Connect to your data source in Tableau, which contains at least

two fields: Date and Sales.

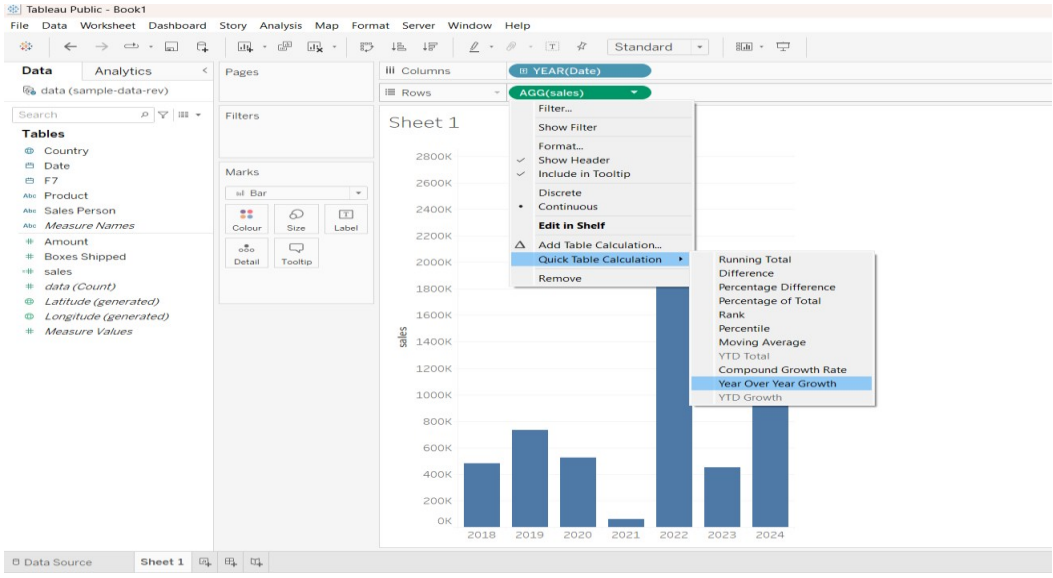
2. Create a Visualization:

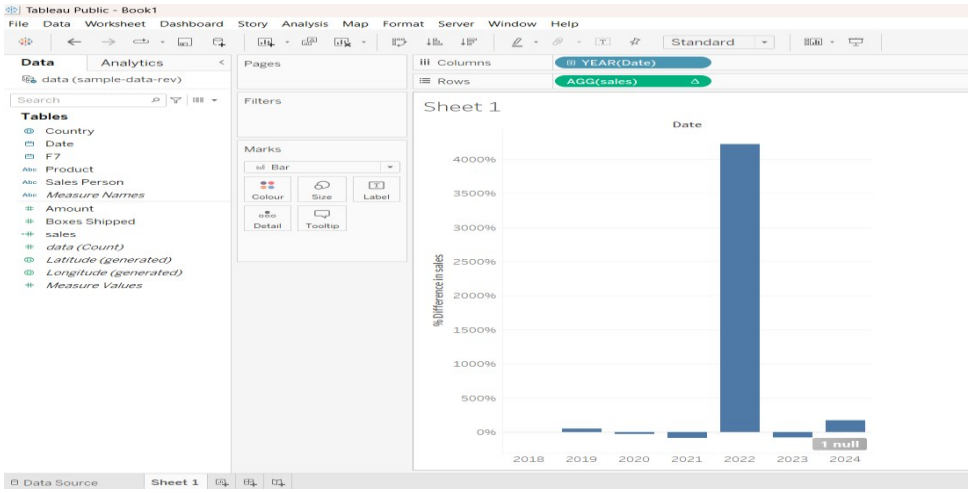
   - Drag Date to the Columns shelf.
   - Drag Sales to the Rows shelf.
   - Change the Date field to display by month (right-click on the Date field, select "More", and then "Month").



3. Add a Table Calculation:

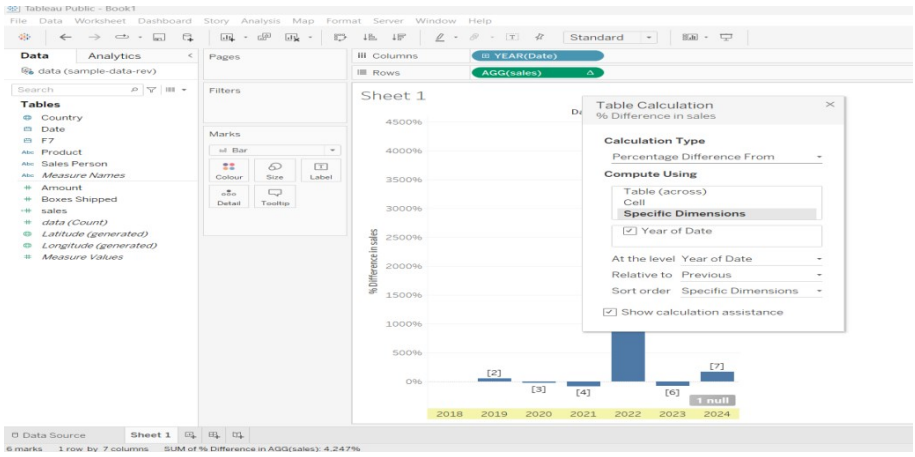
   - Right-click on the Sales field in the Rows shelf.
   - Select "Quick Table Calculation" and then choose "Year over Year Growth".





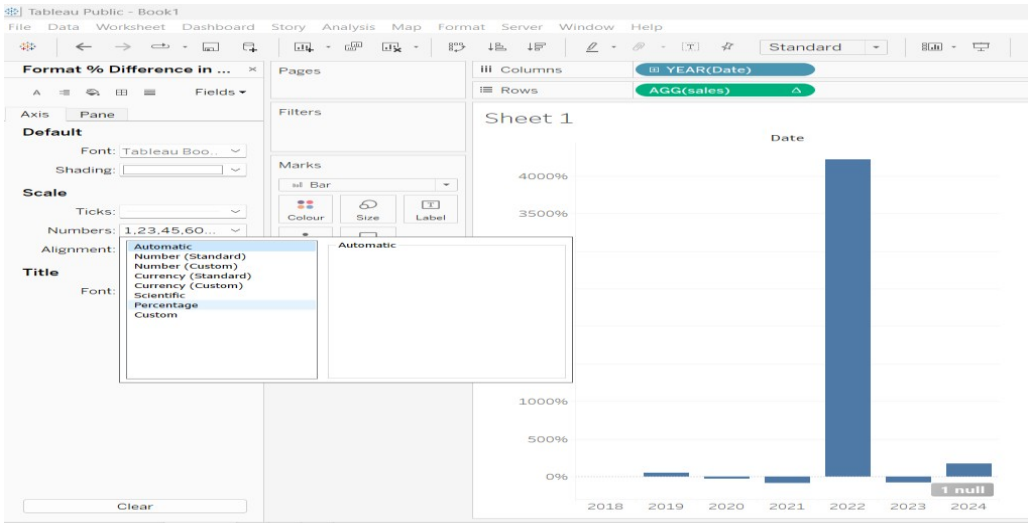
4. Customize the Calculation:

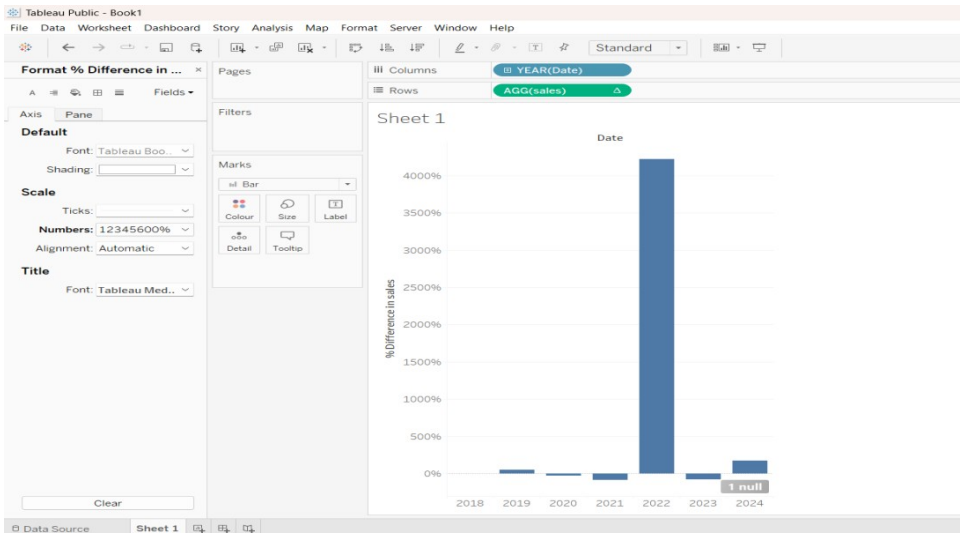
   - If needed, you can customize the table calculation. Right-click on the Sales field again, select "Edit Table Calculation".
   - In the dialog box, you can change the specific settings for the table calculation, such as the "Compute Using" option to ensure it computes along the correct dimension (e.g., Date).



5. Format the Result:

   - You might want to format the result to show the growth as a percentage. Right-click on the Sales field, select "Format", and then choose the percentage format.

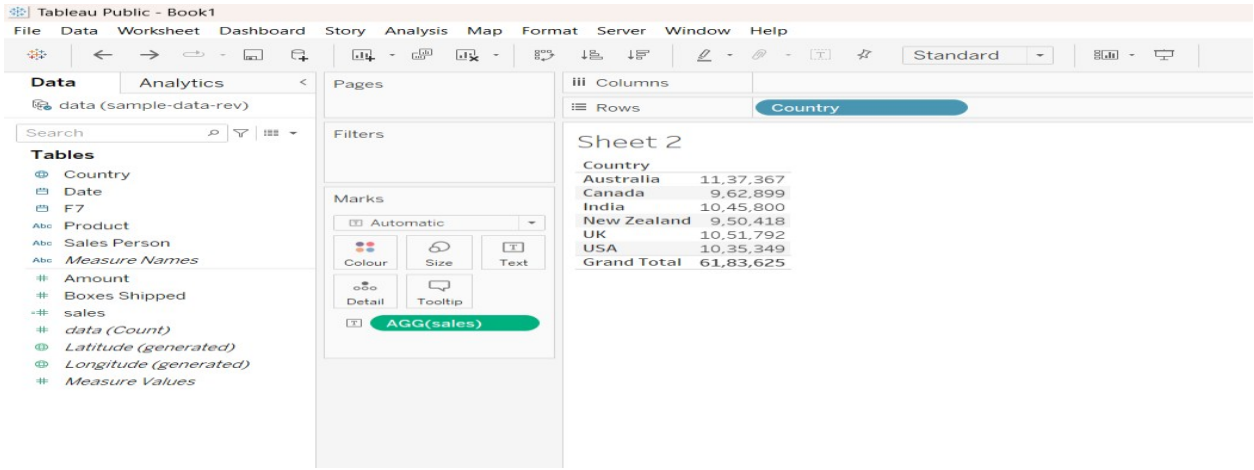




Example2: Calculating percentage of total sales. Here we want to see which country giving how much percentage of sales.

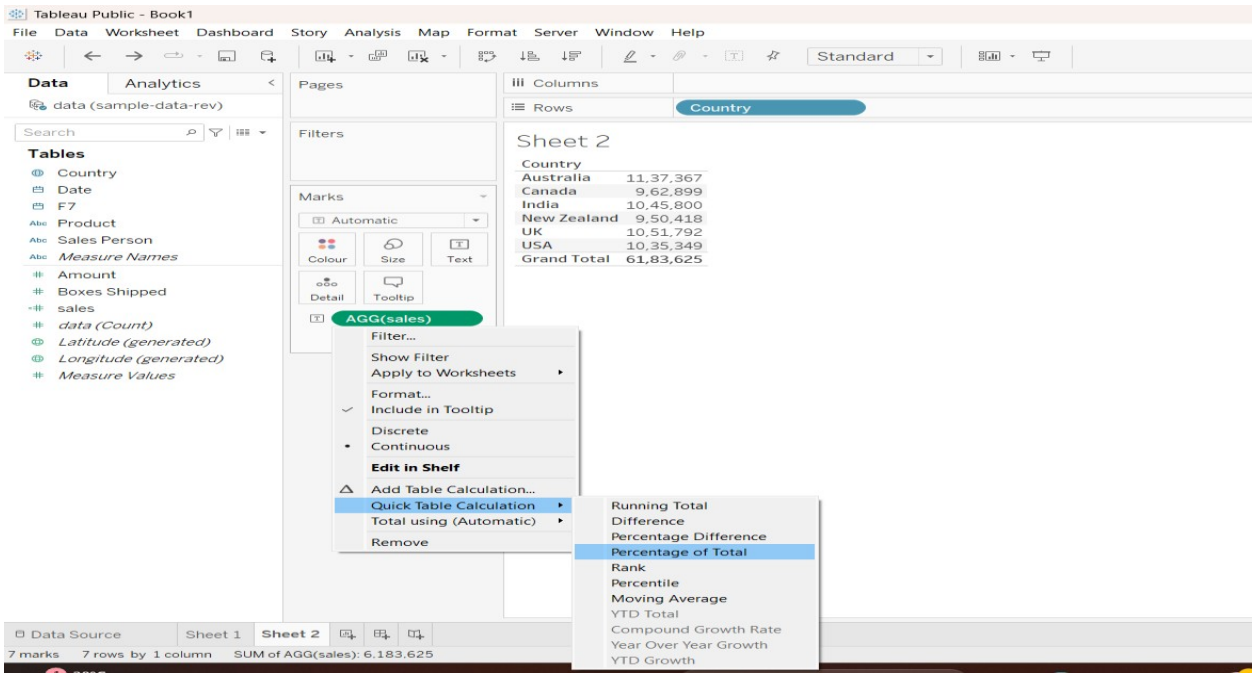
1. Connecting to Data and Creating the Initial Visualization:

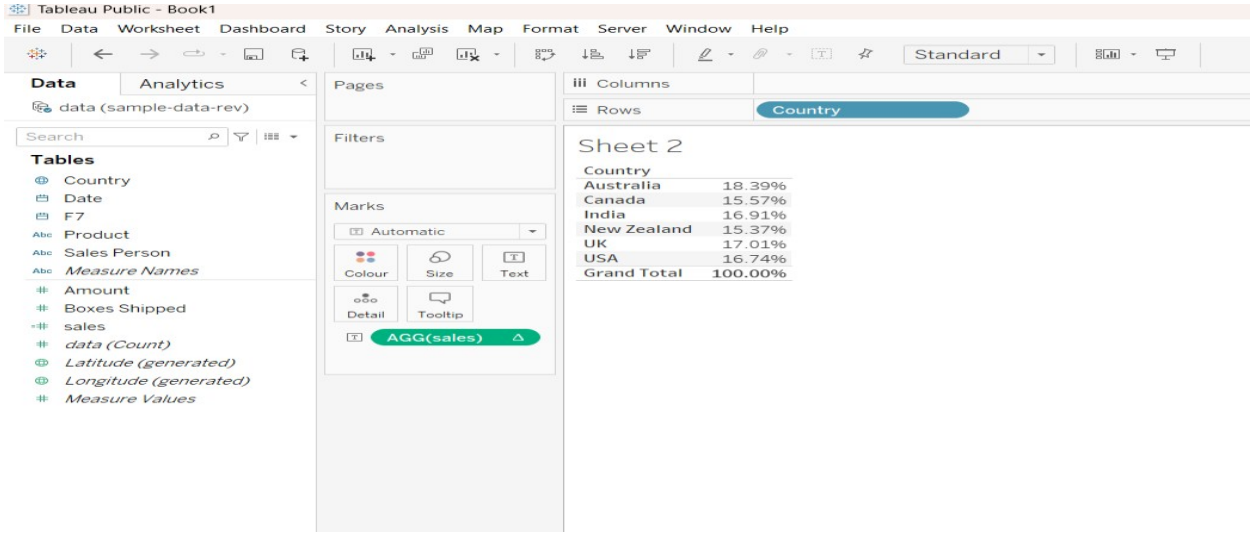
    - Ensure your dataset is loaded into Tableau.
    - Drag the Country field to the Columns shelf and the Sales field to the Rows shelf.



2. Adding and Customizing the Table Calculation:

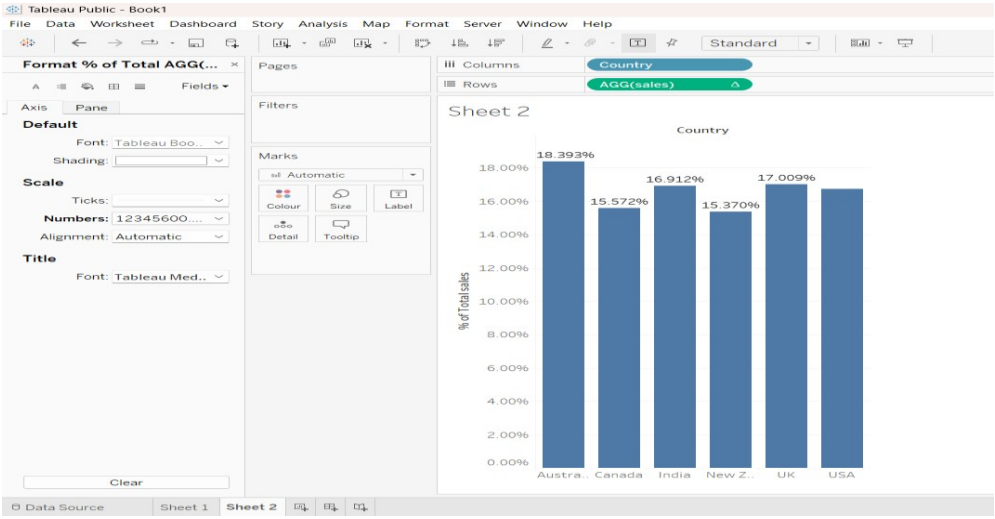
- Right-click on the Sales field in the Rows shelf, select "Quick Table Calculation", and choose "percentage of total".
- For further customization, right-click on the Sales field again, choose "Edit Table Calculation", and adjust the settings as needed, such as setting "Compute Using" to Date.





3. Formatting the Result:

- Format the field to display the results as percentages by right-clicking on the Sales field, selecting "Format", and choosing the percentage format.



This should give you a clear visualization of the year-over-year sales growth and percentage of total in Tableau using table calculations. You can apply similar steps for other types of calculations like moving averages, and running totals by selecting the appropriate quick table calculation and adjusting as necessary.

MODULE 4

INTERACTIONS

Interactions in Tableau are crucial for creating dynamic and user-friendly dashboards. They enhance the user experience by allowing deeper data exploration and making dashboards more interactive. Here's a more detailed look at different types of interactions you can implement in Tableau:

1. Filters
   - Filter Actions: These allow users to filter the data in one visualization by selecting marks or data points in another visualization. To set up a filter action:
     1. Go to Dashboard > Actions.
     2. Add a new action and select Filter.
     3. Configure the source and target sheets, and specify how the filter should behave.
   - Quick Filters: These provide user-friendly controls like dropdowns, checkboxes, and sliders to filter data. You can add a quick filter by right-clicking a field on the shelf and selecting Show Filter.
2. Highlight Actions
   - Highlight actions enable users to highlight related data across multiple visualizations by selecting data points in one visualization. To create a highlight action:
     1. Go to Dashboard > Actions.
     2. Add a new action and select Highlight.
     3. Configure the source and target sheets, and specify the fields to highlight.
3. URL Actions
   - URL actions allow users to open a webpage or another Tableau dashboard by clicking on a mark or text. To set up a URL action:
     1. Go to Dashboard > Actions.
     2. Add a new action and select URL.
     3. Configure the source sheet, the field to use, and the URL to open.
4. Parameter Actions
   - Parameter actions let users change the value of a parameter by interacting with a visualization. This can be used to update calculations or visualizations dynamically. To create a parameter action:
     1. Go to Dashboard > Actions.
     2. Add a new action and select Change Parameter.
     3. Configure the source sheet, the parameter to update, and the field to use.
5. Tooltip Actions
   - Tooltip actions add interactivity to tooltips, such as showing additional visualizations or information when hovering over data points. You can set this up by editing the tooltip of a visualization and inserting a visualization or additional data fields.
6. Set Actions
   - Set actions enable users to dynamically change the members of a set based on their interactions. To create a set action:

1. Go to Dashboard > Actions.
2. Add a new action and select Change Set Values.
3. Configure the source sheet, the set to update, and the behavior.

7. Drill Down and Drill Up
   - Drill down and drill up allow users to navigate through different levels of data granularity within a hierarchy. You can enable this by creating hierarchies in your data source and setting up your visualizations to use these hierarchies.
8. Cross-Highlighting
   - Cross-highlighting highlights related data points in other visualizations when data points are selected in one visualization. This happens automatically when using related fields across multiple visualizations.
9. Legends
   - Interactive legends allow users to highlight or filter data points based on the color, size, or shape legends. You can customize the legend behavior by right-clicking on the legend and selecting the desired options.
10. Story Points
    - Story points create an interactive, narrative presentation by linking multiple dashboards and visualizations together. To create a story:
      1. Go to New Story from the File menu.
      2. Add sheets or dashboards to the story points.
      3. Customize the captions and navigation.
11. Custom Buttons
    - Custom buttons can be added to dashboards to perform specific actions like navigating between dashboards, resetting filters, or triggering other actions. You can create buttons using shapes or images and adding URL or filter actions to them.

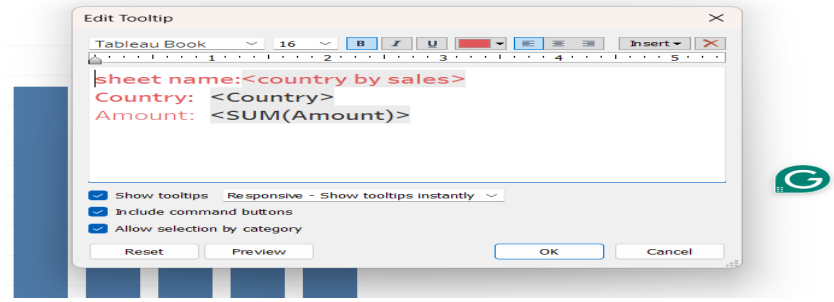
These interactions make Tableau dashboards more engaging and allow users to explore data in a more meaningful way.

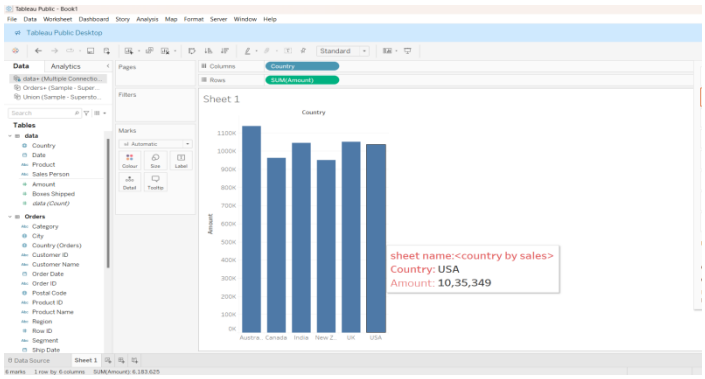
INTERACTIVITY WITH TEXT AND VISUAL TOOLTIPS:

Enhancing interactivity with text and visual tooltips in Tableau can significantly improve the user experience by providing additional context and insights without overwhelming the main visualization. Here's how you can implement and customize these features:

Text Tooltips

1. Basic Text Tooltips:
   - Edit Tooltip: You can add or modify text tooltips by editing the tooltip for a specific sheet.
     1. Click on the sheet you want to edit.
     2. Go to the Tooltip button on the Marks card.
     3. In the Edit Tooltip dialog box, you can add dynamic fields, plain text, and even basic HTML for formatting.





2. Dynamic Text:
    - You can include dynamic text that changes based on the data point being hovered over. Use the Insert dropdown in the Edit Tooltip dialog to add dynamic fields like SUM([Sales]), [Category], etc.
3. Formatting Tooltips:
    - Customize the font, size, color, and alignment of the text within the tooltip. You can use HTML tags for more advanced formatting if needed.

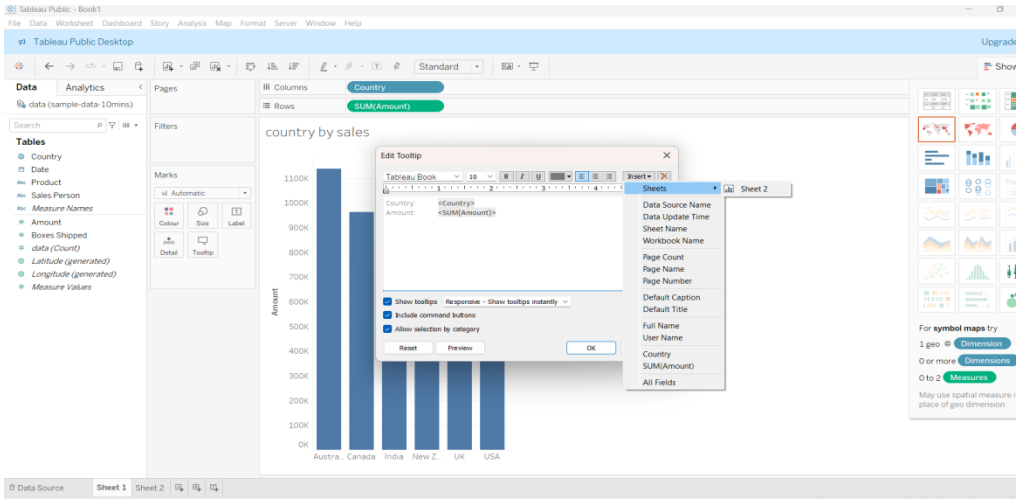
Visual Tooltips

1. Viz in Tooltip:
    - Add Visualization to Tooltip: You can embed another visualization within a tooltip, allowing users to see related data when they hover over a mark.
        1. Create the visualization you want to embed in the tooltip.
        2. Go to the sheet where you want to add the tooltip visualization.
        3. Click on the Tooltip button on the Marks card.
        4. Click the Insert dropdown, and choose Viz in Tooltip.
        5. Select the sheet you want to embed and configure the size and filters.
2. Customizing Viz in Tooltip:
    - You can adjust the size and appearance of the embedded visualization by modifying the maxwidth and maxheight parameters.
    - Apply filters to ensure the embedded visualization shows relevant data based on the context of the mark being hovered.

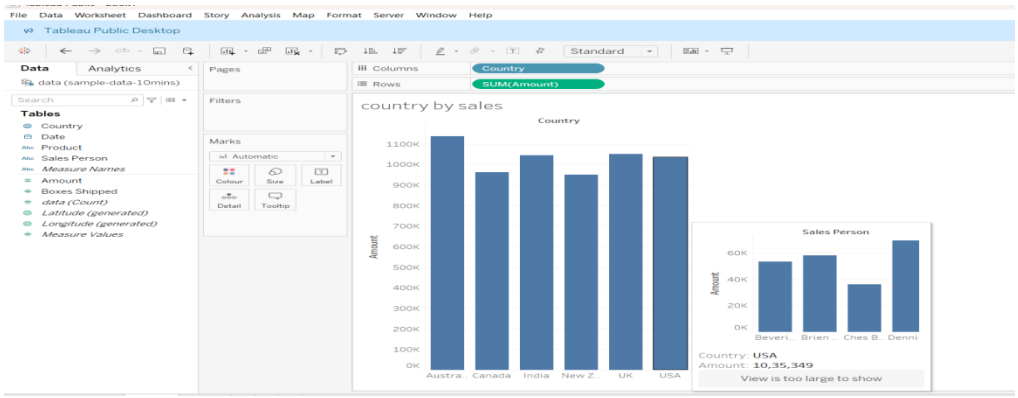
Example: consider two sheets

1. Country by sales
2. Top 10 salesperson

Use top 10 salespersons sheet as tooltip for country by sales sheet.



The result is:



INTERACTIVITY WITH ACTIONS:

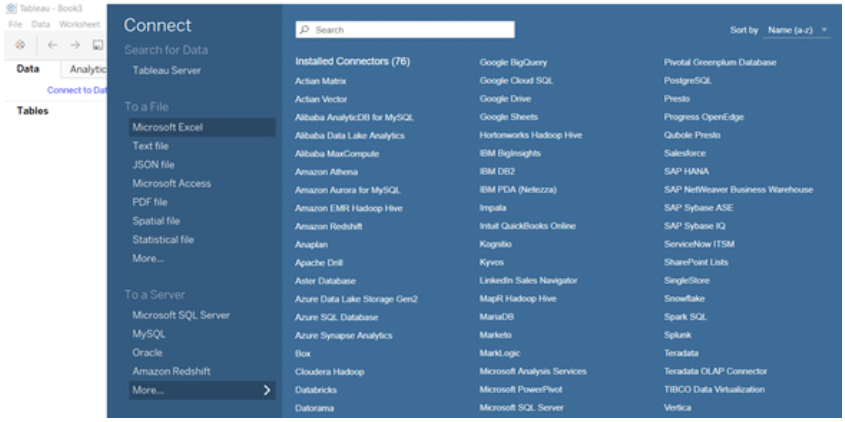
Interactivity with actions in Tableau allows users to engage more deeply with the data by interacting with the visual elements of a dashboard. Here are some common types of actions you can use in Tableau to enhance interactivity:

1. Filter Actions

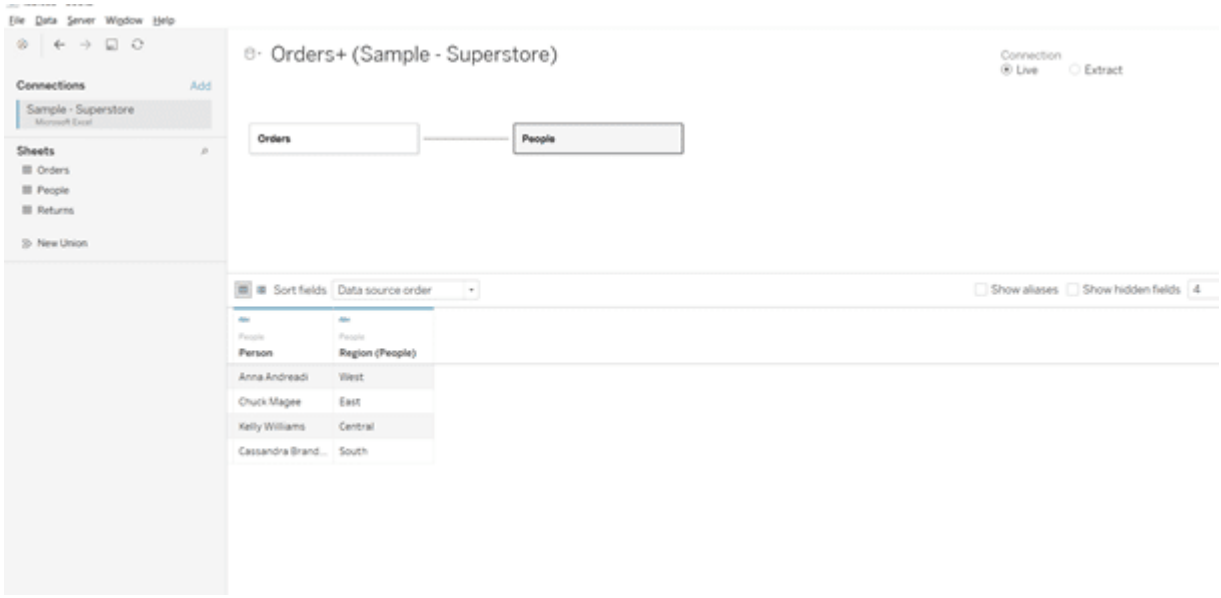
Filter actions enable users to filter the data in one or more visualizations by selecting data points in another visualization. This can be used to create drill-down capabilities and to focus on specific subsets of data.

How to Use Actions in Tableau:

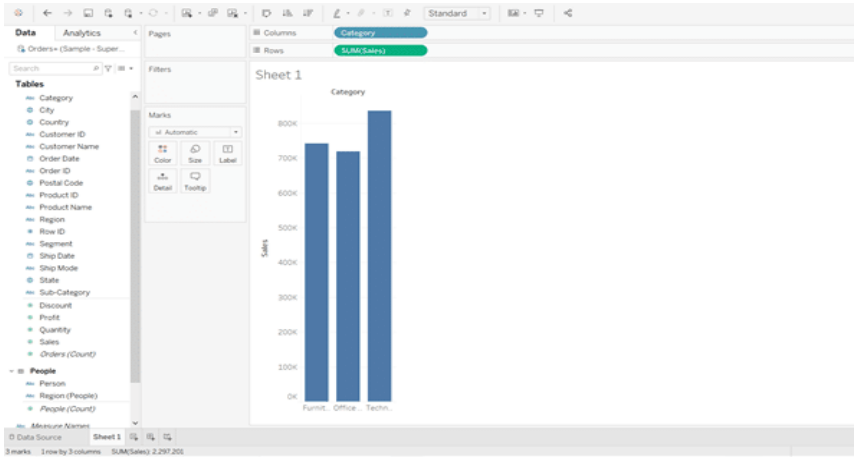
Creating actions in Tableau doesn't require much of an effort if you've already created a dashboard. If not, you must have at least two or three visualizations to implement all three types of actions in Tableau. You can download the sample dataset from here. Now, follow these steps to create two simple visualizations in tableau: Open the Tableau Desktop and select the 'Connect to Data' option from the data panel on the left side of the interface.



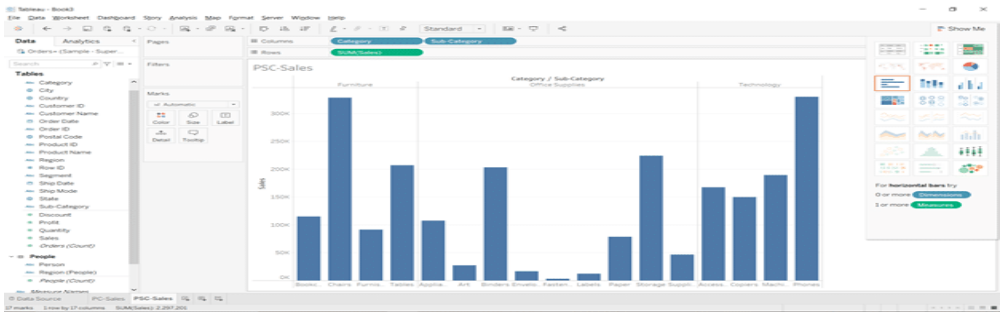
- Load the sample dataset which you've downloaded from the link mentioned above, relate the tables, and go to the worksheet(sheet1).



- Once the data is loaded in the interface, hover onto the sheets at the bottom-left corner and add a new sheet for the Product Category Sales(PC-sales).
- Now, drag the Category and Sales variables from the tables section and drop them in their respective rows and columns under the toolbar.



- Following that, add a new sheet for the Product-Sub-Category Sales(PSC-sales).
- Drop the Category variable in the column section along with the sub-category, and Sales in the row section.



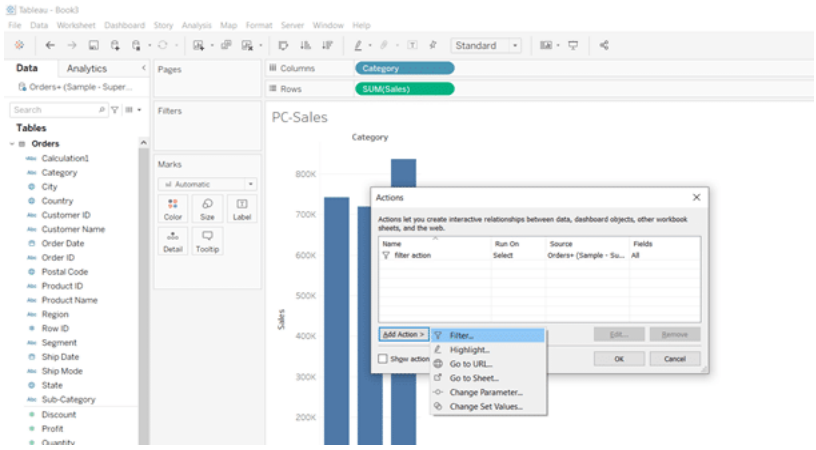
- Similarly, we'll add more visualizations like maps to implement the tableau dashboard URL actions.
- Now, you can either change the visuals' formatting and add labels or move on to the next part and create an action button on Tableau.

Let's move ahead and go through the steps to create three types of action filter tableau and make our dashboards more interactive.

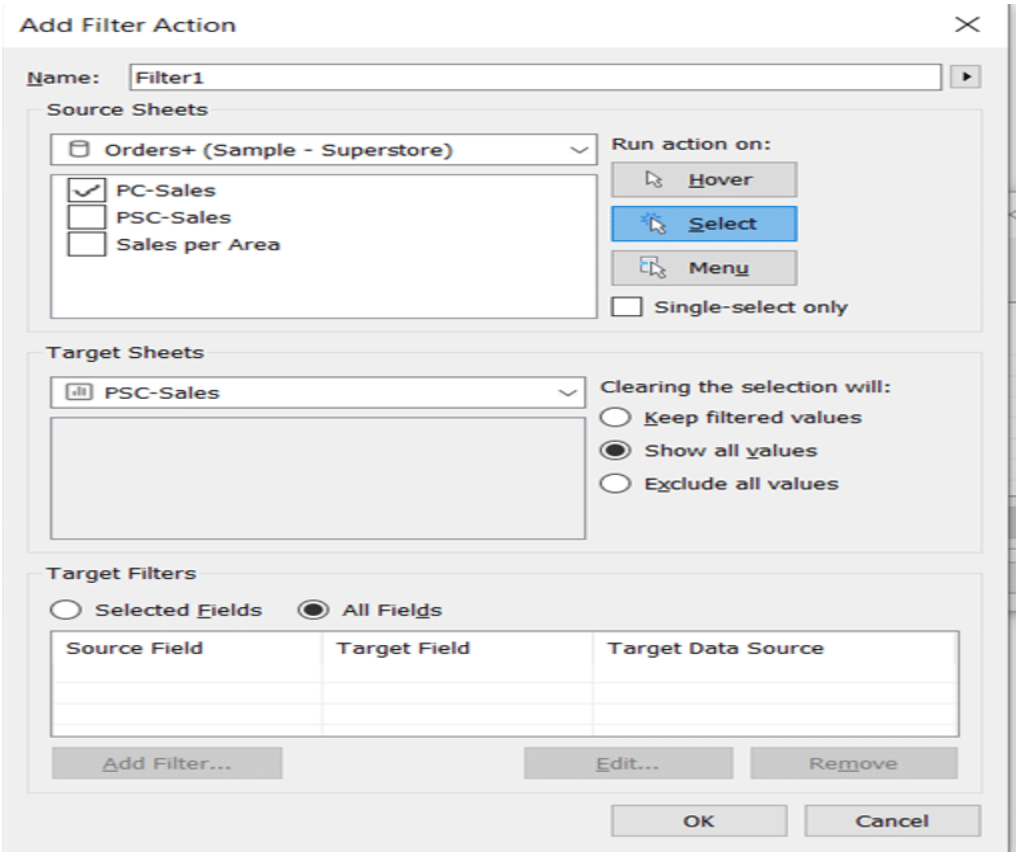
Tableau filter Actions

The filter actions are used to trigger events in one sheet and see the results in the other. So, let's create a tableau filter action in a few steps:

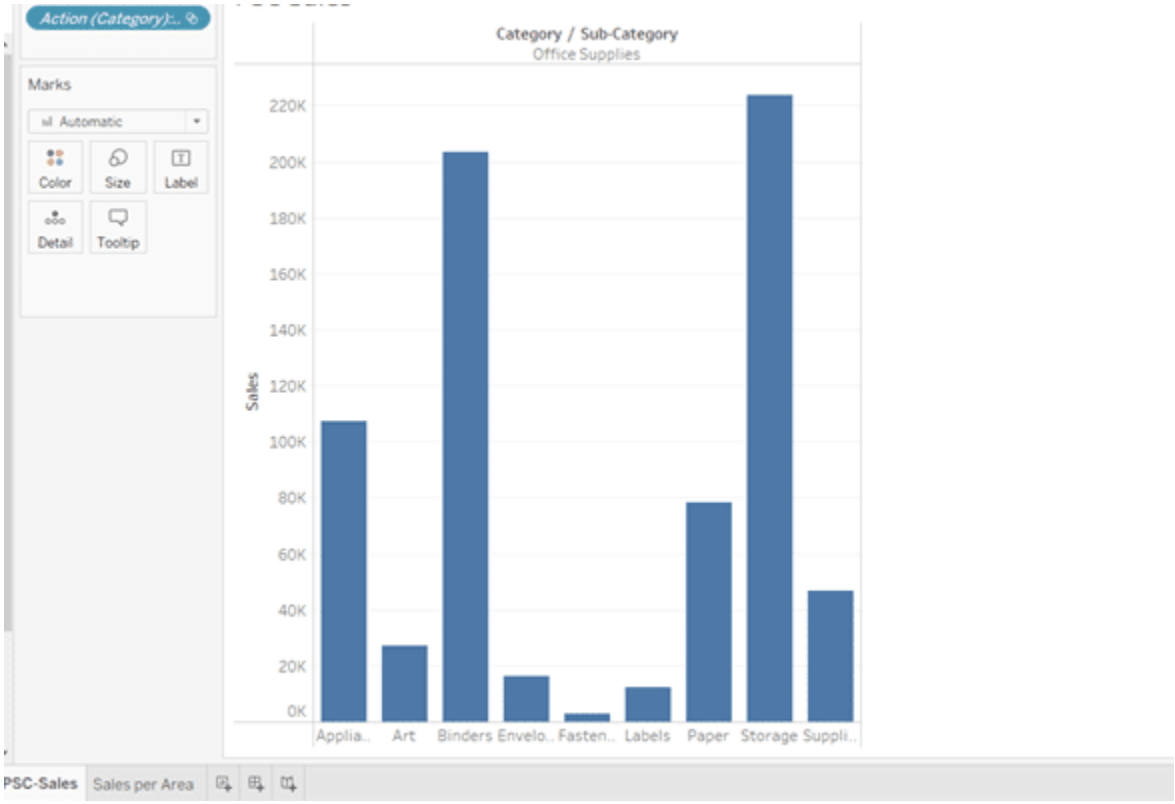
- Go to Worksheet>> Actions and then select Filter from the Add actions option.



- Click Ok and the 'Add Filter Action' dialog box will appear. From here, you can select the sources and target sheets along with the trigger on which you want to run your action.

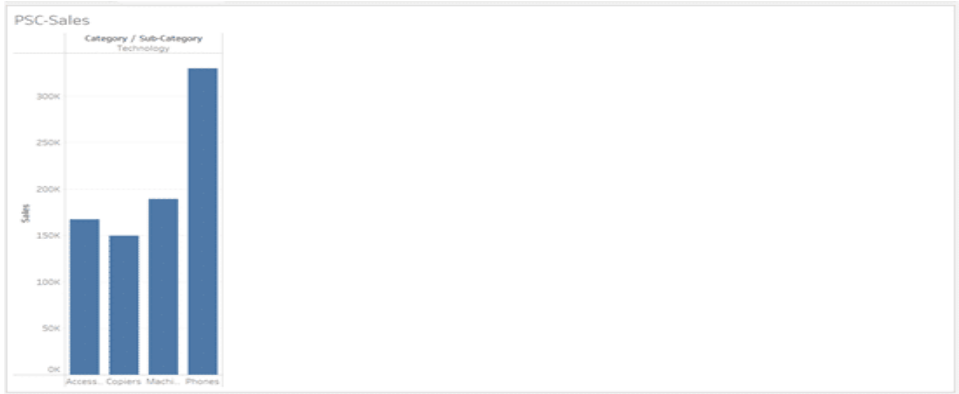


- Apply the changes and select any category in sheet1(PC-Sales).
- As soon as you click on the category, the action will switch to the target sheet(PSC-Sales) and highlight the corresponding sub-category.
- For instance, I've selected the Office supplies category in the PC-Sales figure, which triggered the action to jump onto PSC-Sales and highlight the respective Sub-category.



- You can also choose the way of triggering your action(by either hovering or showing a menu) and the values that will be displayed by the action.
- For example, by changing the 'Run action' from Select to Menu, you can change the ways your action operates and jump on to the target visualization.

- Now, if you click on the filter1 highlighted in the box, the action will jump onto the target figure and show the corresponding values.



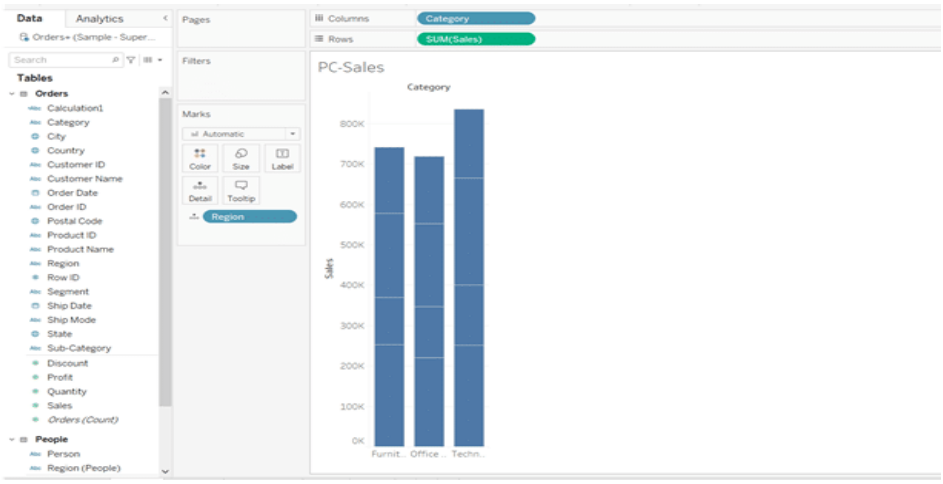
2. Highlight Actions

Highlight actions allow users to highlight related data across multiple visualizations by selecting data points in one visualization.

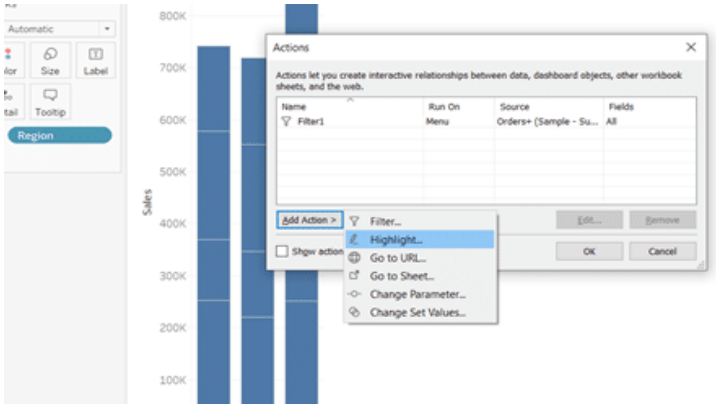
How to Create Highlight Actions:

Tableau Highlight Actions

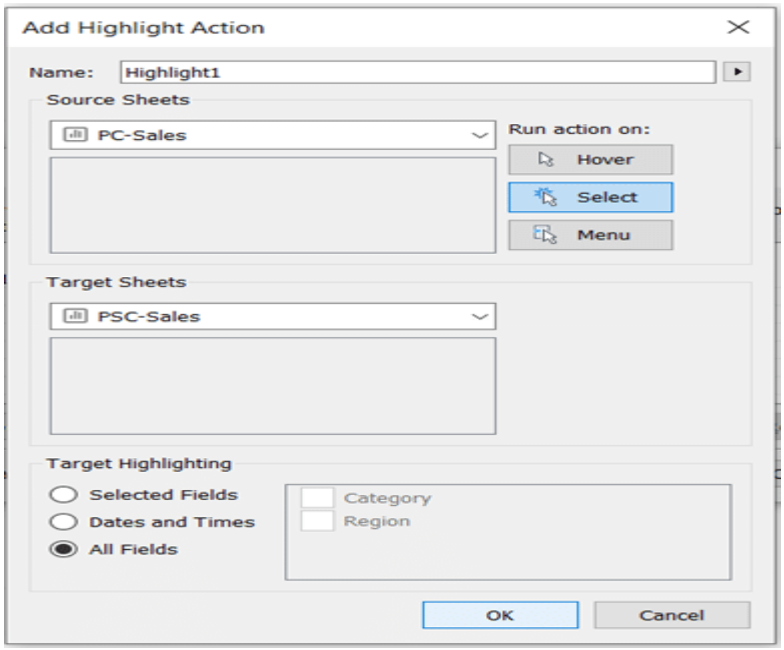
For highlighting the action tableau, you have to add another variable named Region. This will divide every bar of the category based on the regions and create a stacked bar chart. Apply this to both visualizations and the result would look something like this:



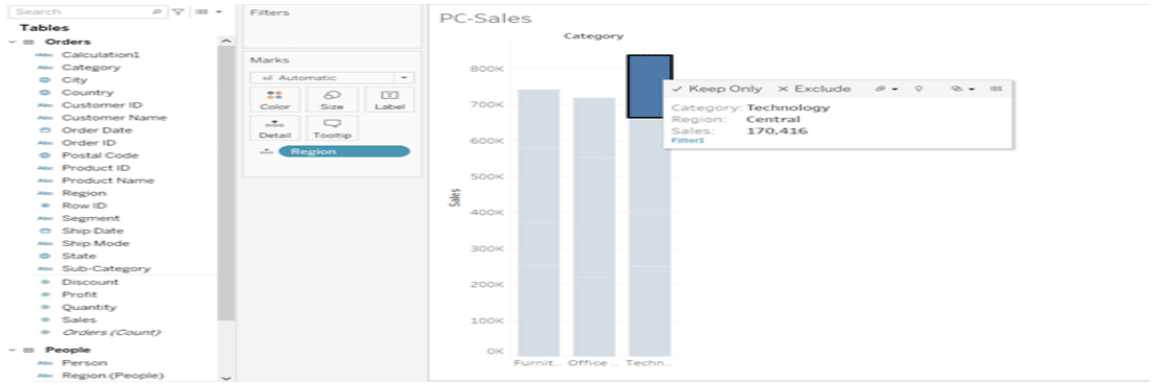
- The process of creating a tableau highlight is pretty much similar to that of filter actions. Here you just have to select Highlight in place of Filter under the add actions section.



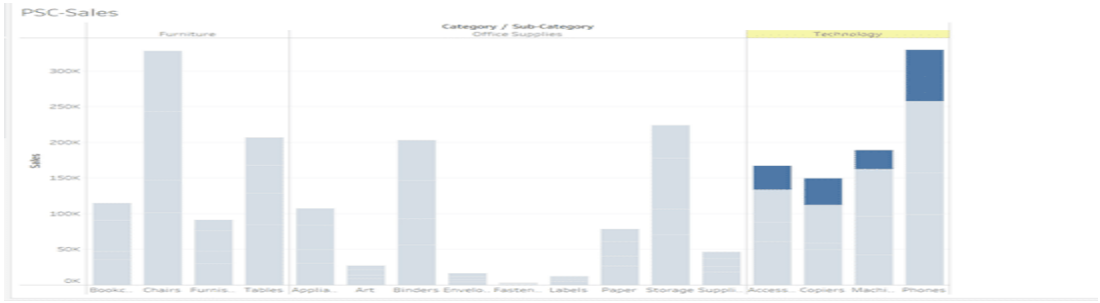
- Now, select the source and target worksheets from the highlight action box, and apply the changes by clicking the OK button.



- Once the changes are applied, if you click on any section of the stacked bar, it will show all the details such as the Sales and region of that bar.



- Now, hover over the target worksheet and you will see that the highlight action has been applied to the respective category.



You can also add this action to the dashboards and apply the button filter tableau to its visualizations. For demonstration, we've created a simple dashboard with visualizations. However, you can add more of them if you want.

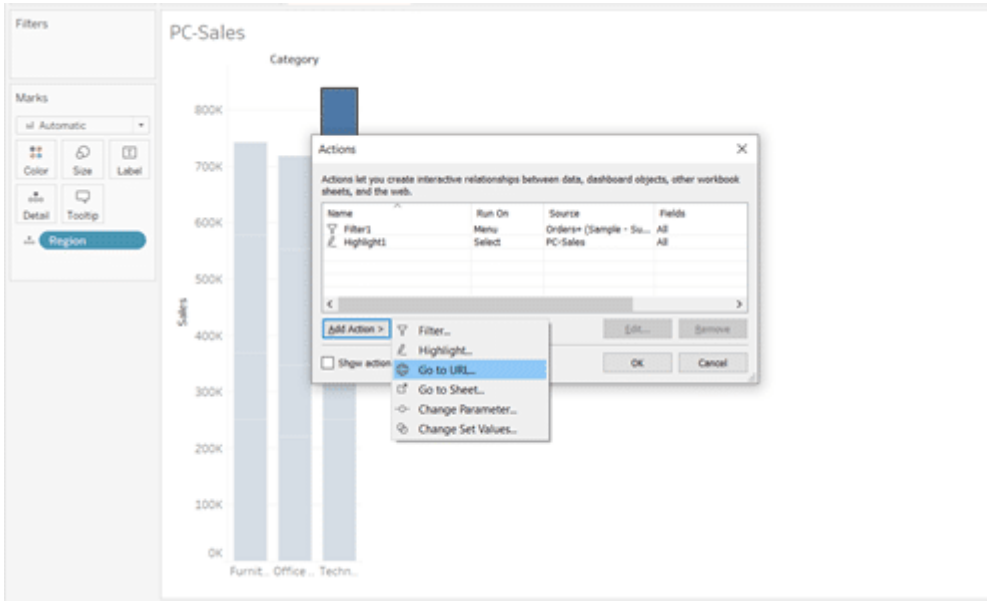
Now, follow the steps given below to add filters to the Tableau dashboard:

- Go to the Dashboard>> Actions and create a new Highlight using the add actions option.
- Do the relevant changes and apply them by clicking on the OK button.
- Now, the action will highlight all the visualizations related to the field or the bar you've selected.

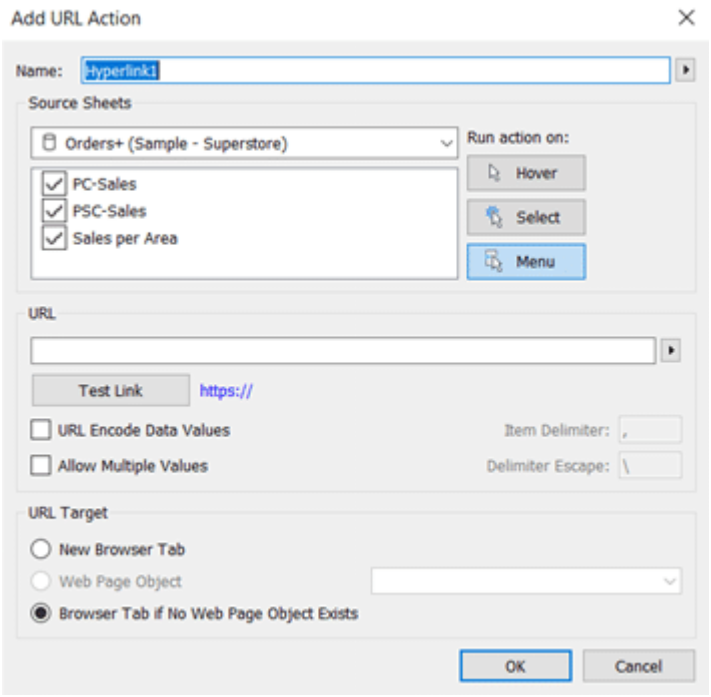
Tableau URL Actions

Following are the steps to create a Tableau URL Filter and apply it to the visualizations:

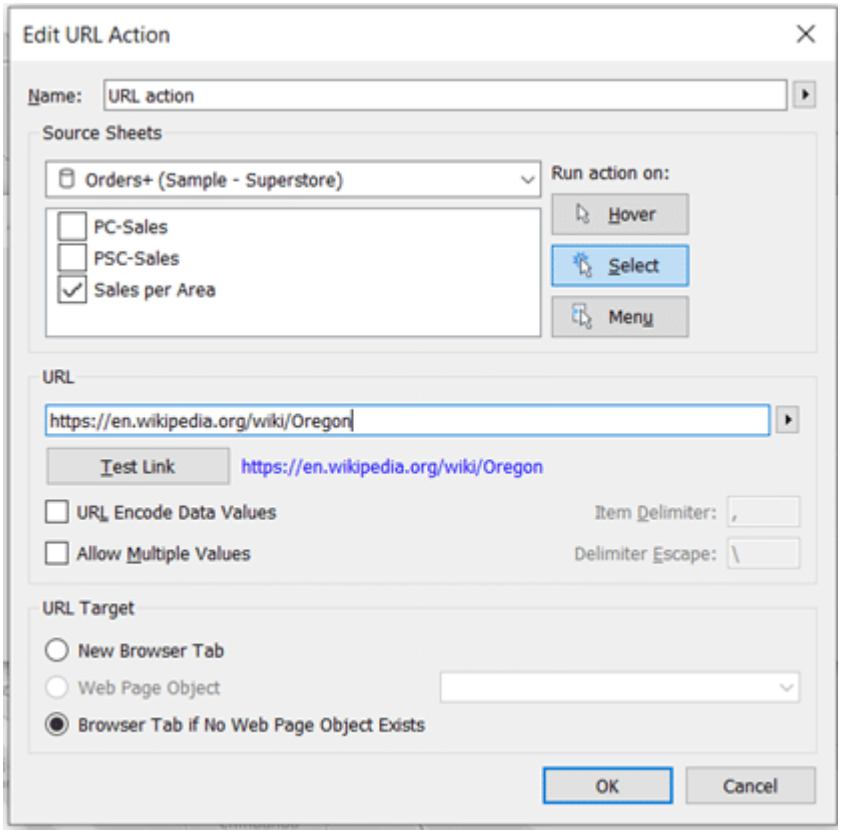
- Go to the Worksheet>> Actions>> Add actions>> URL and click on OK.



- A dialog box named 'Add URL action' will appear on the interface.

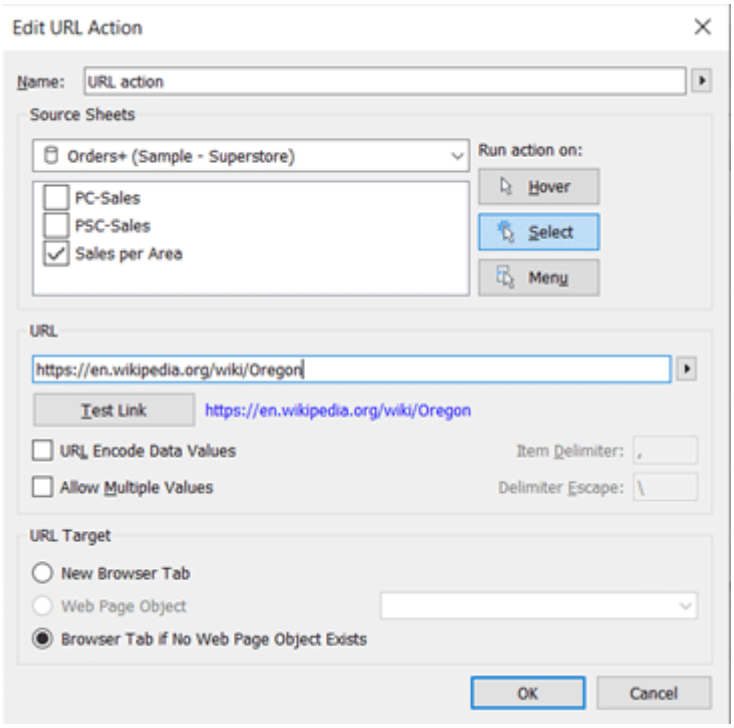


- Here, you can rename the URL action, select the source sheet, and add the URL of the resulting webpage you want to open. For instance, we've added the Wikipedia link for the state.

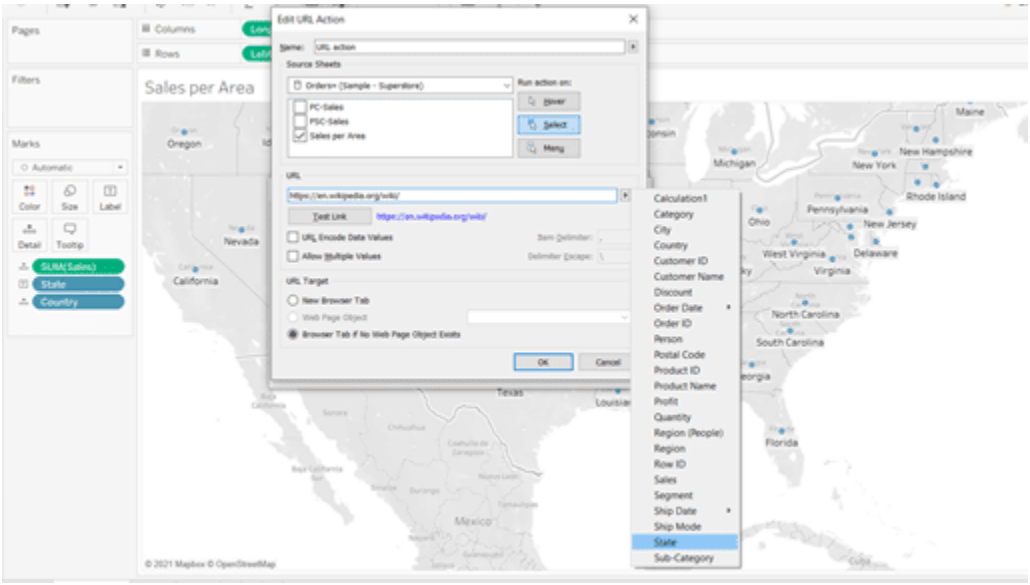


- The action will open the URL on your browser whenever you click on the state. However, the action will open the same links for every State you click on.

- To make the URL open the exact page of the state you click on, open the URL action dialog box and remove the state name from the URL.



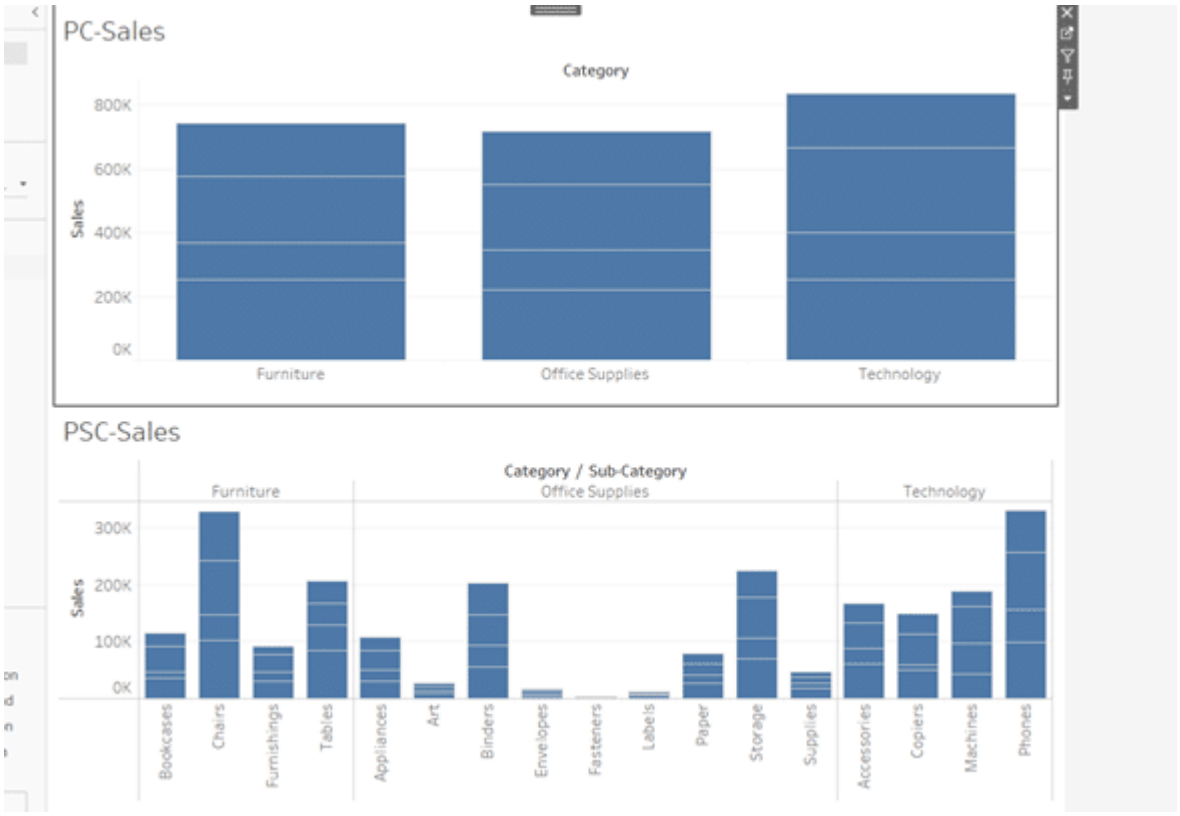
- Now, click on the mark in front of the mentioned URL and select the State variable from the drop-down menu.



- This will create a tableau hyperlink that will keep on changing the URL based on the State you click on.

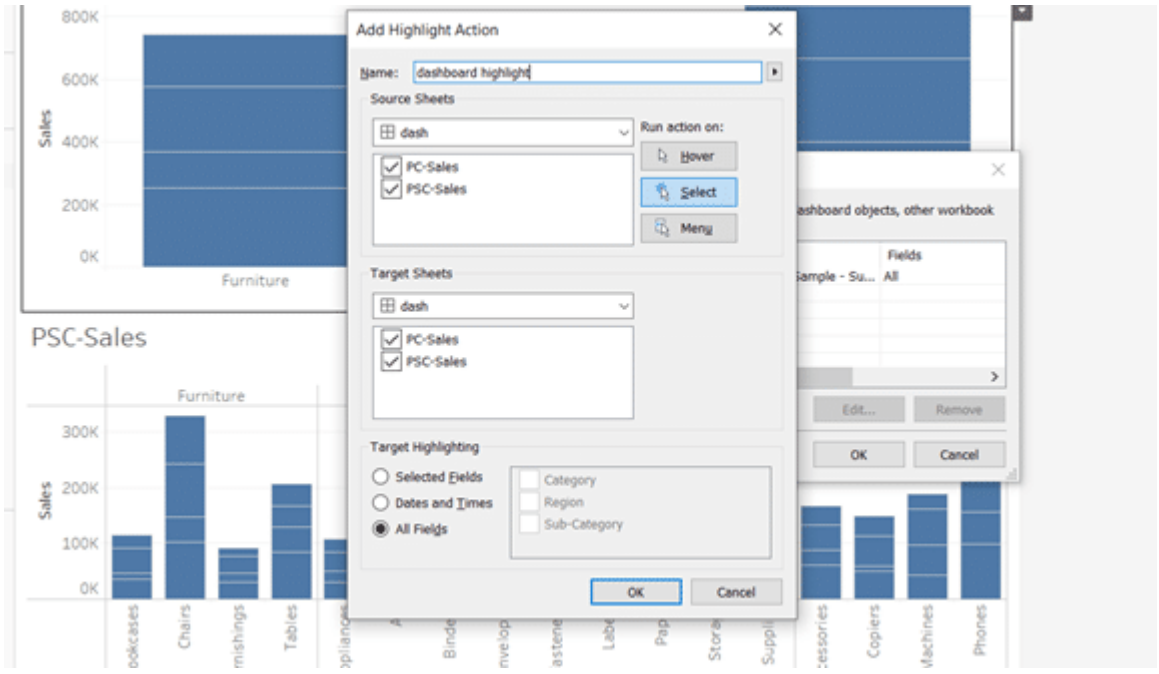
How to Add Tableau Actions in Dashboard?

You can also add actions to the dashboards and apply the button filter tableau on its visualizations. For demonstration, we've created a simple dashboard with visualizations. However, you can add more of them if you want.

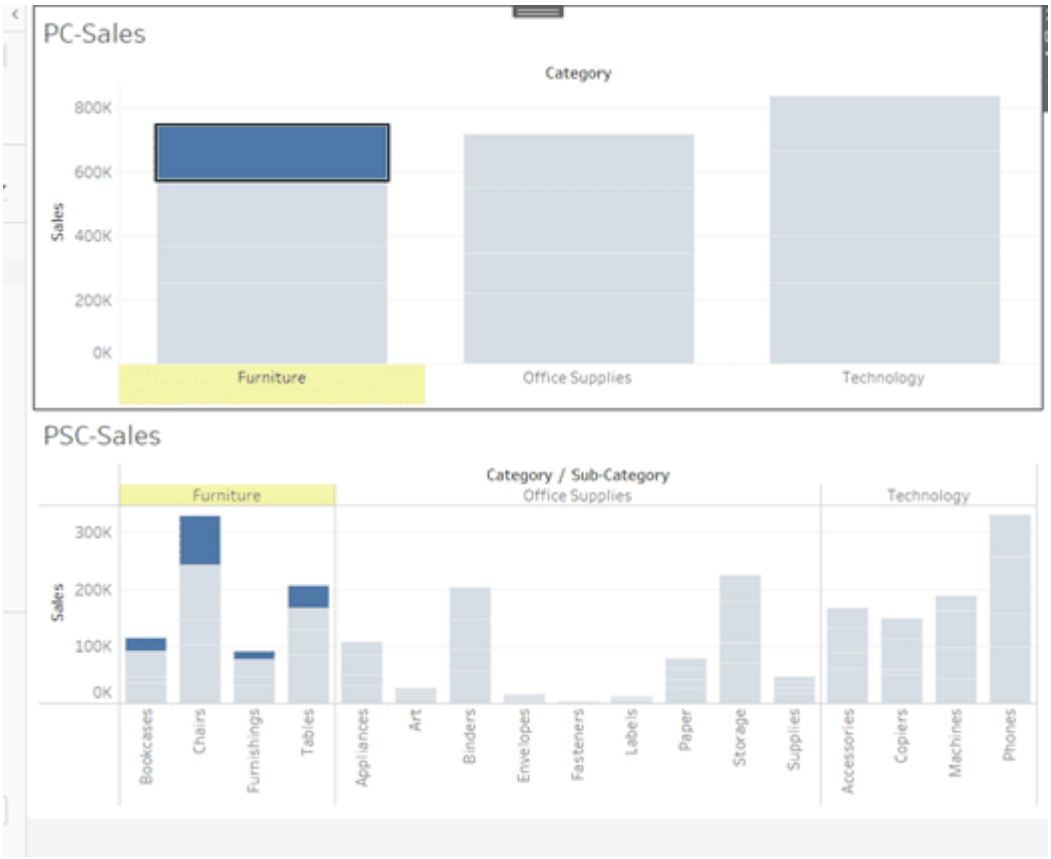


Now, follow the steps given below to add filters to the Tableau dashboard:

- Go to the Dashboard>> Actions and create a new Highlight using the add actions option. You can choose any action of your choice, the process is pretty much the same.
- Do the relevant changes and apply them by clicking on the OK button.



- Now, the action will highlight all the visualizations related to the field or the bar you've selected.



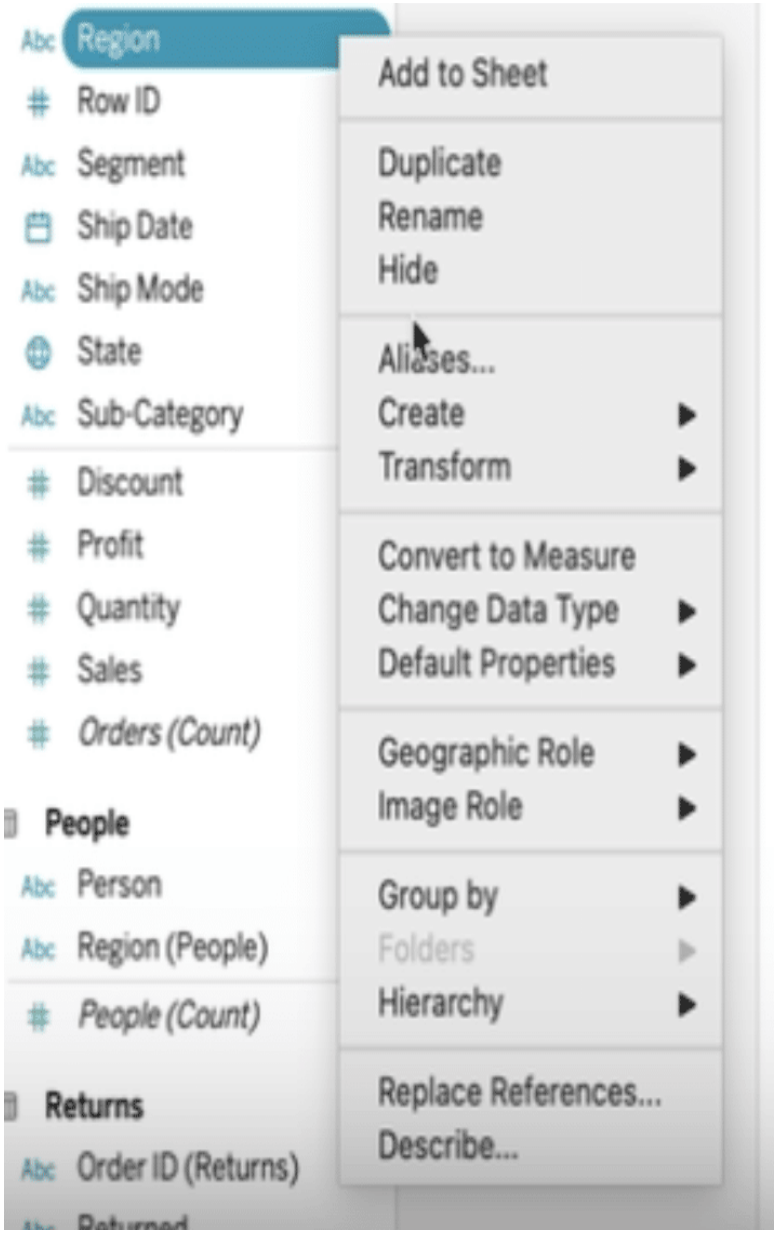
DRILLDOWN BETWEEN DASHBOARDS:

Drilldown between dashboards in Tableau allows users to navigate from a high-level overview dashboard to more detailed dashboards by interacting with specific data points. This enhances data exploration and provides a seamless user experience. Here's how to set up drilldown actions between dashboards:

Step-by-Step Guide to Creating Drilldown Actions:

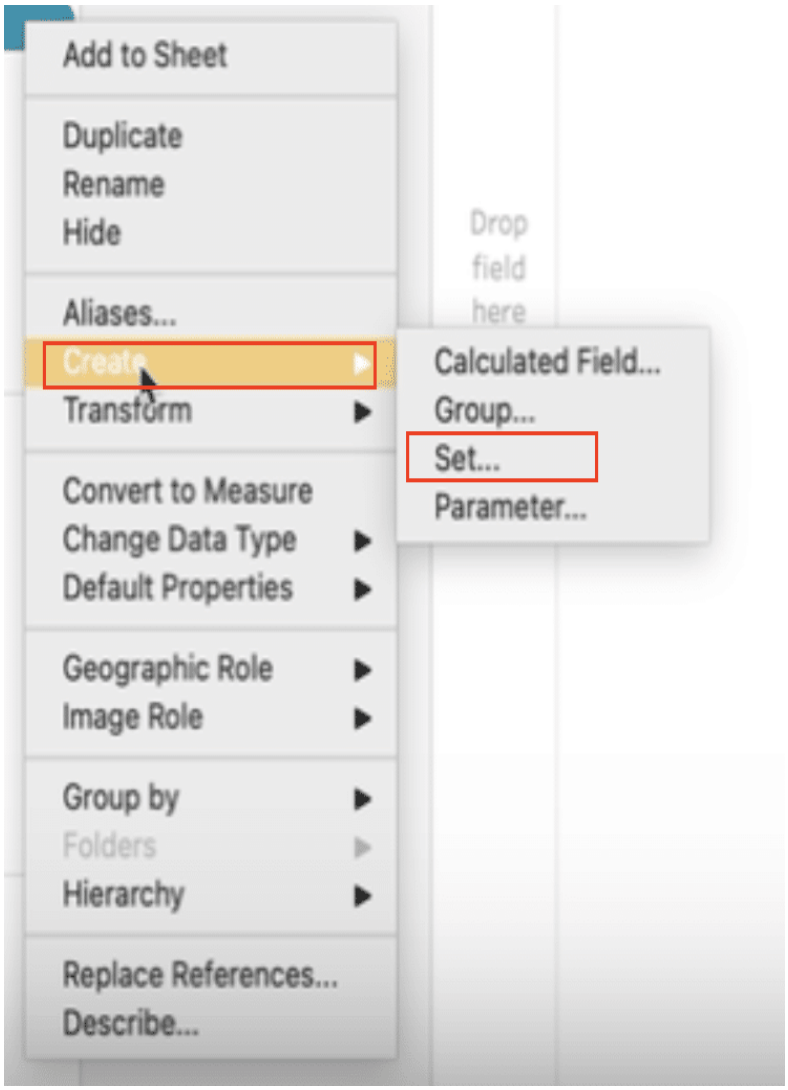
Step 1. Choosing Your Region

First, identify the data category for the drill down—'Region' in this example.



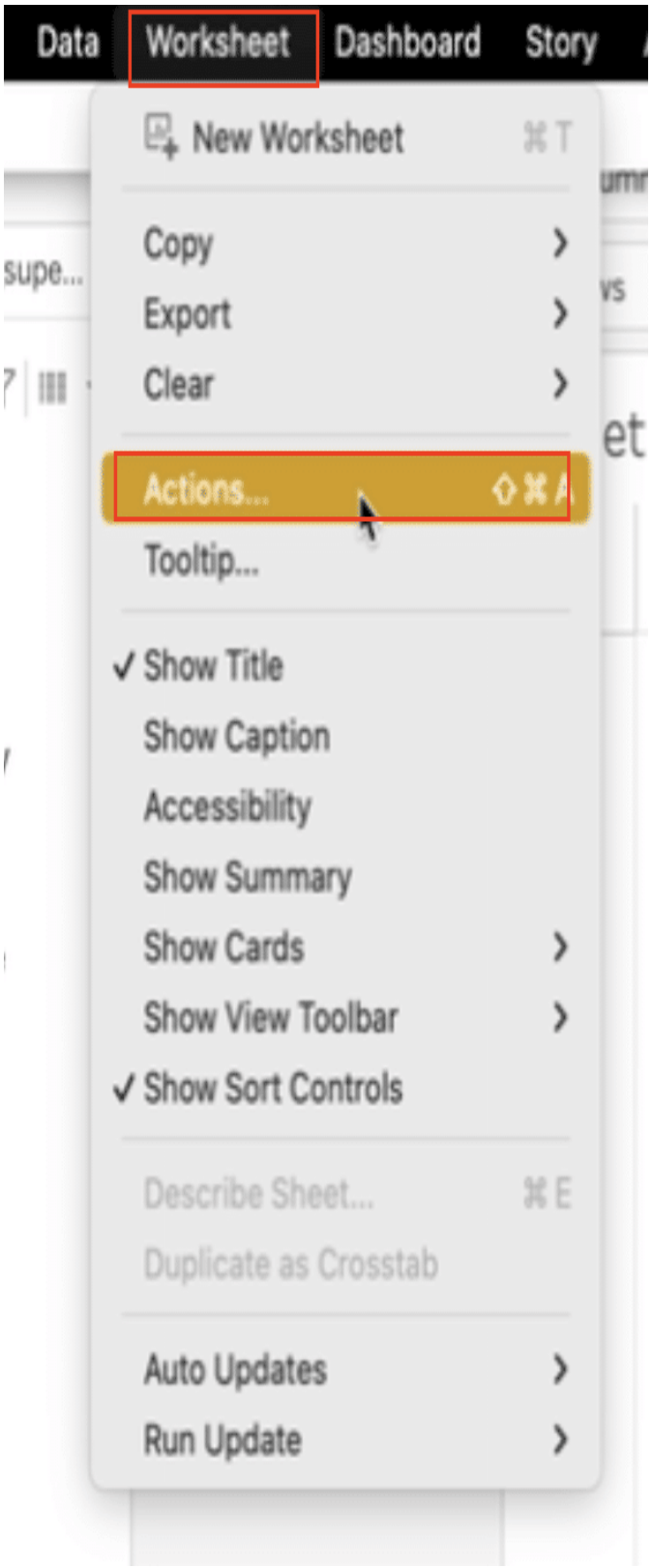
Step 2. Making a Region Set

Next, you create a set for your chosen region to build the basis of your drill down.



Step 3. Setting Up Actions for the Region Set

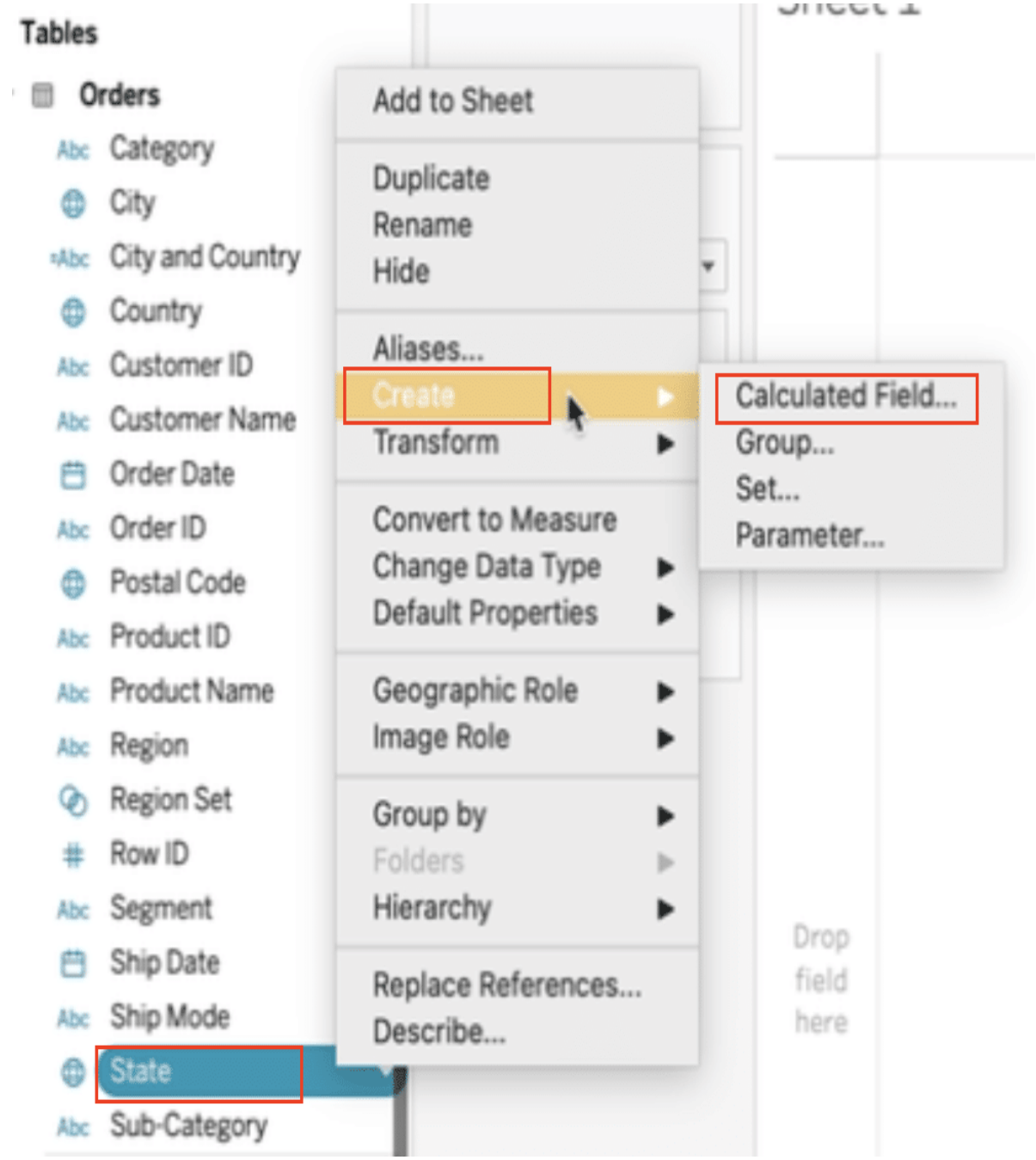
Navigate to where you can add actions in your worksheet.



Then, add a new action that allows your region set to change based on your selection.

Step 4. Creating a State-Based Calculated Field

Click on 'State' to start making a calculated field.

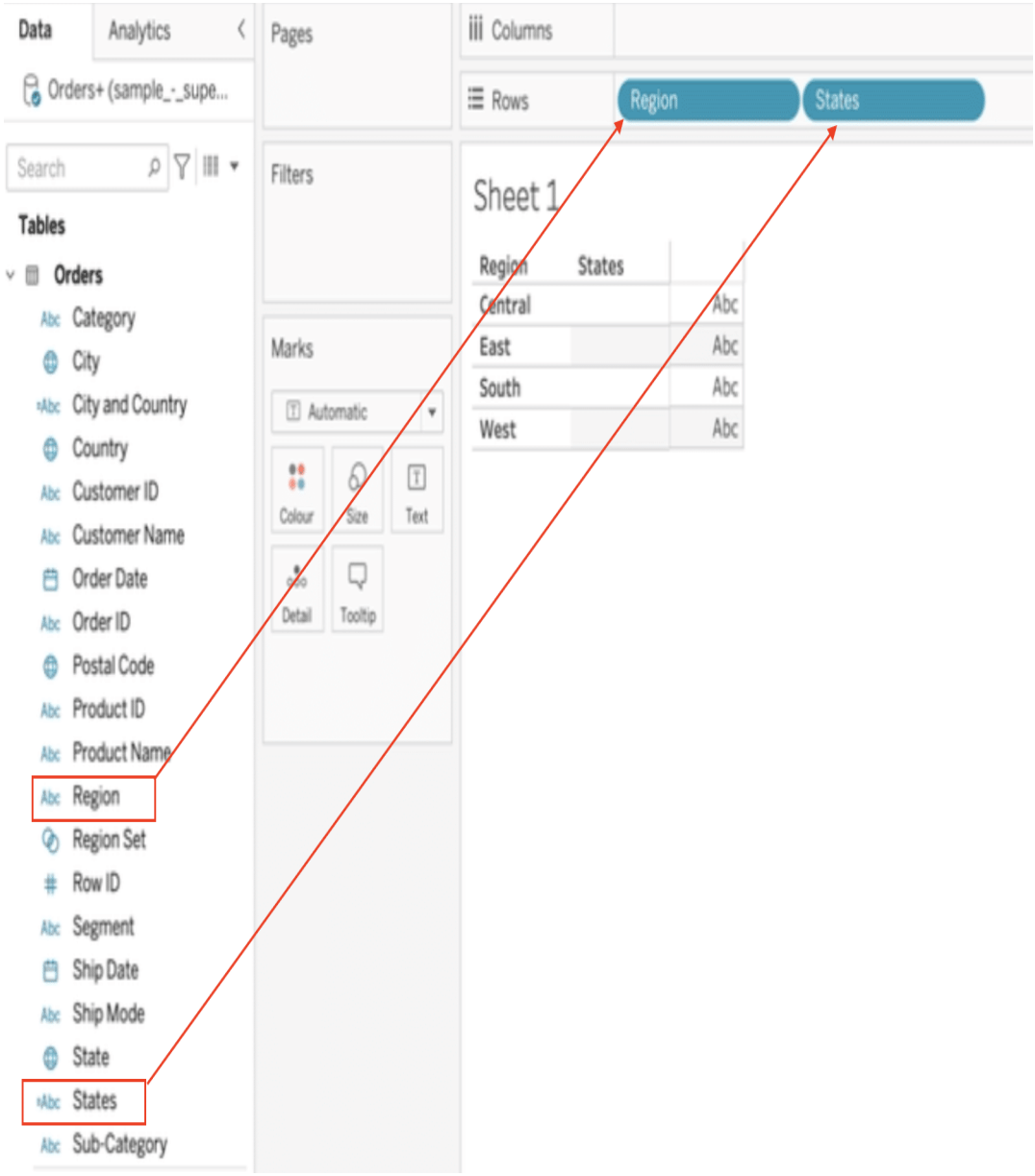


Name your field and set up its calculations for the state drill down.

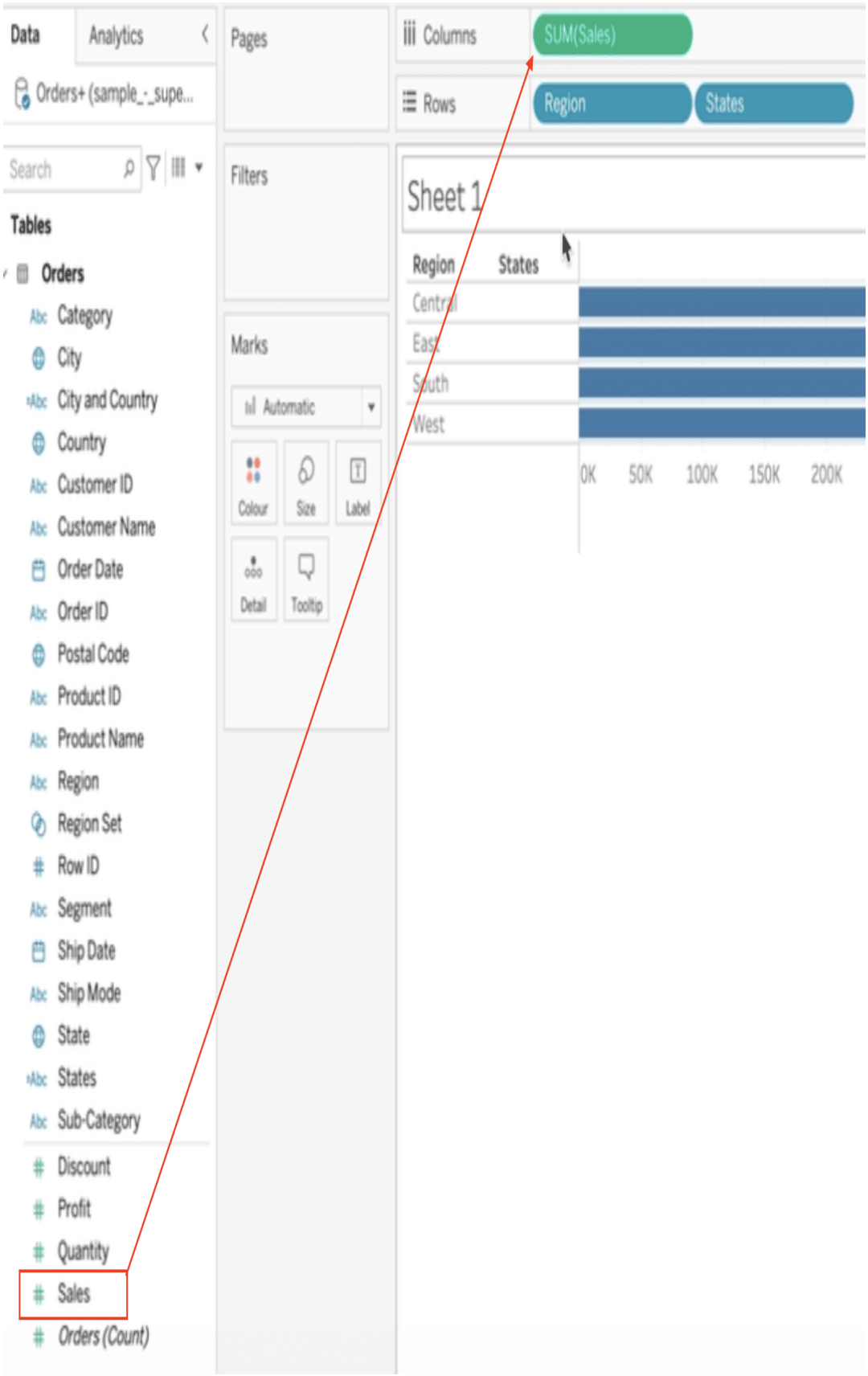
- Time Stamp: 0:48 – 1:05

Step 5. Setting Up Your Table for Drill Down

Start by dragging States and Regions in rows for an organized view.

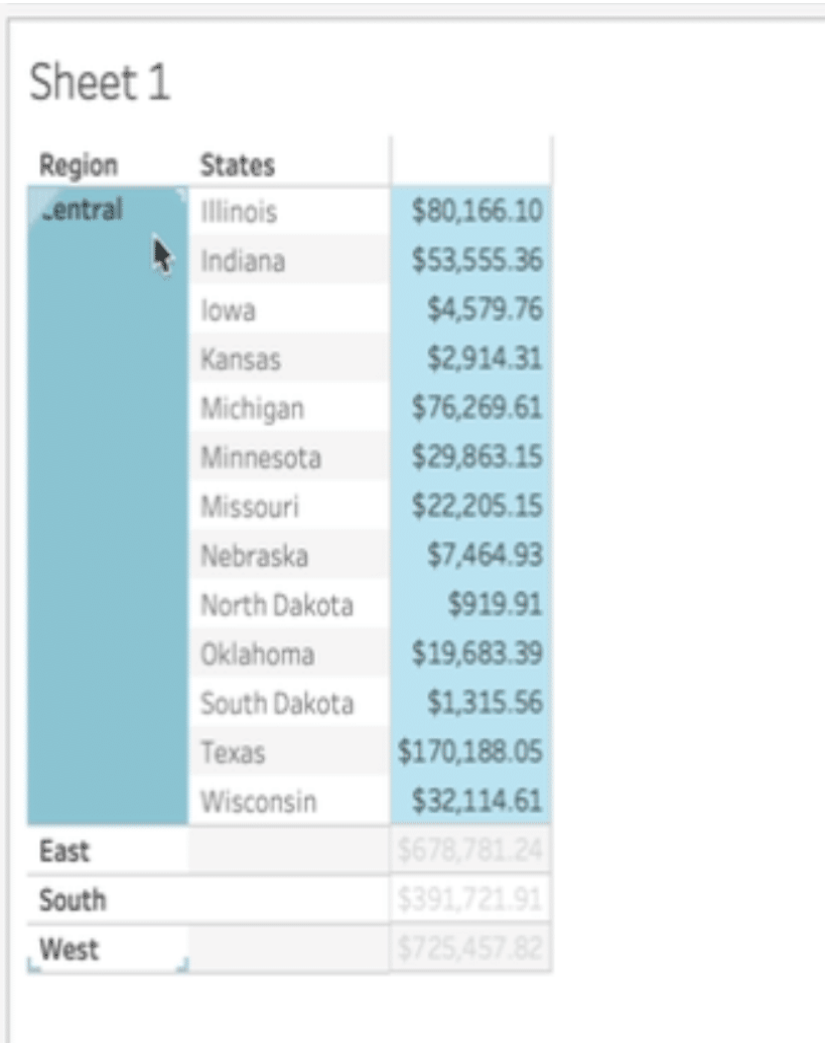


Drag Sales in Column to complete your setup.



Step 6. Showing the Drill Down

Finally, click on a region to see states and their sales values come alive.



Enhancing Your Tableau Drill Down Table: Tips and Tricks

- Keep Data Structure Consistent.
- Use Calculated Fields Wisely.
- Experiment and Learn.

Module-5

Advanced visualizations

Dataviz best practices:

Creating effective and impactful data visualizations requires adherence to several best

practices. Here are some key data visualization best practices to follow:

1. Know Your Audience: Tailor your visualizations to the needs, expertise, and expectations of your audience. Consider their level of familiarity with the data and the context in which they will use the information.
2. Choose the Right Chart Type: Select the appropriate chart type that best represents the data and the message you want to convey. Use bar charts for comparisons, line charts for trends over time, and scatter plots for relationships between variables, etc.
3. Keep It Simple: Avoid clutter and unnecessary complexity. Simplify your visualizations by removing non-essential elements, such as excessive gridlines, labels, and colors.
4. Focus on Key Insights: Highlight the most important information and insights. Use visual emphasis techniques like bold colors, annotations, and callouts to draw attention to key data points.
5. Use Consistent Colors and Styles: Maintain consistency in colors, fonts, and styles across all visualizations to ensure a cohesive and professional look. Use a limited color palette and avoid using too many colors.
6. Provide Context: Include contextual information such as titles, labels, legends, and annotations to help the audience understand the data. Ensure that all axes are clearly labeled and that units of measurement are specified.
7. Ensure Data Accuracy: Double-check your data for accuracy and correctness. Errors in data can lead to misleading visualizations and incorrect conclusions.
8. Maintain Proportionality: Ensure that the visual representation of data is proportional to the actual values. Avoid distorting the data by manipulating axes scales or using inappropriate chart types.
9. Use Appropriate Scaling: Use a scale that accurately reflects the data. Be cautious with truncated axes, logarithmic scales, and dual axes, as they can sometimes mislead the audience.
10. Incorporate Interactivity: When appropriate, add interactive elements such as filters, tooltips, and drill-down capabilities to allow users to explore the data in more detail.
11. Tell a Story: Structure your visualizations to tell a clear and compelling story. Use a logical flow to guide the audience through the data, from introduction to conclusion.
12. Test and Iterate: Test your visualizations with a sample of your audience to gather feedback. Iterate and refine your visualizations based on this feedback to improve clarity and effectiveness.
13. Consider Accessibility: Ensure that your visualizations are accessible to all users, including those with disabilities. Use high-contrast colors, readable fonts, and provide text descriptions where necessary.
14. Leverage Visual Hierarchy: Use size, color, and position to establish a visual hierarchy that guides the viewer's attention through the most important elements first.
15. Balance Aesthetics and Functionality: While aesthetics are important, they should not overshadow the functionality and clarity of the visualization. Strive for a

balance that enhances both visual appeal and comprehension.

By following these best practices, you can create data visualizations that are not only visually appealing but also effective in conveying insights and supporting data-driven decision-making.

CREATING MORE ADVANCED CHART TYPES:

In Tableau, creating advanced chart types can enhance the ability to visualize complex data and gain deeper insights. Here are some advanced chart types and how they can be useful:

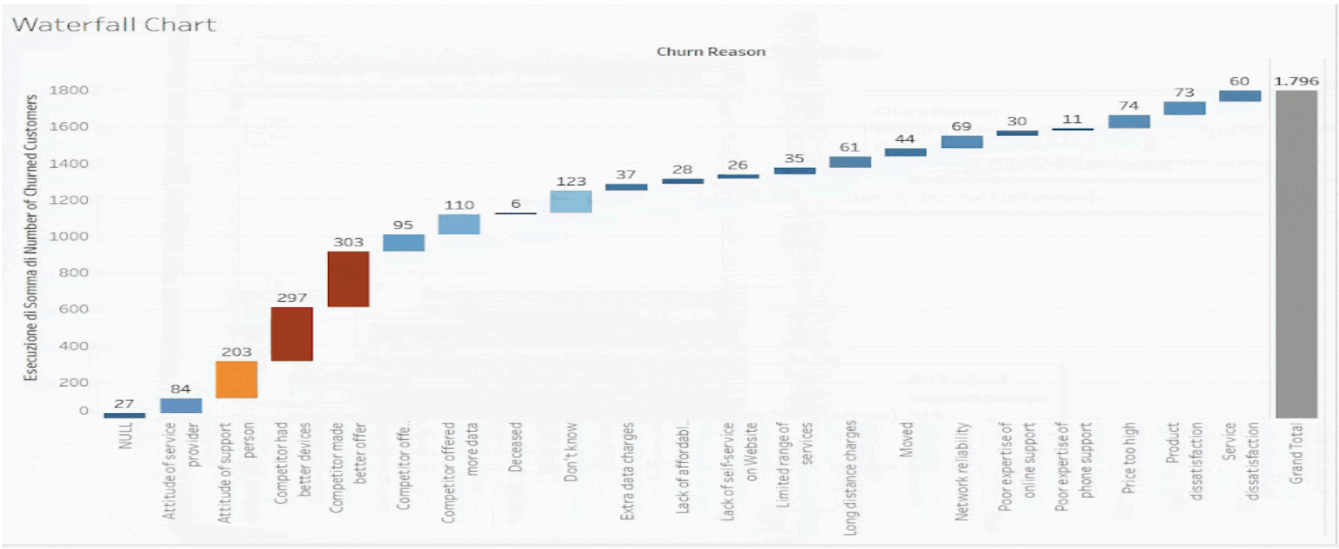
1. Bullet Graphs.
2. Box and Whisker Plots.
3. Waterfall Charts.
4. Gantt Charts.
5. Histogram.
6. Heat Maps.
7. Treemaps.
8. Bump Charts.
9. Sankey Diagrams.
10. Funnel Charts.
11. Pareto Charts.
12. Violin Plots.
13. Radar Charts.
14. Hexbin Plots.
15. Network Graphs.
16. Scatter Plot with Marginal Histograms.
17. Dumbbell Charts.
18. Connected Scatter Plot.
19. Sunburst Charts.
20. Word Clouds.
21. Chord Diagrams.
22. Calendar Heat Maps.
23. Network Maps.
24. Multi-axis Charts.
25. Sparklines.
26. Marimekko Charts.
27. Lollipop Charts.
28. Dot Plots.
29. Slope Graphs.
30. Circular Bar Charts.
31. Ridgeline Plots.
32. Bezier Line Charts.
33. Streamgraphs.
34. Density Maps.

These advanced chart types in Tableau enable you to create more detailed and specific visualizations, enhancing your ability to analyze and present complex data sets effectively.

Here we will see some advanced charts creation.

1. **Waterfall chart:**

A waterfall chart, shown below, is a special type of bar chart designed to show the cumulative effect of positive and negative values on an outcome. It's especially useful for visualizing the progression of data through a sequence of changes, providing a clear picture of how different factors contribute to a result over time.



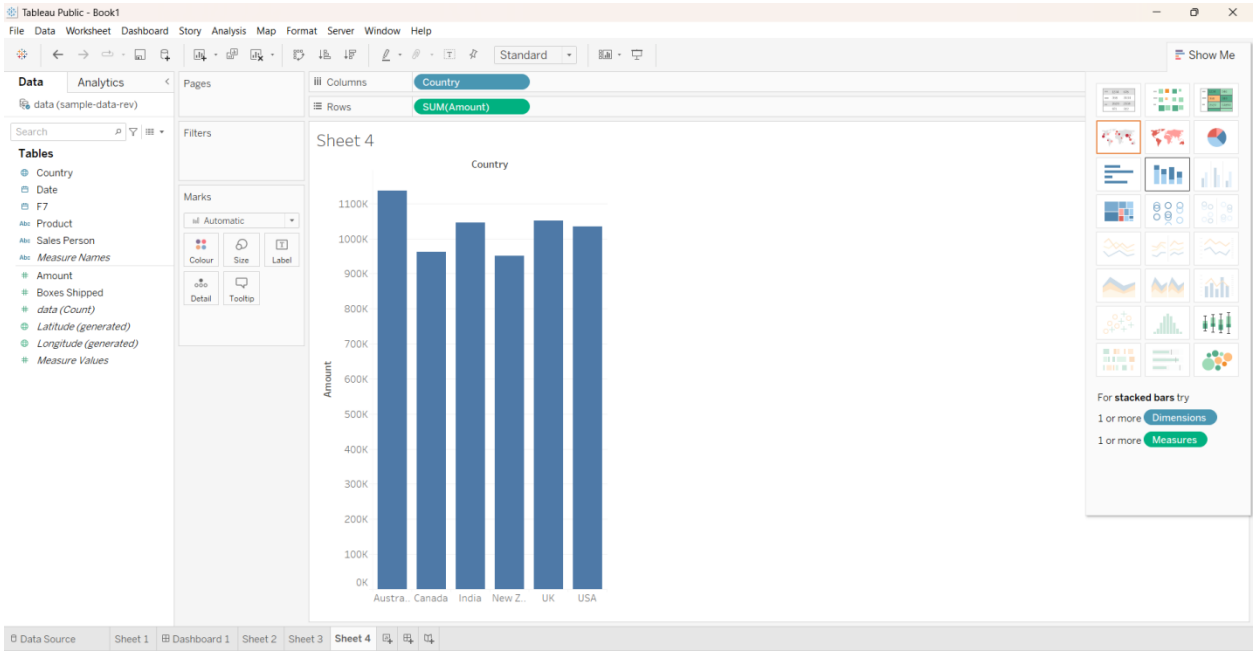
Steps for creating Waterfall chart:

 Prepare Your Data: Ensure your data is structured properly, with at least one dimension and one measure. For example, you might have categories and corresponding values that represent increases or decreases.

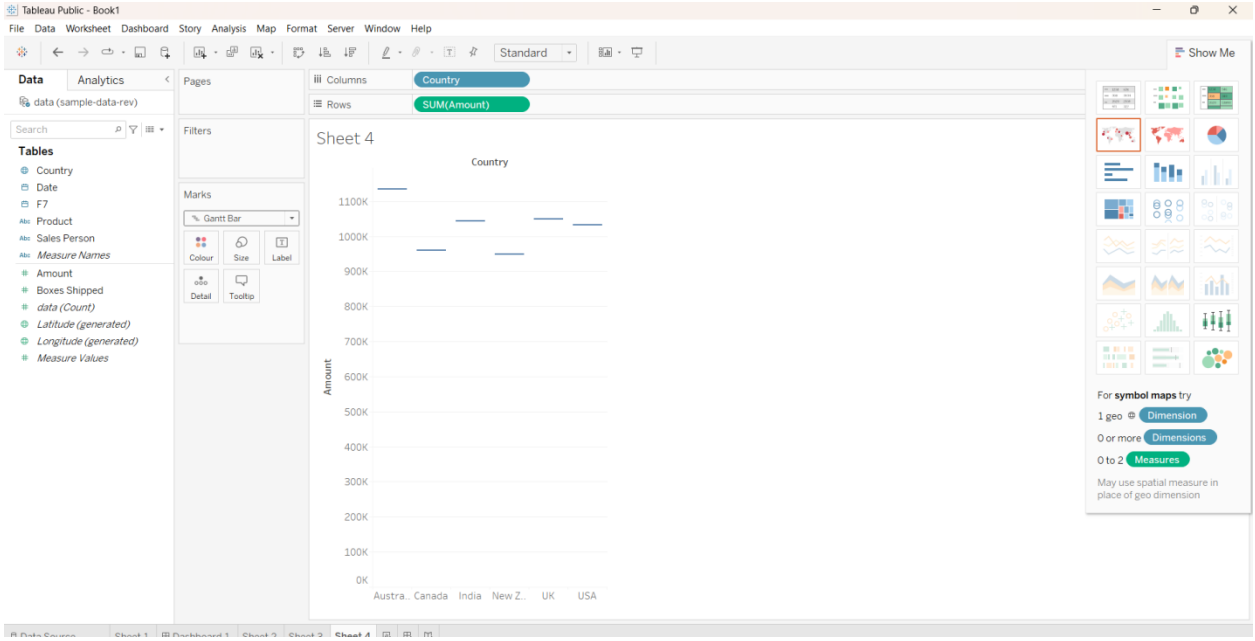
 Open Tableau and Connect to Your Data Source: Load your dataset into Tableau.

 Drag Dimensions and Measures to the View:

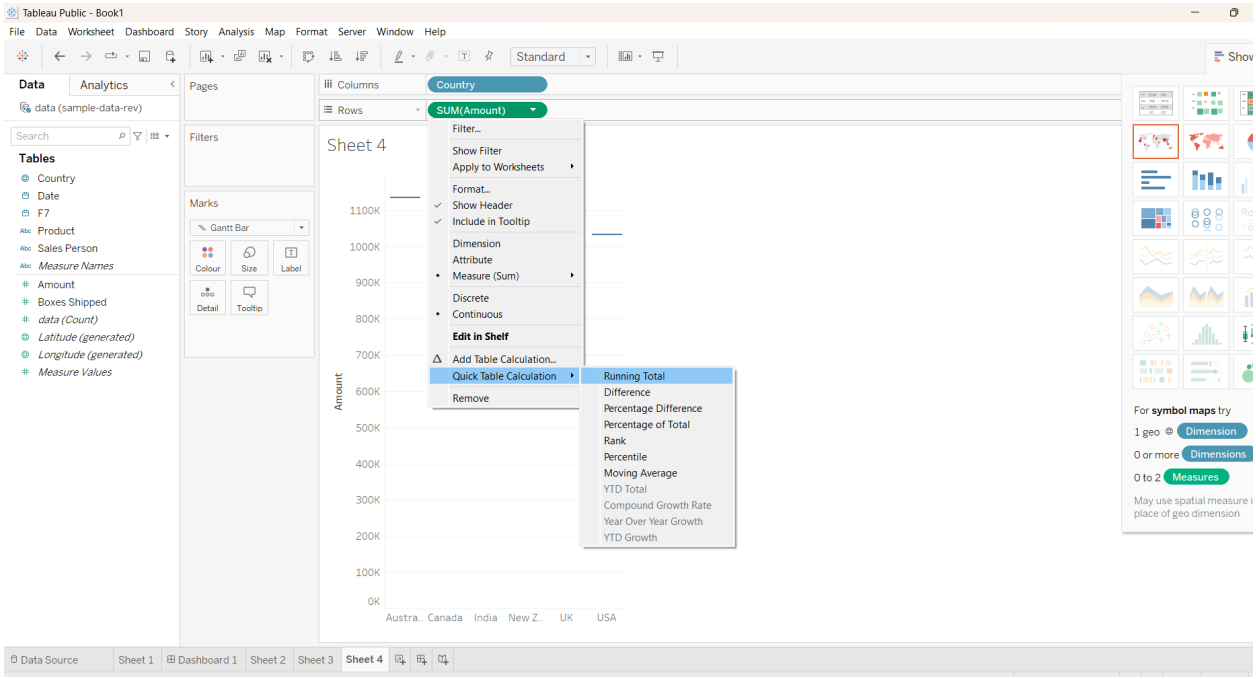
- Drag the dimension that you want to break down (e.g., country) to the Columns shelf.
- Drag the measure (e.g., Amount) to the Rows shelf.



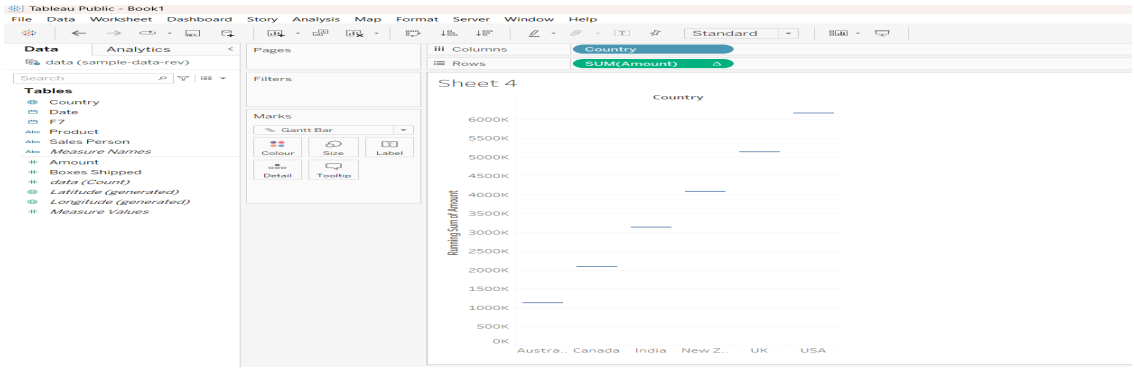
- **Convert to Gantt Bar**:
  - Click on the drop-down menu of the Amount(Measure) on the Rows shelf and select "Gantt Bar" as the mark type.



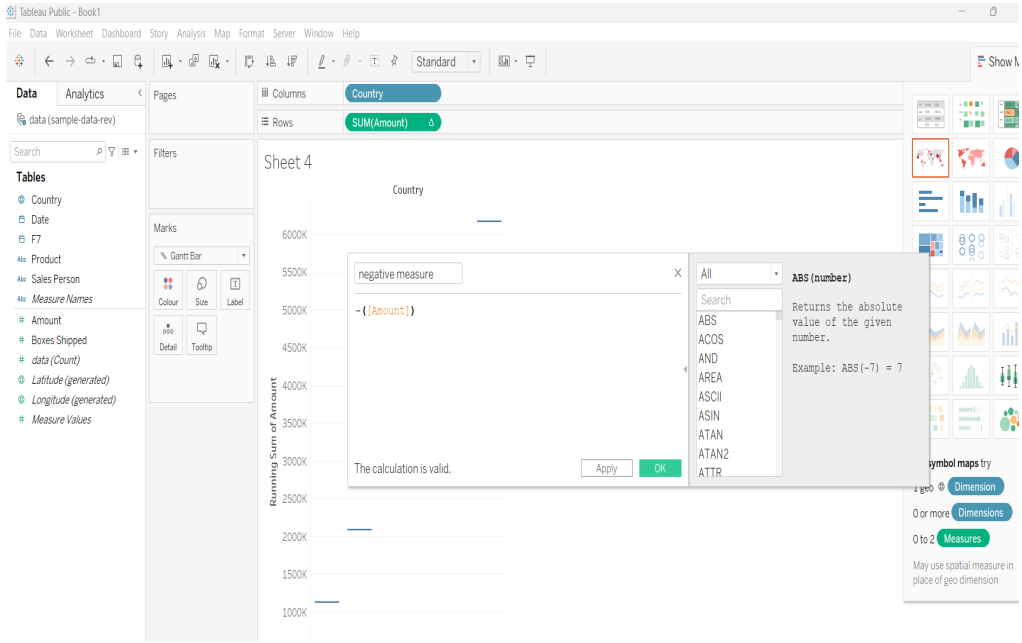
- **Create a Running Total Calculation**:
  - Right-click in the Data pane and select "Create Calculated Field."
  - Name it something like "Running Total."



- **Add the Running Total to the View**:
  - Drag the new calculated field "Running Total" to the Rows shelf, placing it to the right of the original measure.



- **Create the Waterfall Effect**:
  - Create another calculated field to offset the Gantt bars. Right-click in the Data pane and select "Create Calculated Field."
  - Name it "Negative Offset" and use the following calculation: -([Measure]).
  - Click OK.

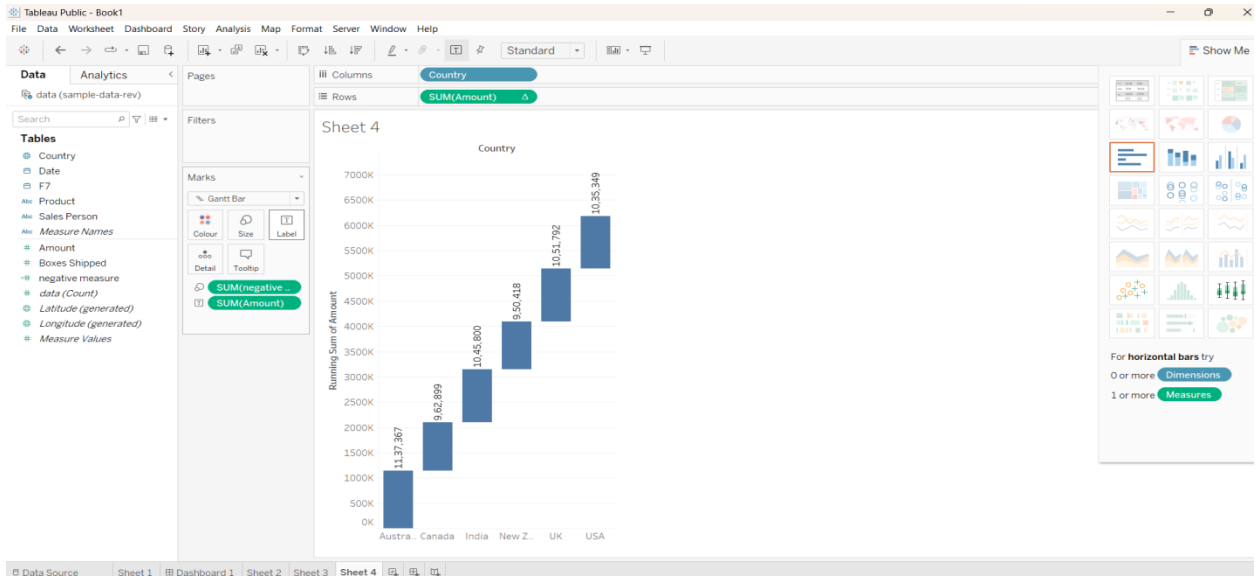


☐ **Add the Offset Calculation to the View**:

- Drag the "Negative Offset" field to the Size shelf on the Marks card.

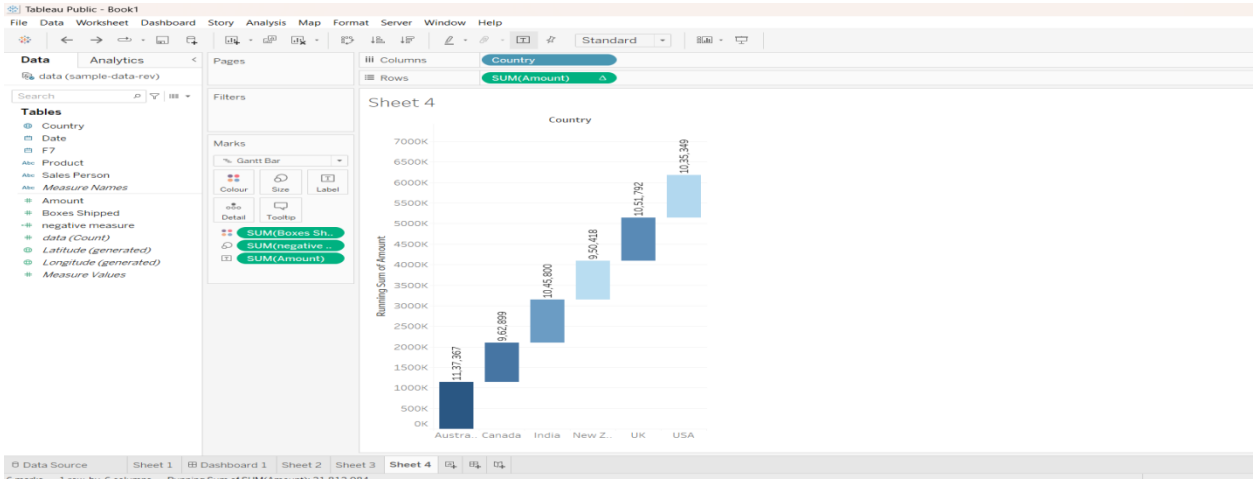
☐ **Adjusting the View**:

- Ensure the "Running Total" calculated field is set to compute using the correct dimension (e.g., Table Across if you are using categories).
- Format the view to improve readability, adjust colors, labels, and tooltips as needed.



☐ **Add Final Touches**:

- Add color to indicate positive and negative changes by dragging the original measure (e.g., [Measure]) to the Color shelf on the Marks card.
- Adjust the color palette to differentiate between increases and decreases (e.g., green for positive values and red for negative values).



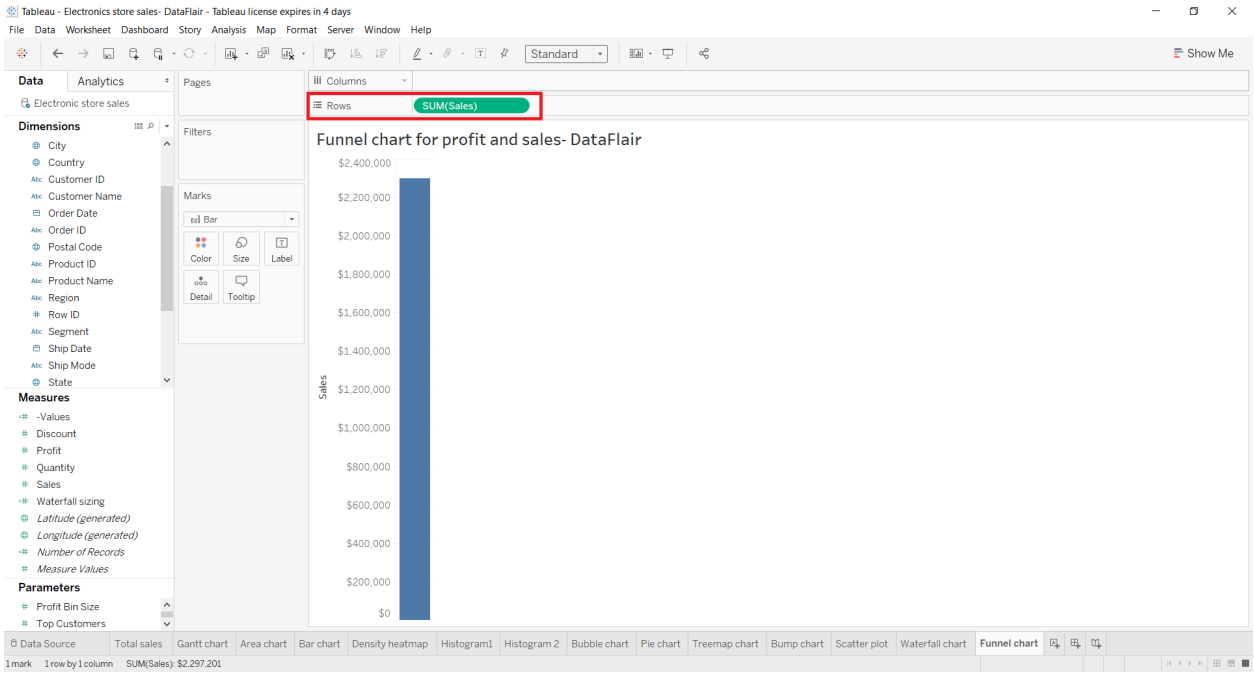
2. Funnel chart:

Funnel charts are important visualization in business intelligence as they offer a way to represent linear workflows. We can make a stepped or smooth funnel chart to visually represent and understand the progression or workflow of a process. Also, we can get a systematic view of our data values through a funnel chart.

Follow the steps given below to create a funnel chart in Tableau. Make sure you have a dataset uploaded in your Tableau software.

Step 1: Add Measures to the Rows Section

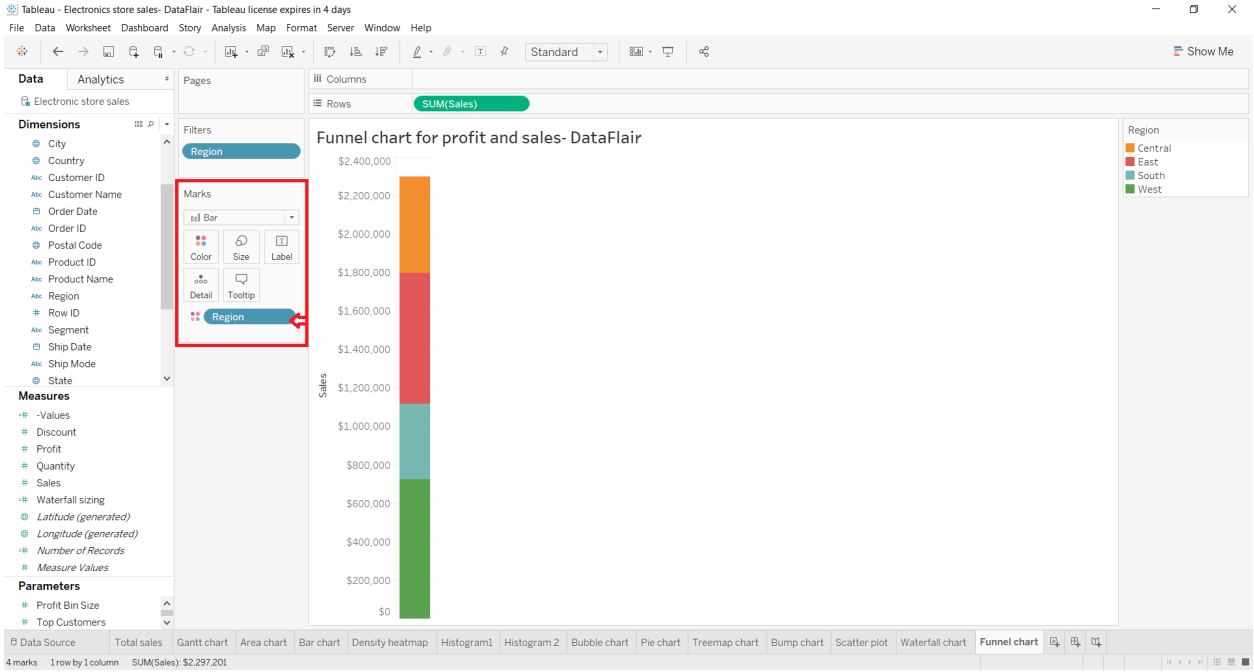
To begin with, we add one measure that is *Sales* to the **Rows** section. We select the aggregation type as SUM.



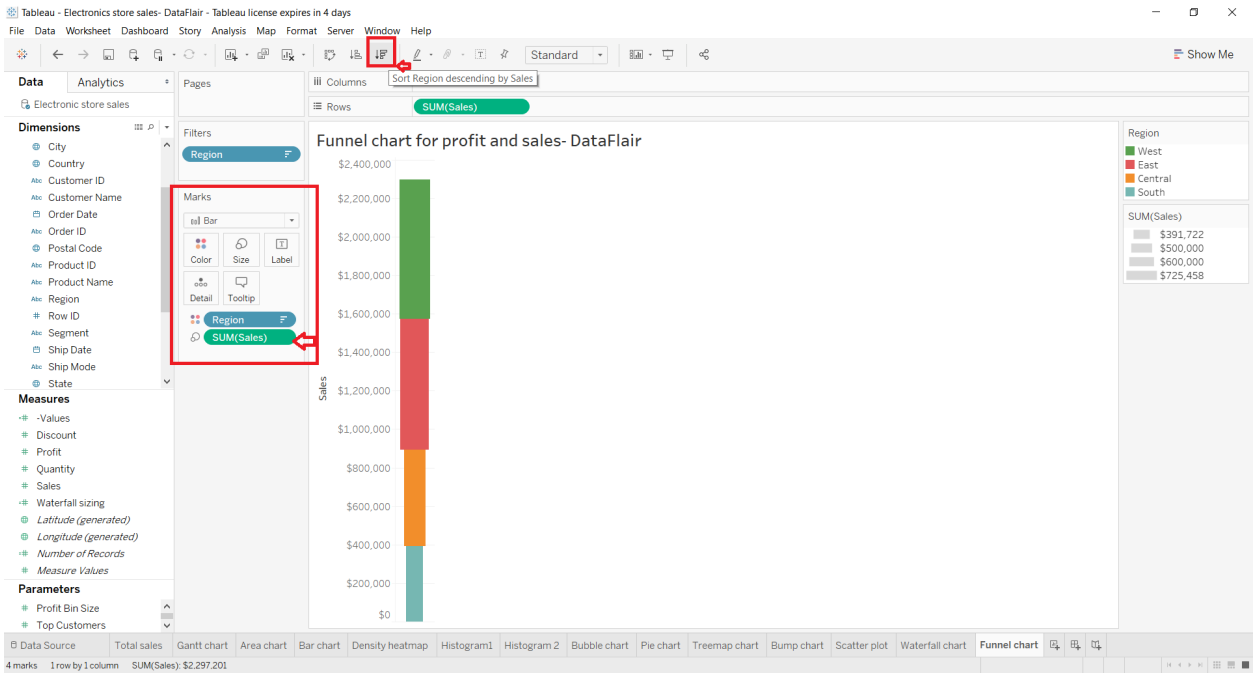
Step 2: Select Dimensions in the Marks Section

Next, we select a dimension *(Region)* from the list of **Dimensions** at the left and drag it

onto the **Colors** card in the **Marks** section. This will divide our vertical bar into four different colors each of which represents a region.

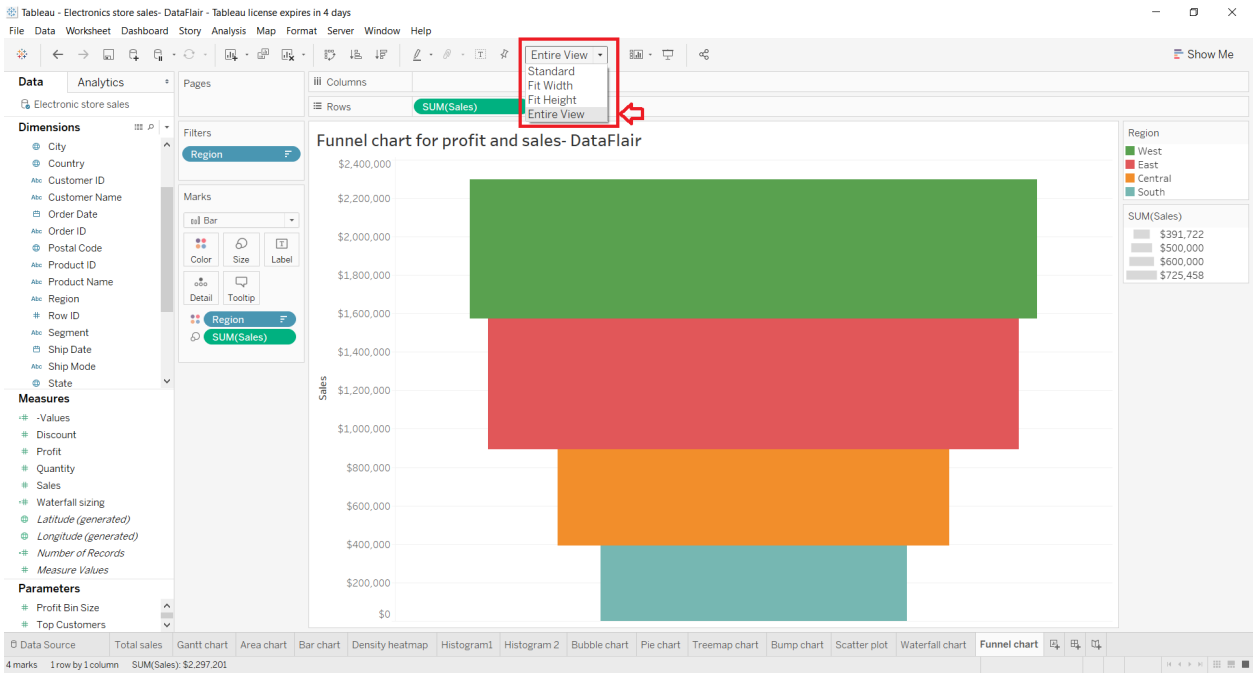


Then, we add *SUM(Sales)* into the **Size** box present in the **Marks** section. Also, we select the icon for the *"Sort Region descending by Sales"* option. It will arrange the segments on the bar in a descending manner.



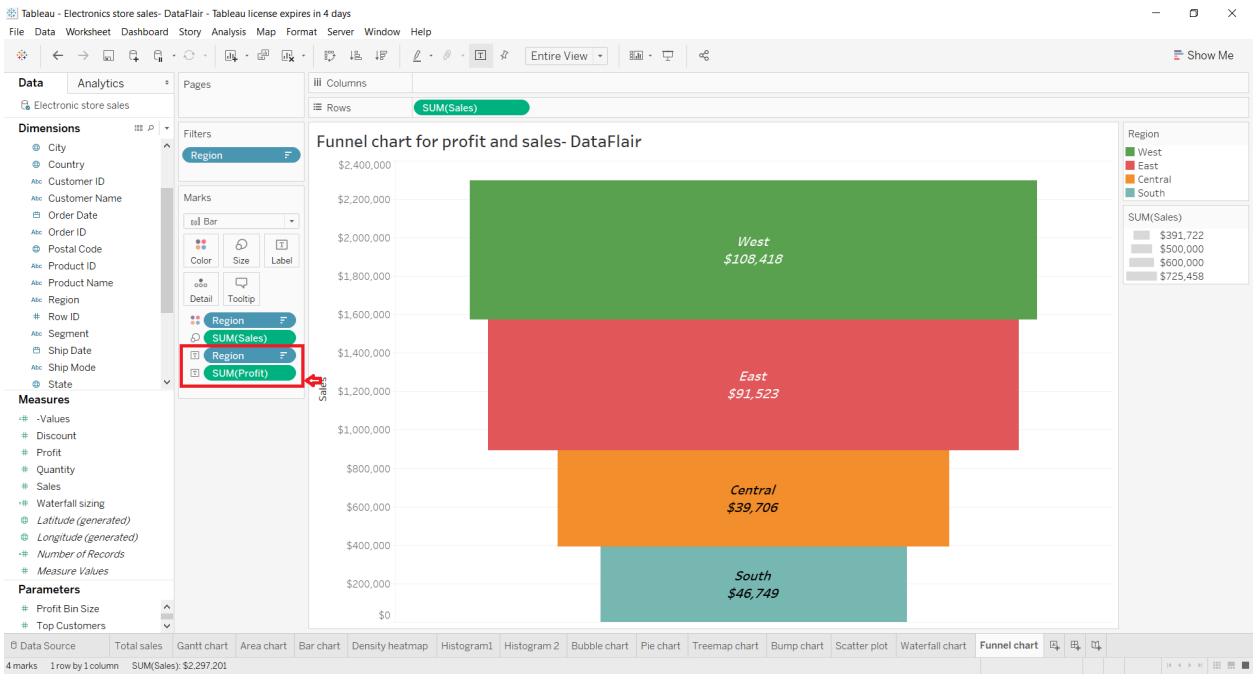
Step 3: Convert Standard View to Entire View

By default, the view type is set to *Standard*, we change it to *Entire View* so that our chart covers the full view and looks more like a funnel in shape.



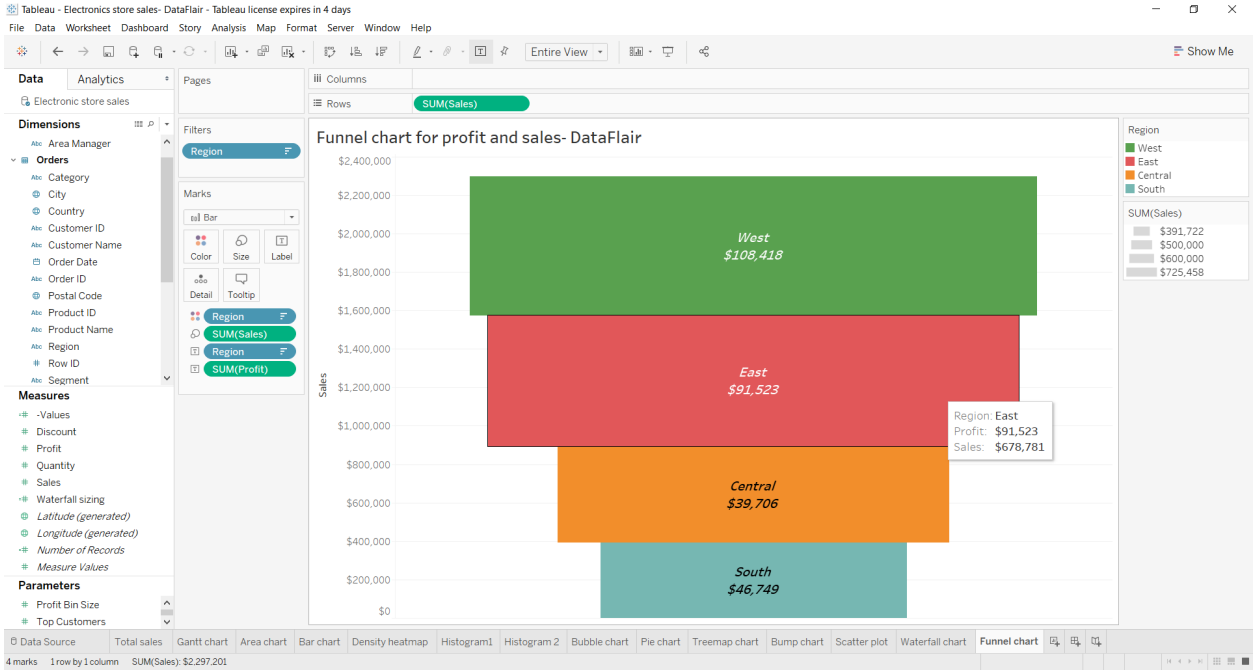
Step 4: Add Labels in the Marks Section

Next, we add the fields *Region and SUM(Sales)* into the **Label** box present in the **Marks** section.



Step 5: Final Funnel Chart

This adds text labels showing the region and total sales for each region block in our funnel chart.



These are some examples of creating advanced charts in tableau.

USING MULTIPLE SOURCE TABLES:

Using multiple source tables in Tableau allows you to combine data from different sources to create comprehensive visualizations. You can achieve this by using joins, unions, blends, or relationships. Here's a guide on how to use multiple source tables in Tableau:

1. Using Joins

Joins are used to combine data from two or more tables based on a related column.

Steps:

1. **Connect to your data sources**: Open Tableau and connect to the primary data source.
2. **Add secondary data source**: In the Data pane, click on "Add" to connect to another data source.
3. **Drag tables to the canvas**: Drag the tables you want to join onto the data canvas.
4. **Define join conditions**: Specify the columns to join on and the type of join (inner, left, right, or full outer join).

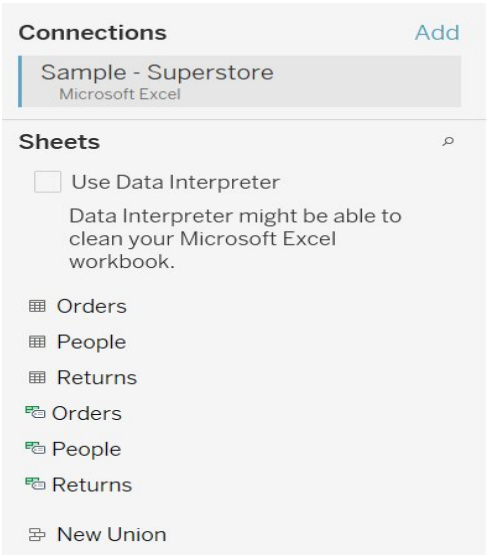
Example:

- Connect to Orders table.
- Add returns table.

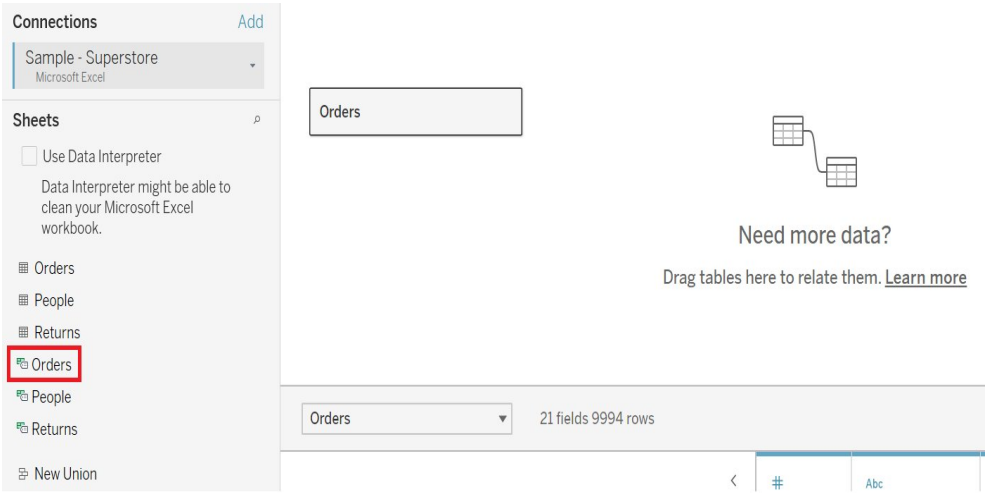
- Join Orders and returns on order ID.

creating a Join in Tableau

- Connect the relevant data sources
    - Here, we will use the sample superstore data



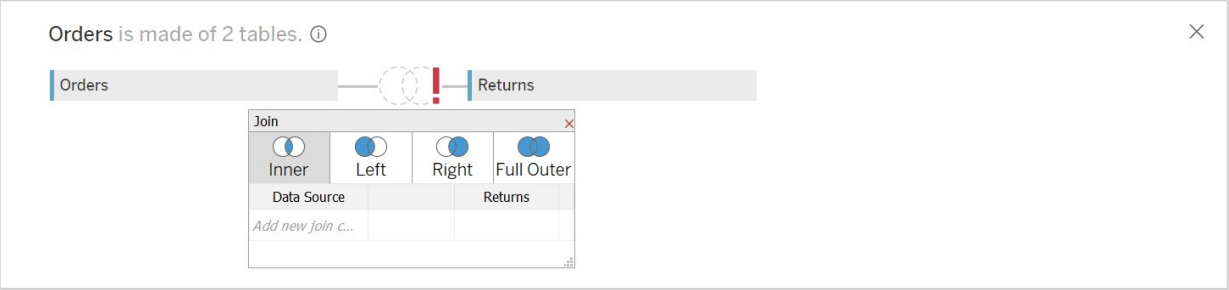
- Drag the first table to the canvas
    - Here, the order table



- Select open from the dropdown to open the join canvas.
- Join canvas looks like this

- Double click or drag another table to the join canvas.

- Here the second table will be Return



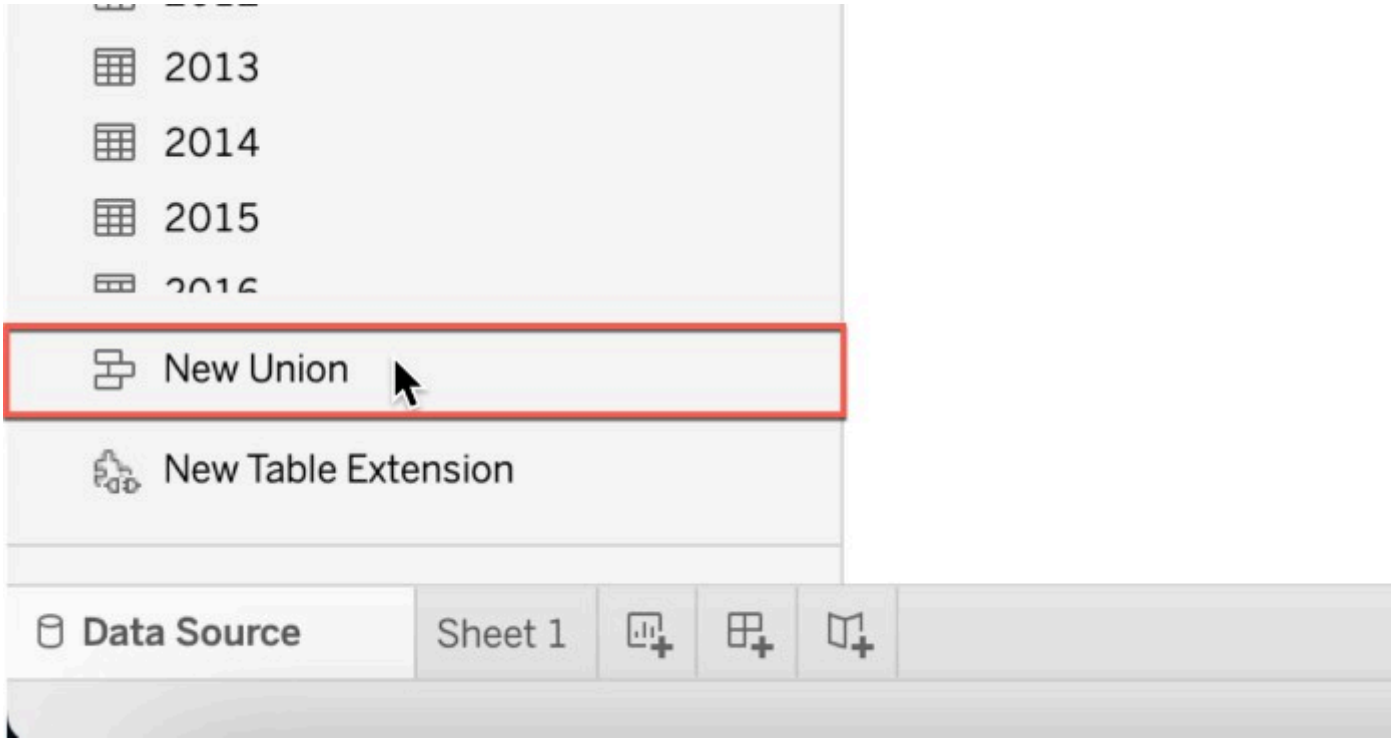
- Choose the desired join which you want
- When finished, close the joined dialogue and join the canvas

2. Using Unions

Unions combine data from two or more tables with similar structure into a single table.

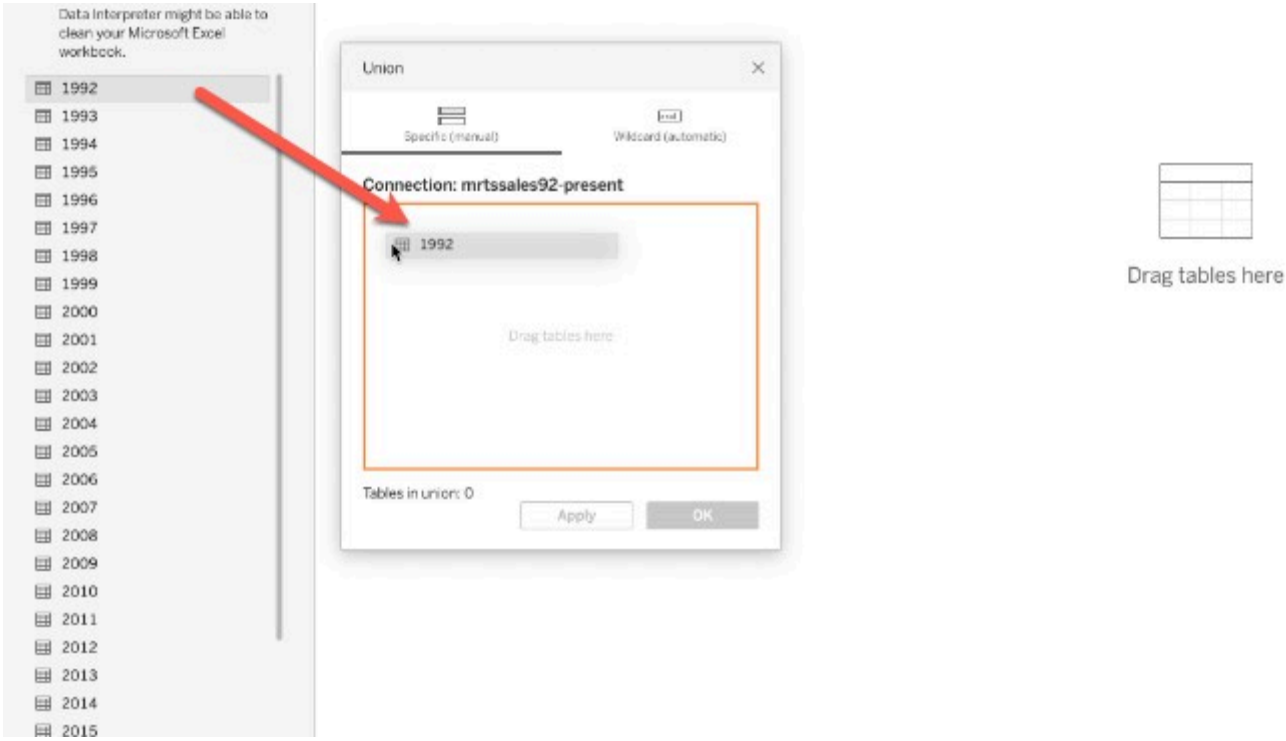
Step-by-Step Instructions to Union Tables Manually

1. Select New Union



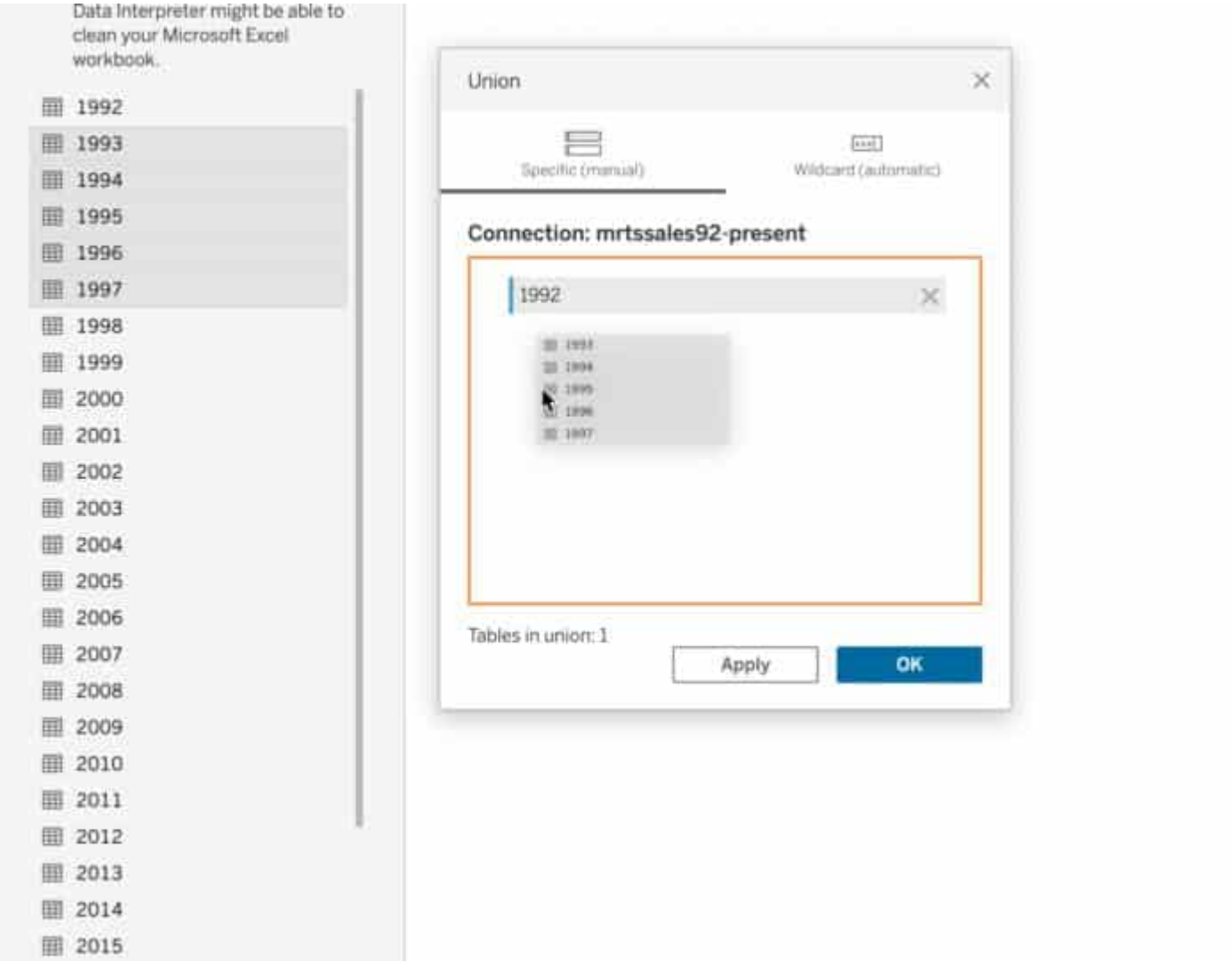
Start by navigating to the **Data Source** tab in Tableau, then double-click the **New Union** option.

2. Drag Tables to Union dialog Box



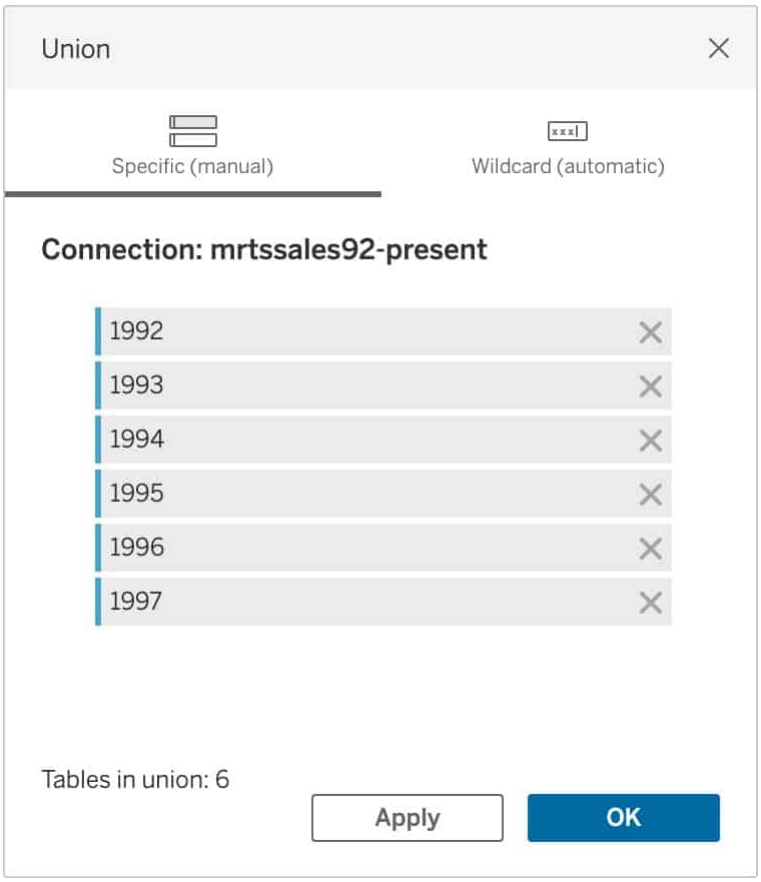
In the Union dialog box, drag in the tables you want to combine. You can add as many as you need.

3. Drag multiple tables at the same time



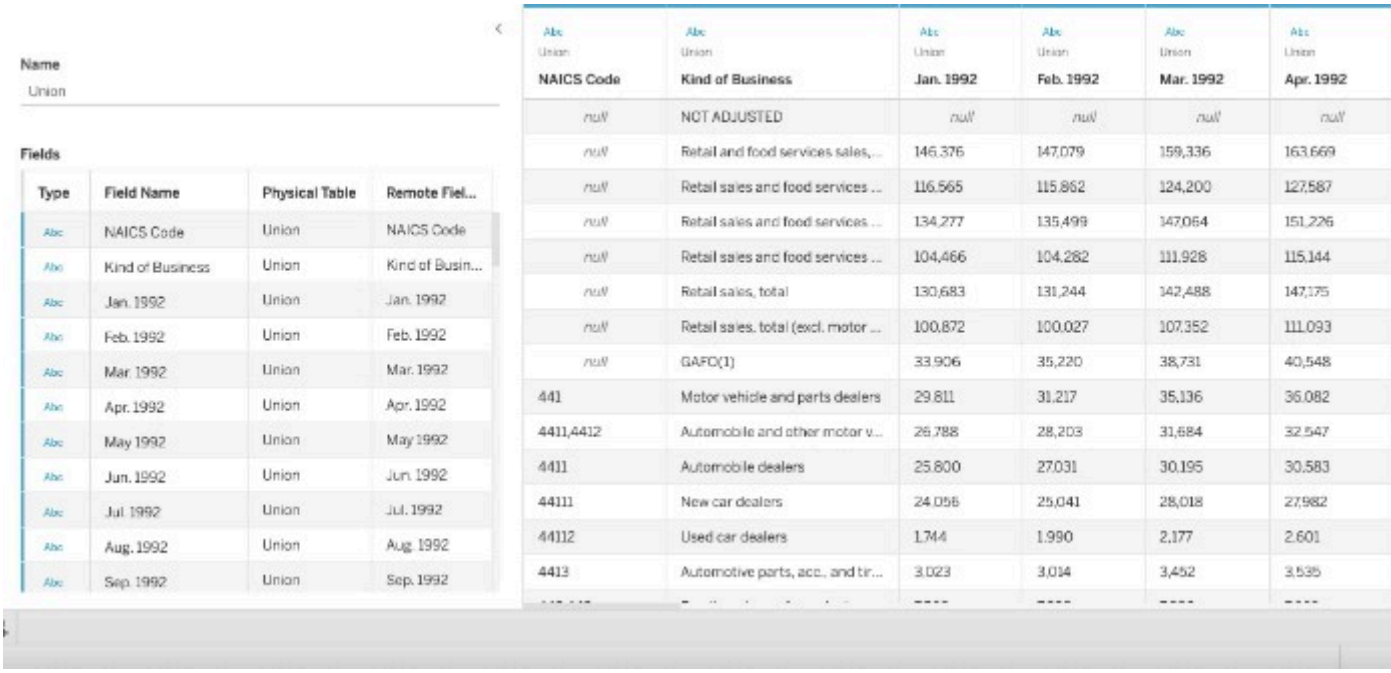
Drag in multiple tables by pressing **Shift** or **Ctrl** (**Shift** or **Command** on Mac).

4. Click on Apply or Okay to union



Once all the tables have been added, click either **Apply** or **Okay** to union the tables.

5. Review the New Table



You can now use this new table in your analysis, allowing you to leverage the best insights from all of your available data.

By following these steps, you can quickly and easily union two or more tables together in Tableau.

3. Using Data Blending

Data blending allows you to combine data from different sources while keeping the data separate.

Steps:

1. **Connect to your primary data source**: Open Tableau and connect to the primary data source.
2. **Connect to your secondary data source**: In the Data pane, click on "Add" to connect to another data source.
3. **Create a primary and secondary relationship**: Drag a field from the primary data source to the view, then drag a related field from the secondary data source. Tableau creates a blend automatically, indicated by an orange checkmark.
4. **Ensure fields are related**: Check that the related fields are correctly linked.

Example of Data Blending in Tableau

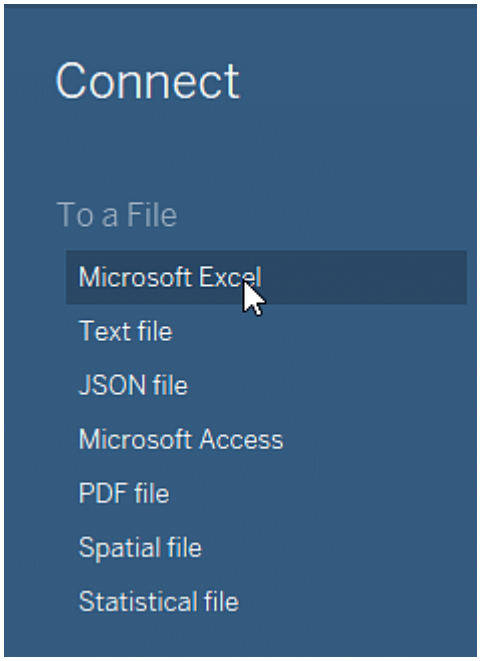
In the following example, consider two different datasets, namely.

Car Data Set

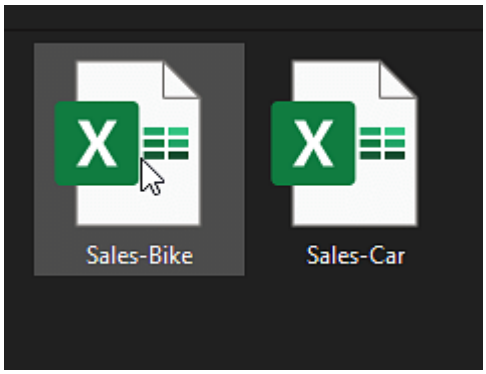
Bike Data Set

Here, the objective is to try to import these two datasets and combine them to implement Data Blending in Tableau.

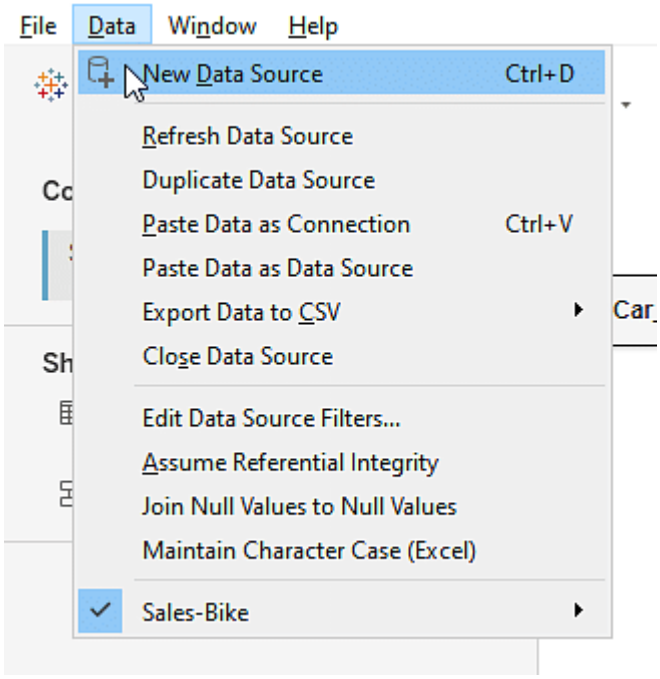
So, the first step is to import the first dataset as shown below.



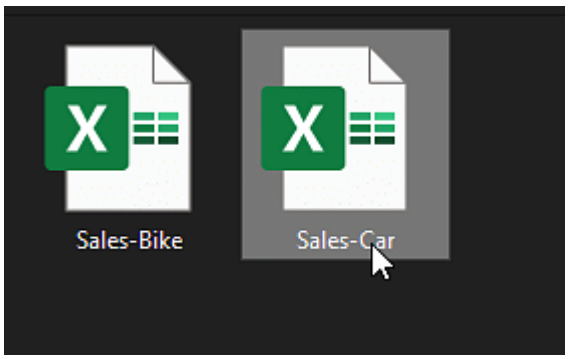
Since the file type here is Excel, choose Microsoft Excel.



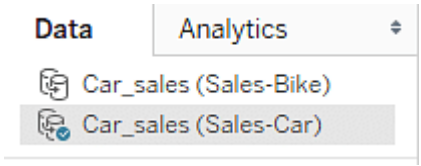
Next, you have to choose the data option from the toolbar and import the second dataset.



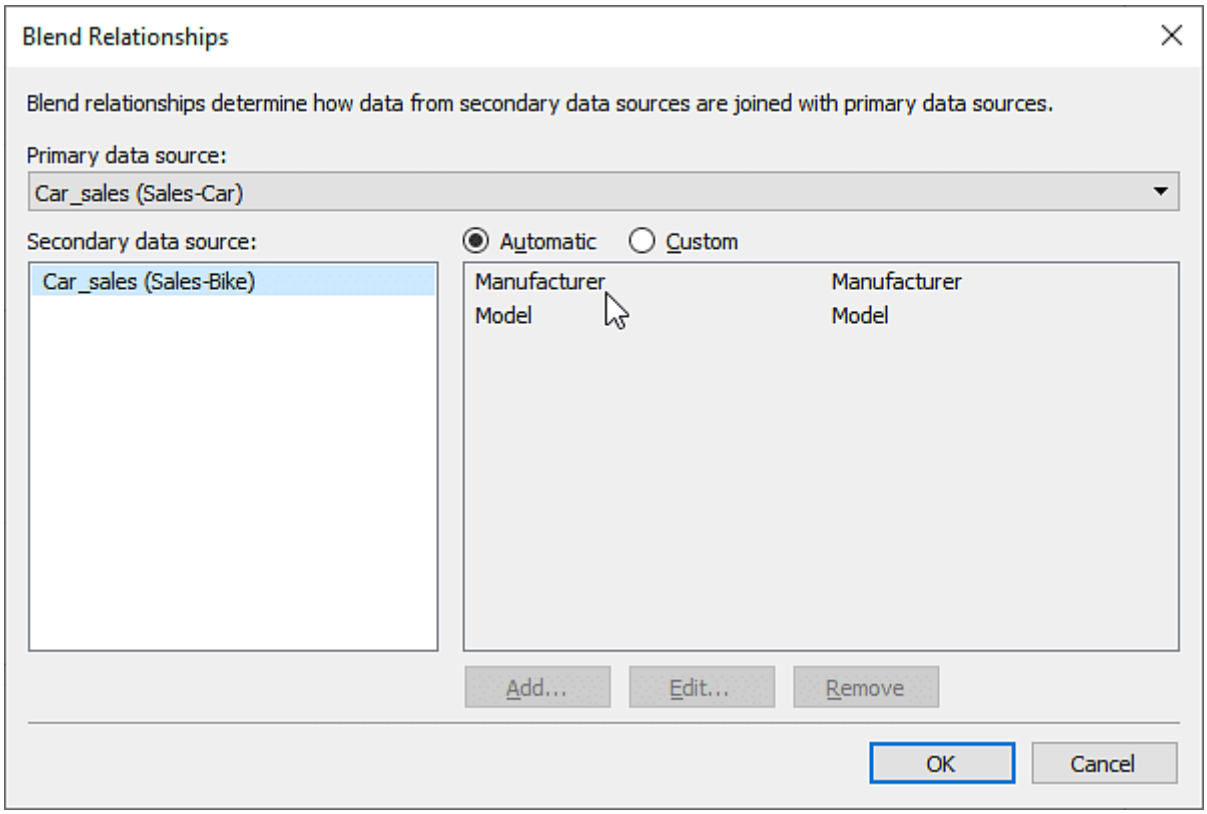
The second dataset is selected now.



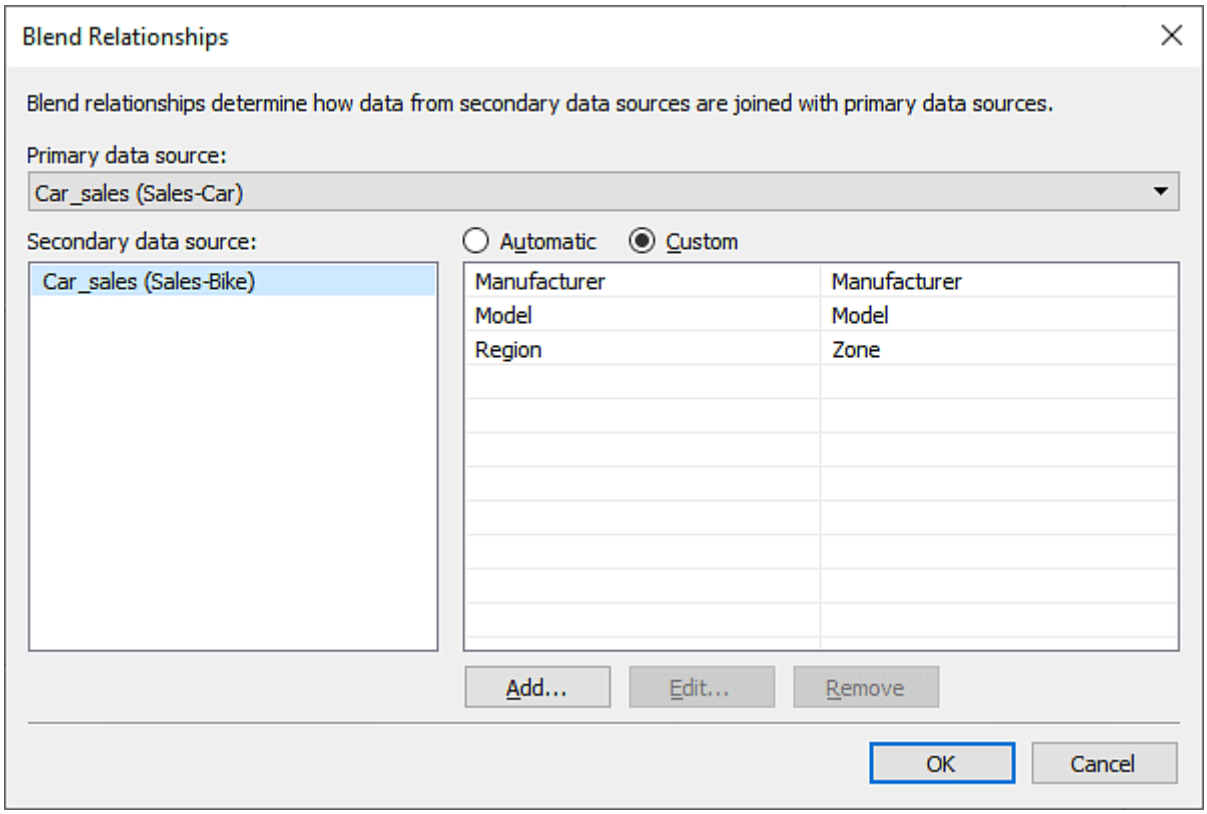
Now, both the datasets are visible on the tableau window.



Next, Tableau automatically generates the blend between the data, as shown below.

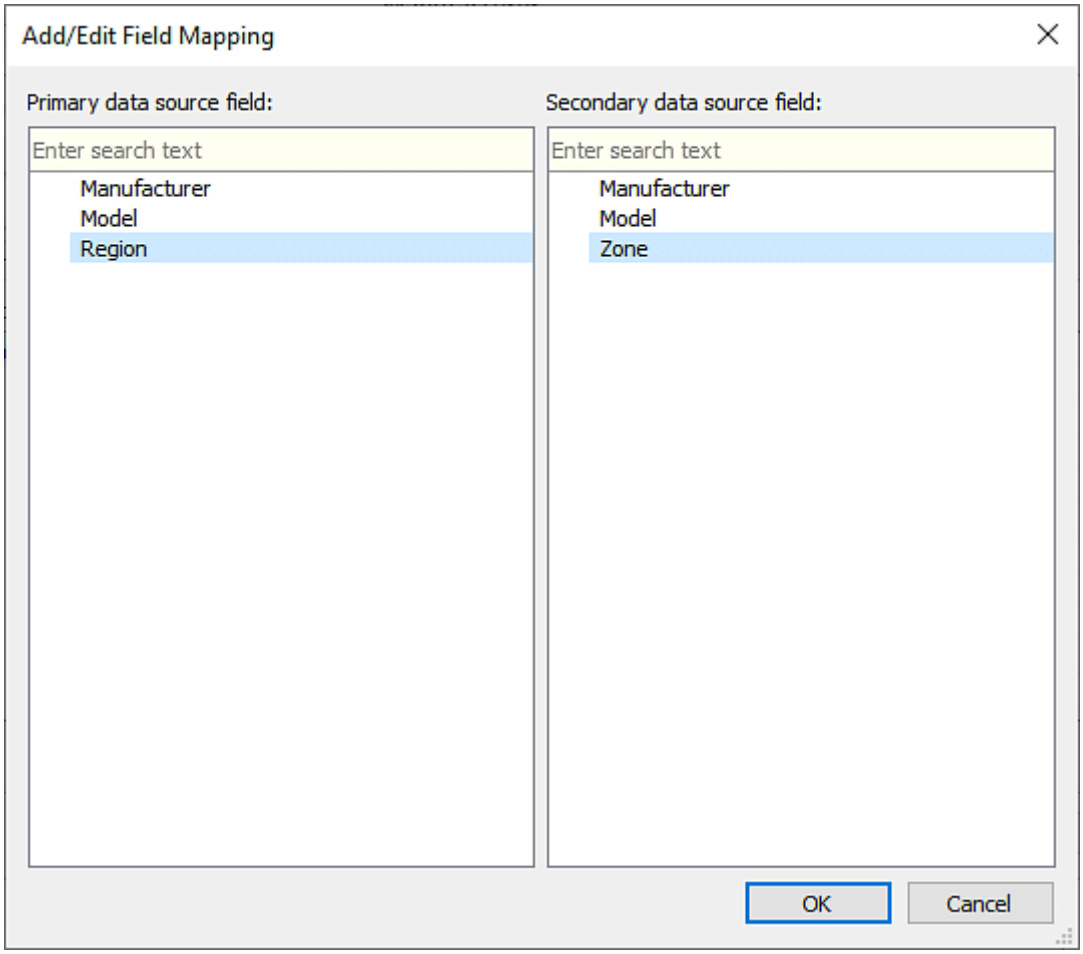


Also, the option of choosing the custom blend is available, as well. The two datasets have similarities between the Zone and Region columns. So, here you must perform the Custom Data Blending between the two columns as shown below.



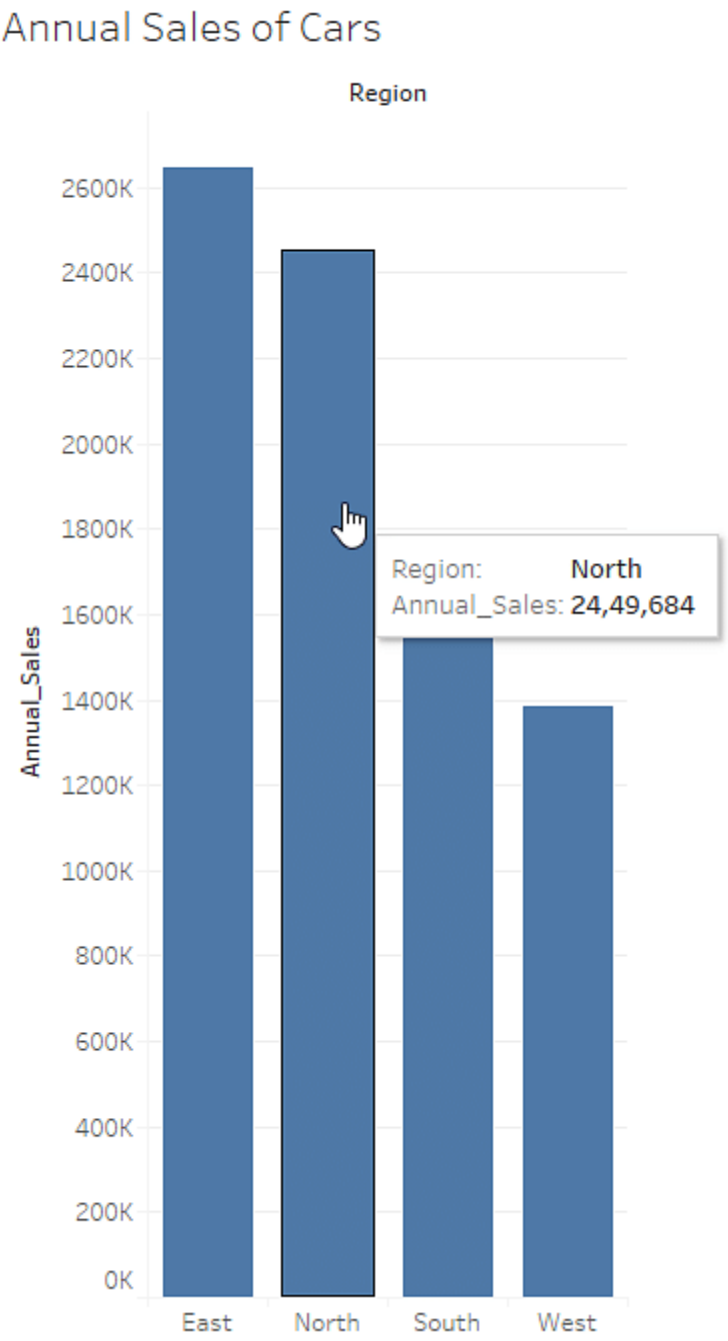
Selecting the Custom option will open a new window. This new window will provide you with columns from both datasets. Next, you need to select the common columns

and apply the Custom Blend as shown below.

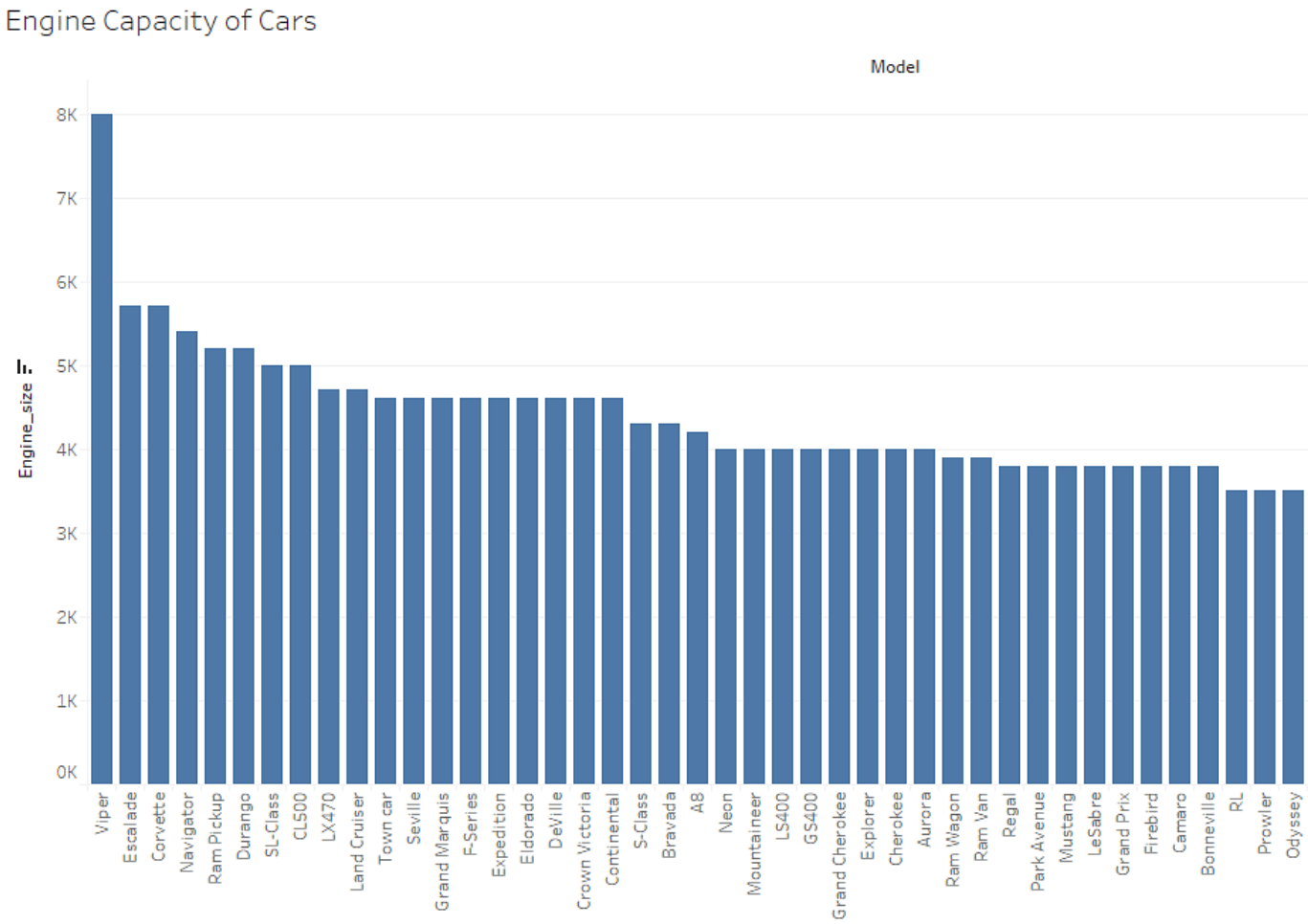


The next step is to create some visualizations using the data available.

First, create a visualization that explains cars' annual sales in different regions of a country. Here in this visualization, the Car Data Set acts as the Primary Data Source. The visualization looks like this, as shown below.



In the next visualization, you should calculate the highest horsepower amongst the cars available in the dataset. The visualizations look as follows.



According to the results, Dodge Viper is the one with the highest engine Horsepower.

Next, you need to find out the fuel efficiency of the different bikes available. Now, you must use the data obtained from Bikes Data Set. Tableau will change Bikes Data Set to Primary Source and convert the Car Data Set to Secondary Data Source in the current situation.

In short, Tableau will automatically convert the currently active dataset as a Primary Data Source.

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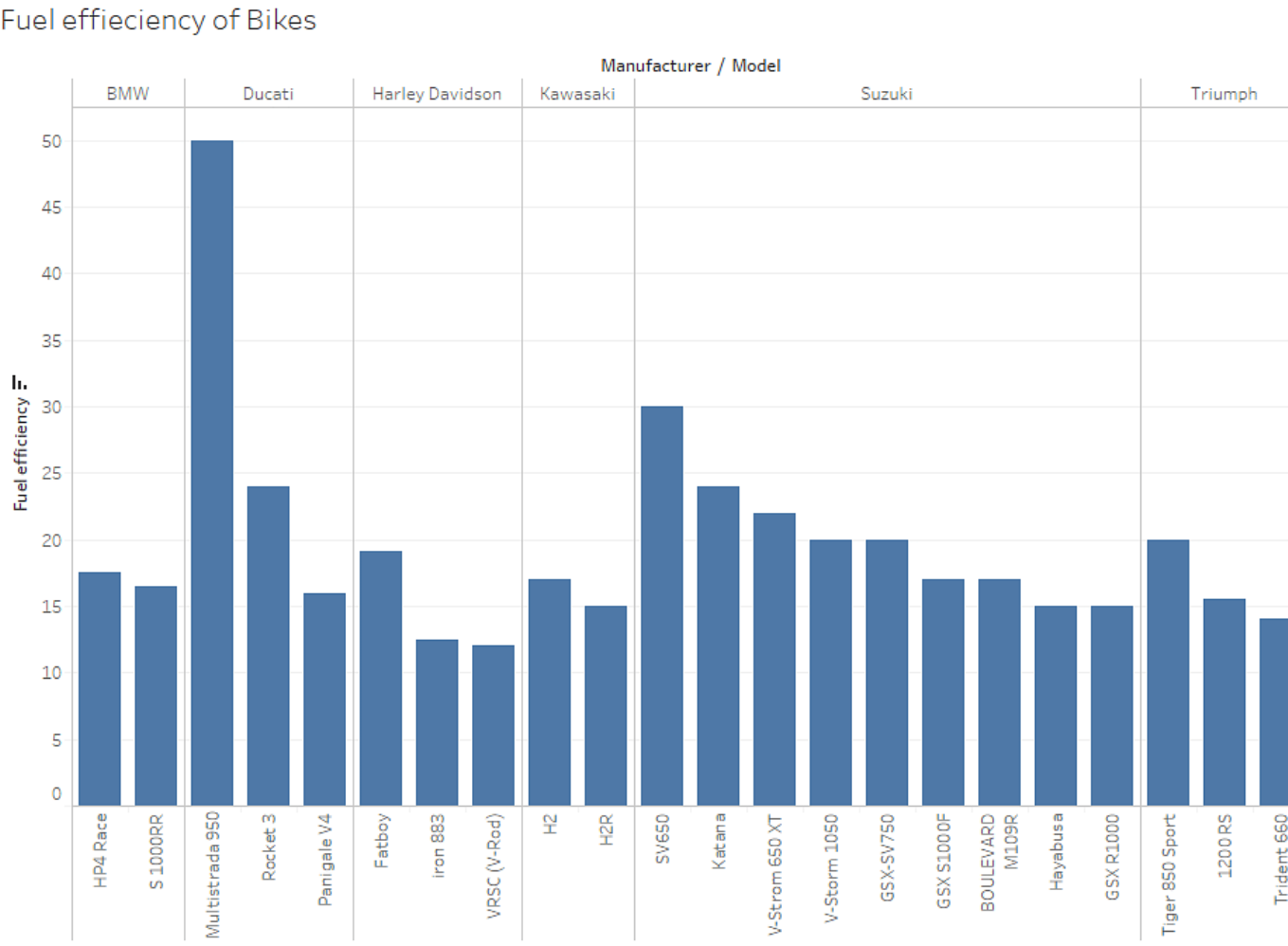
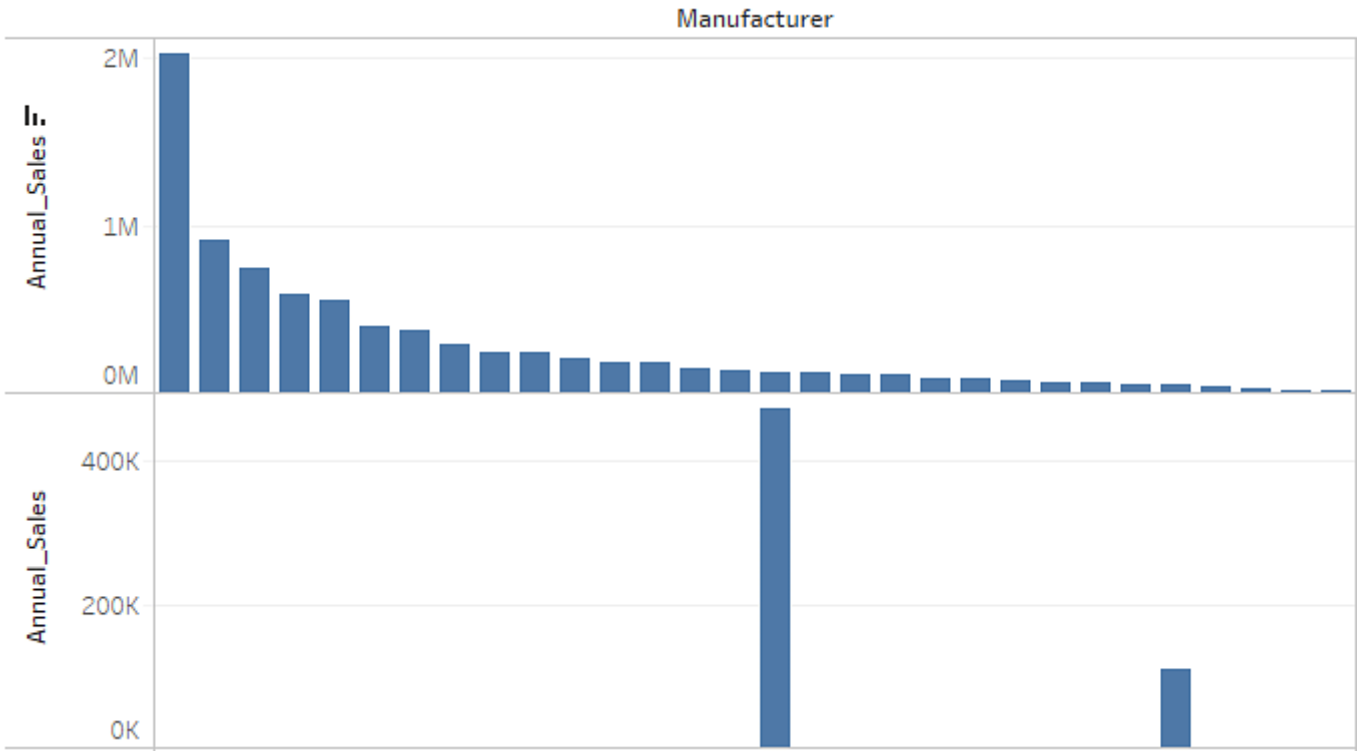
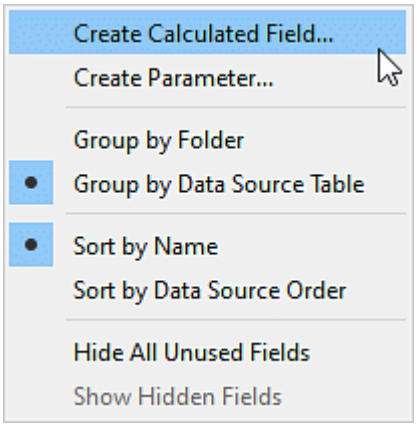
The visualization for the Fuel Efficiency of bikes is shown below.



Next, you will need to find out the annual sales for bikes and cars together. The combined result will look as shown below.



Now, as it is evident there are null values in the second graph. To eliminate these null spaces, the agenda is to create a new calculated field and write the formula below.

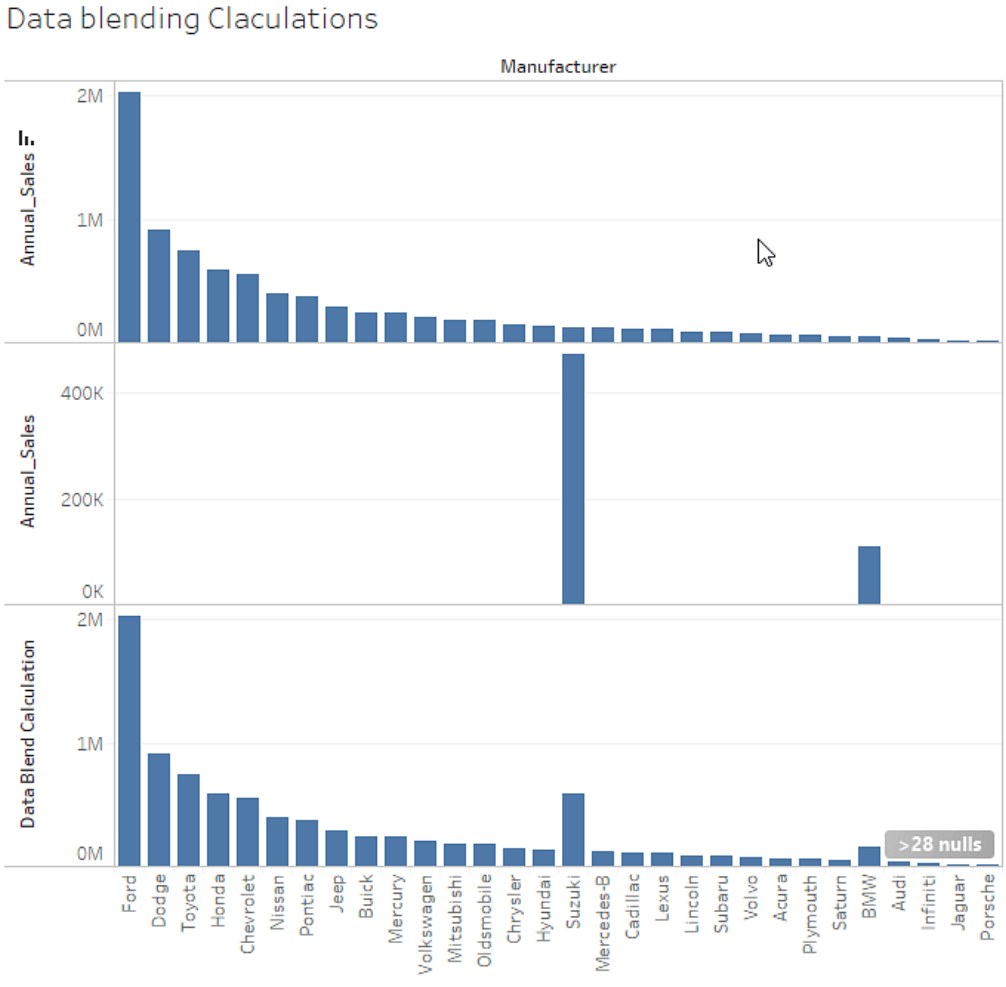


Moving on, write in the formula below and select the OK button in the right bottom corner.

//Formula:

ZN(SUM([Annual_Sales])) + ZN(SUM([Car_sales (Sales-Car)].[Annual_Sales]))

Now, you can see the newly created calculated field in the measures section. Drag that into the columns section, and you can instantly see the newly created visualization with combined sales.



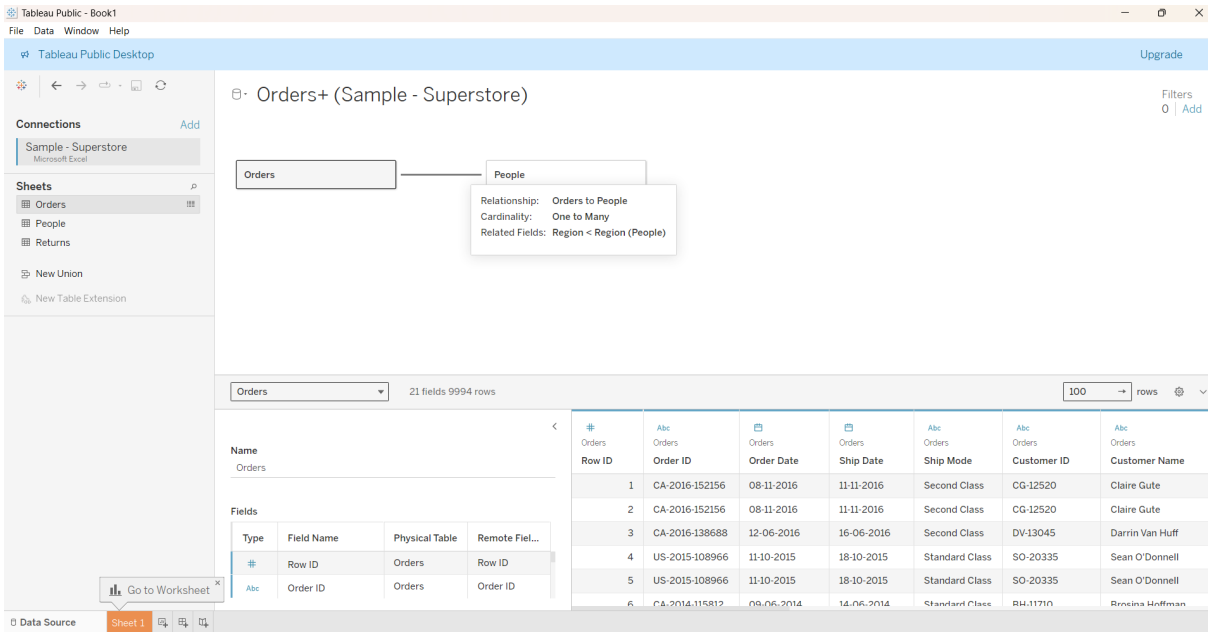
4. Using Relationships (Data Model)

Relationships in Tableau allow you to create a more flexible and easier-to-manage data model compared to traditional joins.

Steps:

1. **Connect to your data sources**: Open Tableau and connect to your primary data source.
2. **Add secondary data source**: Click on "Add" to connect to another data source.
3. **Drag tables to the canvas**: Drag tables onto the canvas to define relationships.
4. **Define relationships**: Click on the "noodle" between tables to define the relationship based on keys.
5. **Build your visualization**: Use fields from both tables in your visualization without worrying about join types.

Example:



MODULE 3

DATA STORYTELLING

INTRODUCTION TO DATA STORYTELLING

Data storytelling is the process of using data to create a narrative that communicates a message or conveys insights. It combines data analysis with storytelling techniques to make data more accessible and understandable to a wider audience. Here is a brief introduction to data storytelling:

1. **Purpose:** The purpose of data storytelling is to make data meaningful and relevant. It helps to uncover insights, trends, and patterns in data that can inform decision-making and drive action.
2. **Components:** Data storytelling typically involves three main components:
    - **Data:** The raw material that is analyzed and visualized.
    - **Visualization:** Charts, graphs, and other visual representations of the data.
    - **Narrative:** The story that is built around the data, including the context, analysis, and conclusions.
3. **Why it's Important:** Data storytelling is important because it helps to:
    - Engage and persuade audiences: By presenting data in a compelling and easy-to-understand way, data storytelling can engage and persuade audiences more effectively than raw data alone.
    - Drive decision-making: Data storytelling can help decision-makers understand complex data and make informed decisions based on the insights presented.
    - Create impact: Data storytelling can create impact by highlighting important issues, trends, or opportunities that may otherwise go unnoticed.
4. **Key Elements:** Some key elements of effective data storytelling include:
    - **Clarity:** The story should be clear and easy to understand, even for audiences with limited data literacy.
    - **Relevance:** The story should be relevant to the audience and address their specific needs or interests.
    - **Visual Appeal:** The use of compelling visualizations can help to capture the audience's attention and make the data more engaging.
    - **Emotion:** Adding a human element to the story can help to evoke emotion and make the data more relatable.

Overall, data storytelling is a powerful tool for making data more accessible, engaging, and impactful. It can help to uncover insights, drive decision-making, and communicate complex ideas in a clear and compelling way.

CREATING A DATA STORY IN TABLEAU:

Creating a data story in Tableau involves several steps to effectively communicate insights and engage your audience. Here's a guide to creating a data story in Tableau:

1. **Define Your Story:** Start by defining the purpose of your data story. What do you want to communicate or what insights do you want to highlight?
2. **Gather and Prepare Your Data:** Import your data into Tableau and prepare it for analysis. Clean, filter, and structure your data as needed.
3. **Create Visualizations:** Use Tableau's powerful visualization tools to create charts,

graphs, and maps that help tell your story. Choose visualizations that best represent your data and convey your message.

4. **Arrange Your Visualizations:** Arrange your visualizations on a dashboard in a logical sequence to create a narrative flow. Use layout containers and dashboard objects to organize your visualizations.
5. **Add Interactivity:** Use filters, parameters, and actions to add interactivity to your dashboard. Allow users to explore the data and uncover insights on their own.
6. **Provide Context:** Use annotations, labels, and tooltips to provide context for your visualizations. Explain key points and help users understand the data.
7. **Tell Your Story:** Use the dashboard caption and text boxes to introduce your story and guide users through the key insights and findings.
8. **Engage Your Audience:** Use storytelling techniques such as highlighting key data points, using color and formatting to draw attention, and using a narrative flow to engage your audience.
9. **Conclusion and Call to Action:** Conclude your data story by summarizing the key insights and suggesting actions or next steps based on the data.
10. **Review and Iterate:** Review your data story and gather feedback to improve it. Iterate on your visualizations and narrative to make your story more impactful.

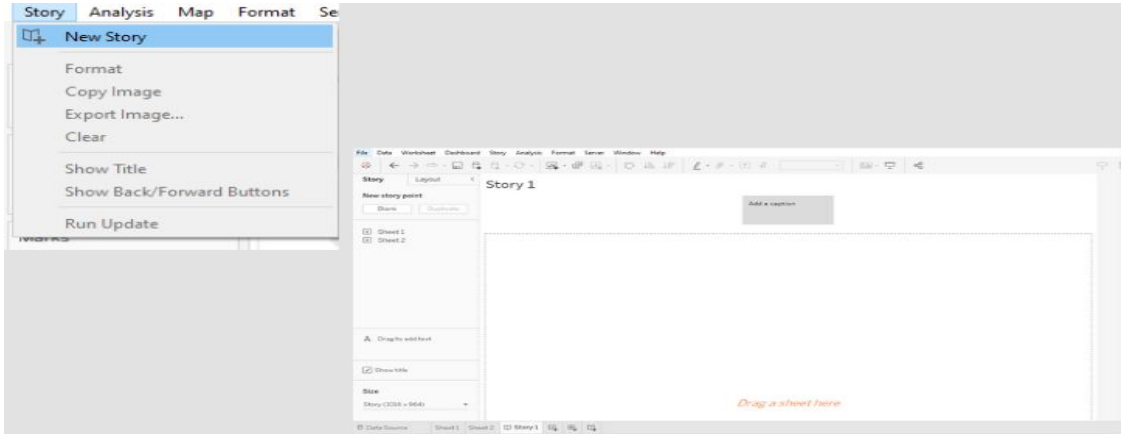
By following these steps, you can create a compelling data story in Tableau that effectively communicates your message and engages your audience.

Creating Your Tableau Story: A Step-by-Step Guide

Creating your very Tableau story can be very interesting. In this section, I will walk you through the steps.

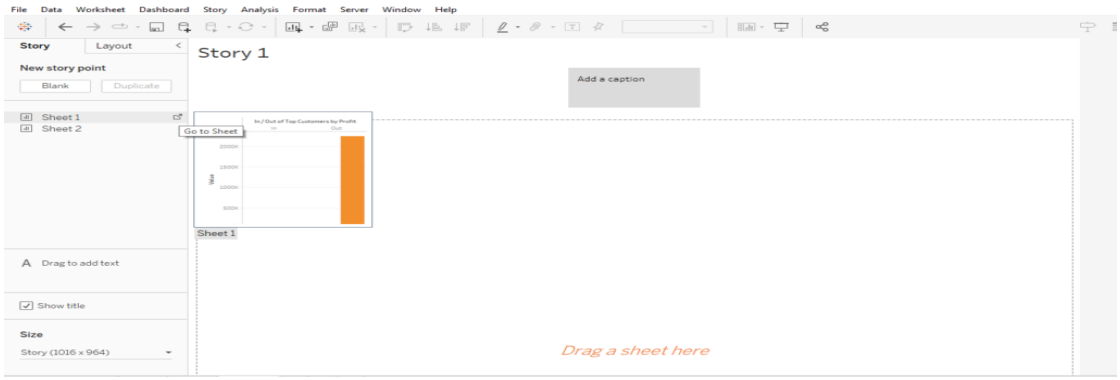
1. Open a New Story Tab

To start with, open Tableau and click on the “New Story” icon. Select “Story > New Story.” This will create a blank canvas where you can now create your story.



2. Add Worksheets or Dashboards

After creating a story tab, the next thing is to add worksheets and dashboards (on the left pane) by dragging and dropping the desired sheet onto the blank canvas. This is your first story point, a unit in your whole story.



3. Create Story Points

Now that you have added your first worksheet, the next thing is to create story points. These story points will serve as the basic components of your Tableau story, as they lead your audience through.

To create story points, you can either duplicate an existing one or start from scratch. When duplicating, it maintains all the details from the original story point, this includes charts, captions, and annotations.

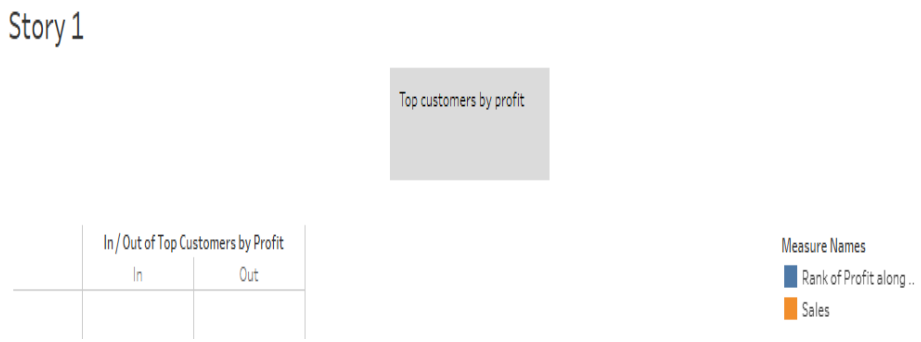
To duplicate, right-click on the story point and select “Duplicate”.

4. Add Context with Captions

Now, to enhance your visuals and keep your audience better informed, you should add captions. Captions provide context and guide the understanding of your audience.

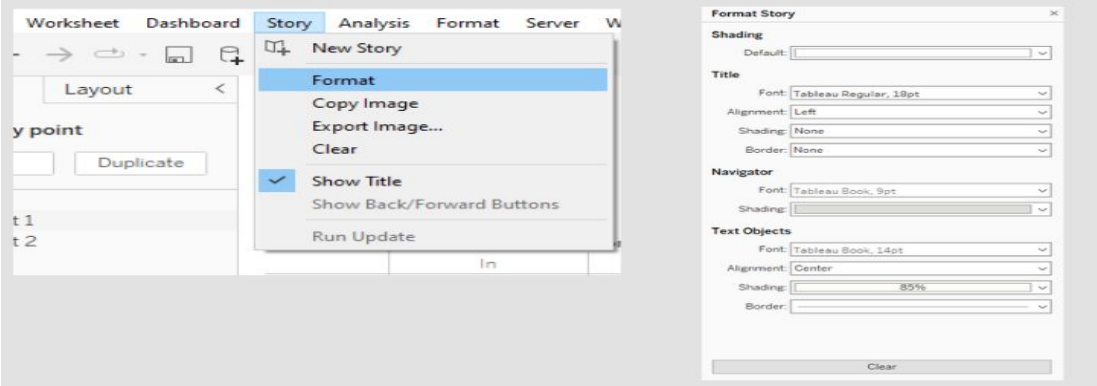
PS: Don’t forget to always keep your captions concise, with one or two sentences.

Just click the caption box, and write your desired caption.



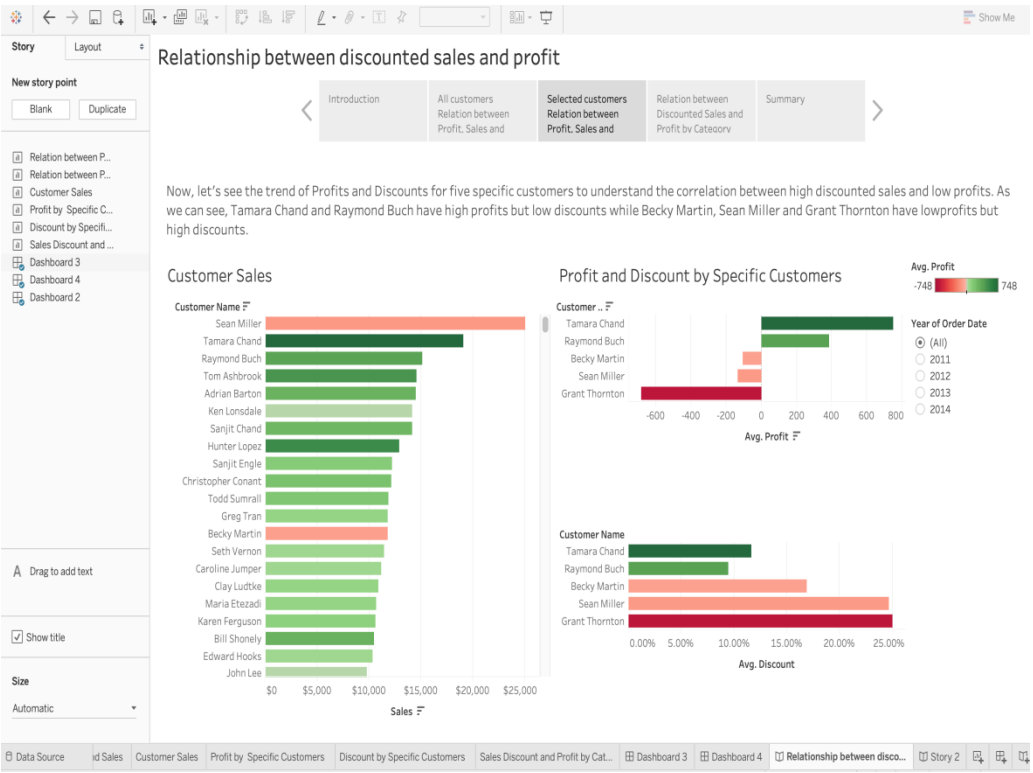
5. Format Your Story

Finally, navigate to the menu bar and select “Story > Format” to modify the fonts, shading, alignment, and borders of your story elements, paying attention to your audience.



To remove certain elements, such as chart annotations, you can right-click on them and select “Remove.” You can also Click “X” on the story toolbar to delete.

EXAMPLE:



Best Practices for Creating Effective Tableau Stories

Tableau storytelling is an endless journey, and for your story to stand out, there are some tips and best practices you must follow. They include:

1. Write Captivating Captions

To capture the attention of your audience, always make use of concise captions. These captions will serve as pointers, giving the audience a sense of what lies ahead.

2. Make Use of Annotations

Annotations are secret weapons that further aid viewer comprehension. They are usually put alongside key data points, clarifying trends, correlations, and anomalies that might not be easily understood.

Annotations can transform your visuals, ensuring your audience fully understands the

data.

3. Enhancing Your Visualization

Visual appeal plays a crucial role in retaining your audience's attention. Hence, dive deep into the Tableau formatting options, and adjust fonts to ensure legibility.

You can also try out different color shades to highlight data contrasts, align elements for a clean look, and add edges to make things clear.

4. Custom Resize for Universal Access

In storytelling, one size does not fit all. So, always optimize your story size by choosing the right dimensions that are suitable for your audience, whether it's a high-resolution screen or a smaller device.

5. Keep Modifying to Create the Perfect Story

Creating a Tableau Story is a repetitive process. So, as you go, you must keep modifying elements to align with your ideal story.

If some charts or annotations no longer help the story make sense or have an impact, do not hesitate to take them out. This makes sure your story stays focused, clear, and impactful.

OVERVIEW OF THE TABLEAU ECOSYSTEM:

The Tableau ecosystem consists of a variety of products and services designed to help organizations analyze, visualize, and share data. Here's an overview of the key components of the Tableau ecosystem:

1. **Tableau Desktop:** Tableau Desktop is the primary authoring tool used to create interactive data visualizations and dashboards. It allows users to connect to various data sources, create visualizations using a drag-and-drop interface, and share their work with others.
2. **Tableau Server:** Tableau Server is an enterprise platform that allows organizations to publish, share, and collaborate on Tableau content. It provides a secure and scalable way to distribute Tableau workbooks and data sources to a large number of users across an organization.
3. **Tableau Online:** Tableau Online is a cloud-based version of Tableau Server. It offers similar functionality to Tableau Server but is hosted and managed by Tableau in the cloud. It is a good option for organizations that want to use Tableau without managing the infrastructure.
4. **Tableau Public:** Tableau Public is a free version of Tableau that allows anyone to publish interactive data visualizations to the web. Visualizations created with Tableau Public are publicly accessible and can be embedded on websites or shared via social media.
5. **Tableau Prep:** Tableau Prep is a tool for preparing and cleaning data for analysis. It allows users to connect to, combine, and clean data from multiple sources using a visual interface. The cleaned data can then be used in Tableau Desktop for analysis and visualization.
6. **Tableau Mobile:** Tableau Mobile is a mobile app that allows users to access and interact with Tableau visualizations on their mobile devices. It provides a touch-optimized experience for viewing and analyzing data on the go.

7. **Tableau Extensions:** Tableau Extensions are add-ons that extend the functionality of Tableau Desktop and Tableau Server. They allow users to integrate with third-party applications, add custom visualizations, and enhance the overall Tableau experience.
8. **Tableau Public Gallery and Community:** Tableau Public Gallery is a repository of visualizations created by the Tableau Public community. It showcases a wide range of visualizations and provides inspiration for users. The Tableau Community is a forum where users can ask questions, share ideas, and collaborate with others.

Overall, the Tableau ecosystem provides a comprehensive set of tools and services for data analysis and visualization, enabling organizations to gain valuable insights from their data and make informed decisions.

FURTHER LEARNING OPPORTUNITIES:

To further your learning in Tableau and data visualization, you can explore the following opportunities:

1. **Tableau Training and Certification:** Tableau offers a variety of training courses and certification programs to help you master Tableau. These courses cover topics such as data visualization best practices, advanced analytics, and dashboard design.
2. **Online Courses:** Platforms like Coursera, Udemy, and LinkedIn Learning offer online courses on Tableau and data visualization. These courses range from beginner to advanced levels and cover a wide range of topics.
3. **Books:** There are many books available on Tableau and data visualization that can help deepen your understanding of the subject. Some recommended titles include "Tableau Your Data!" by Daniel G. Murray and "Communicating Data with Tableau" by Ben Jones.
4. **Webinars and Workshops:** Attend webinars and workshops hosted by Tableau and other organizations to learn about the latest trends and techniques in data visualization. These events often feature expert speakers and provide hands-on learning opportunities.
5. **Community and Forums:** Join the Tableau Community and participate in forums and user groups to connect with other Tableau users, share ideas, and learn from their experiences.
6. **Data Visualization Challenges:** Participate in data visualization challenges such as the Makeover Monday project, where participants redesign visualizations using Tableau and other tools. This can help you practice your skills and get feedback from the community.
7. **Data Visualization Blogs and Websites:** Follow data visualization blogs and websites to stay updated on the latest trends, tools, and techniques in the field. Some recommended blogs include Tableau Public, Datawrapper, and Information is Beautiful.

By taking advantage of these learning opportunities, you can continue to improve your Tableau skills and become a more proficient data storyteller.