PSGR
Krishnammal College for Women

DEPARTMENT OF BCA

DATA ANALYTICS - DATA VISUALIZATION TOOLS - AP21SBP3

NAME : _____

CLASS : _____

REGISTER NUMBER : _____

YEAR : _____

DEPARTMENT OF BCA

DATA ANALYTICS - DATA VISUALIZATION TOOLS - AP21SBP3

Certified that this is a bonafide record work done by_____of III BCA during the year of 2023 - 2024

REGISTER NUMBER: _____

STAFF INCHARGE **HEAD OF THE DEPARTMENT**

Submitted for the practical examination held on_____at PSGR Krishnammal College for Women

INTERNAL EXAMINER

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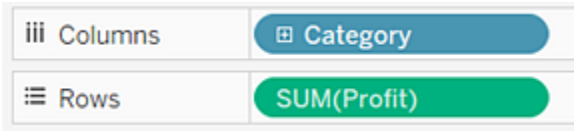
EX: 1 Create a Bar Chart

Date:

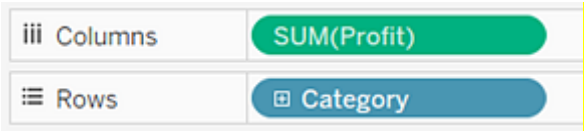
Aim:

To create a bar chart that displays total sales over a four-year period.

Creates Vertical Bars

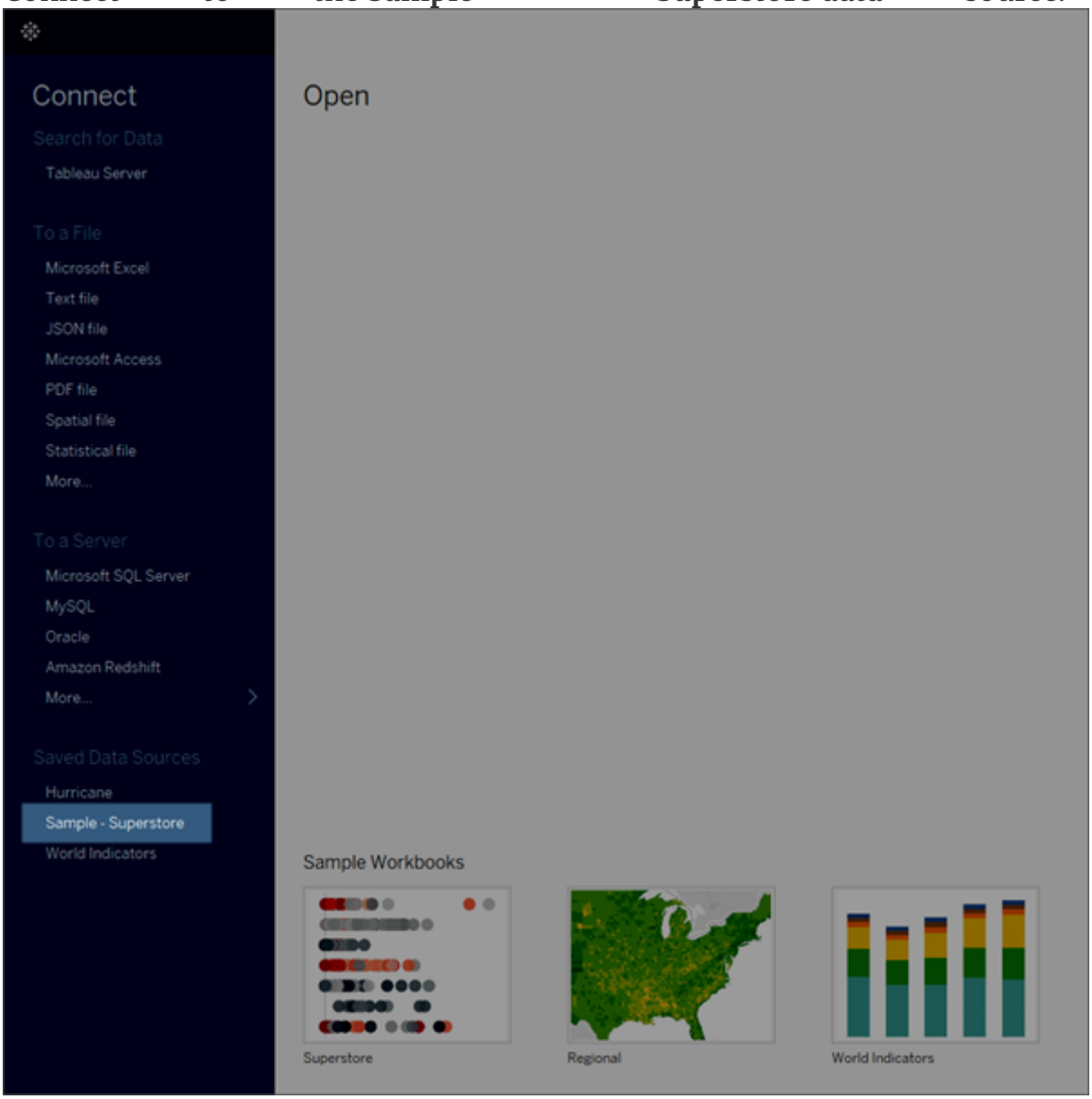


Creates Horizontal Bars



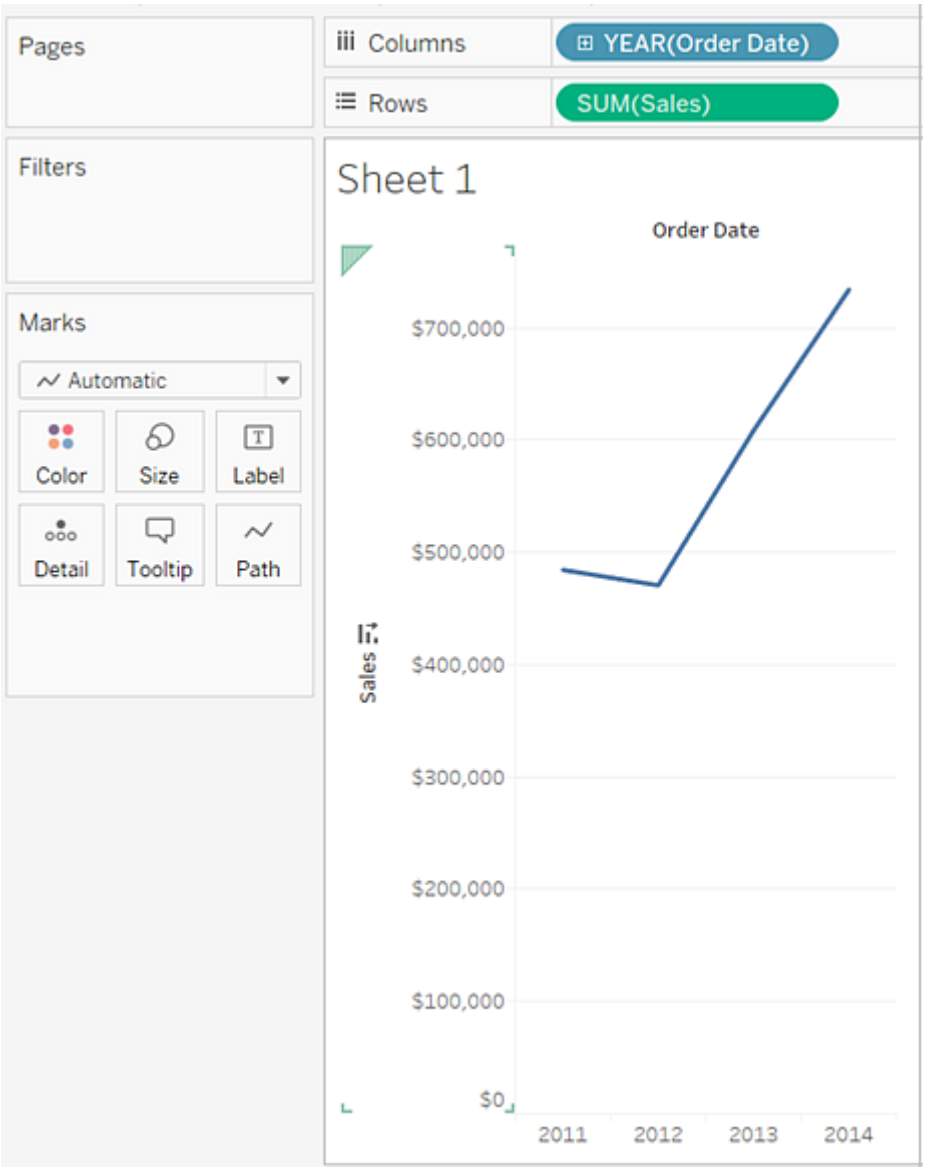
Algorithm:

1. Connect to the **Sample - Superstore** data source.

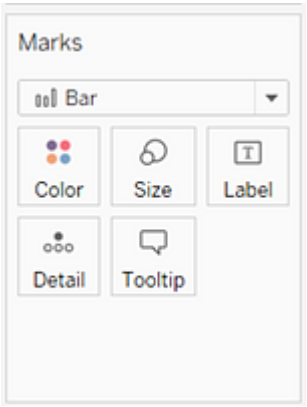


2. Drag the Order **Date** dimension to **Columns** and drag the **Sales** measure to **Rows**.

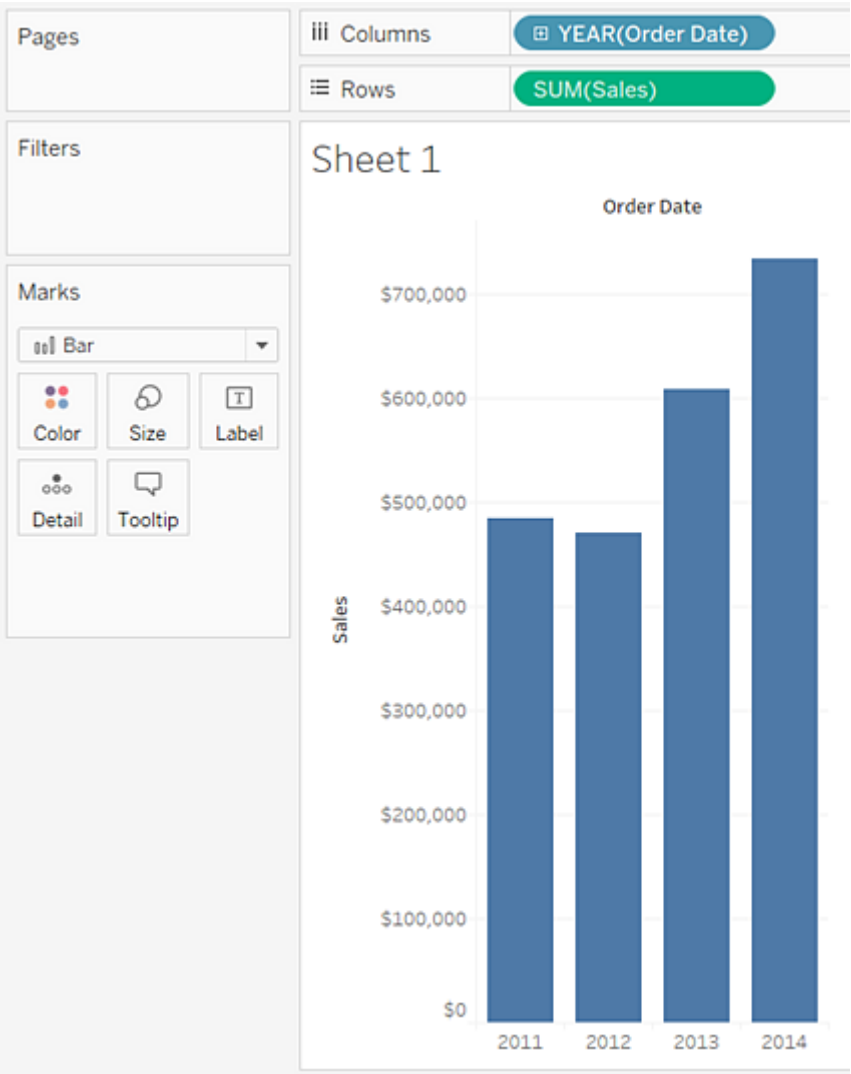
   The data is aggregated by year and column headers appear. The Sales measure is aggregated as a sum and an axis is created, while the column headers move to the bottom of the view. Tableau uses **Line** as the mark type because you added the date dimension.



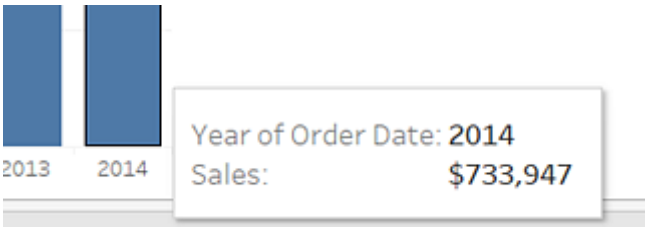
3. On the **Marks** card, select **Bar** from the drop-down list.



The view changes to a bar chart.

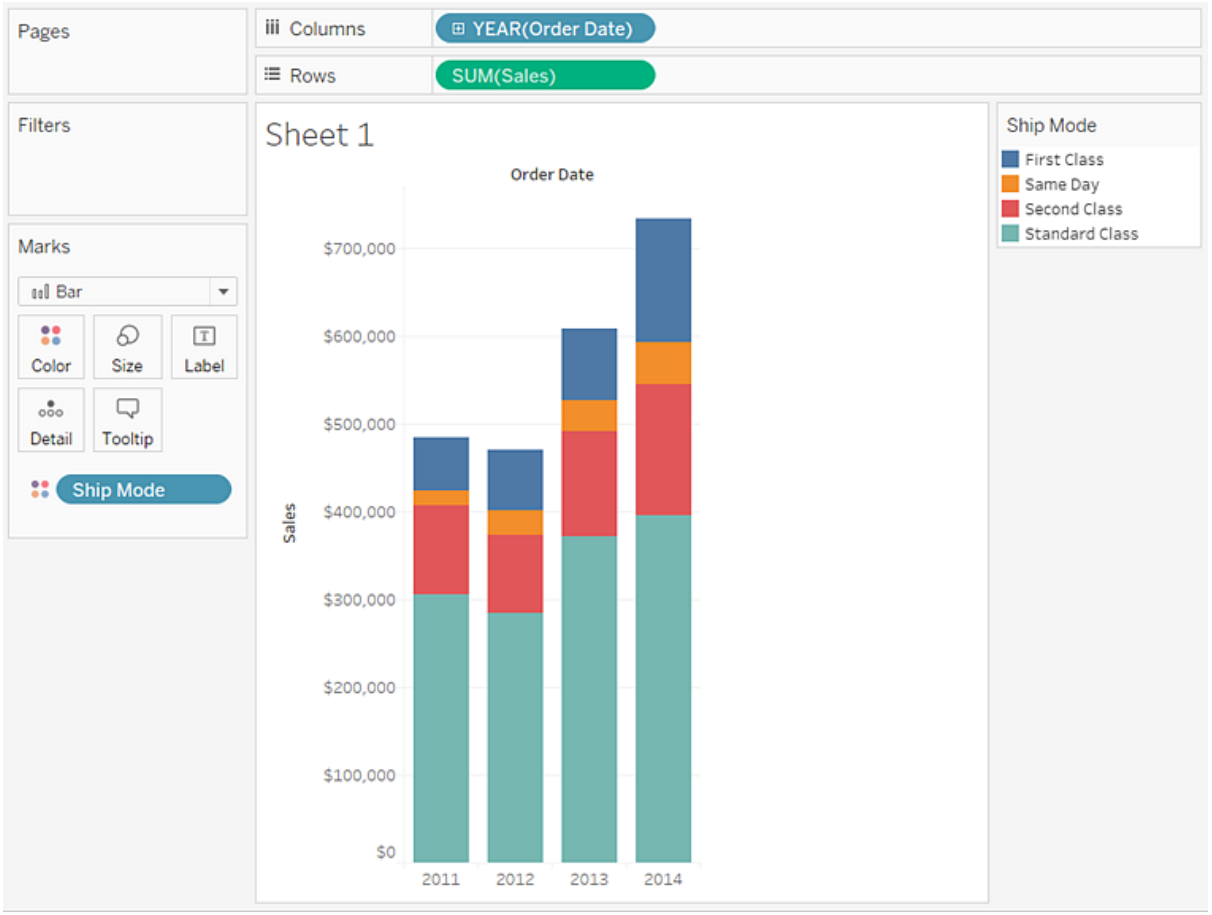


The marks (which are bars in this case) are vertical because the axis is vertical. The length of each mark represents the sum of the sales for that year. The actual numbers you see here might not match the numbers you see—the sample data changes from time to time.

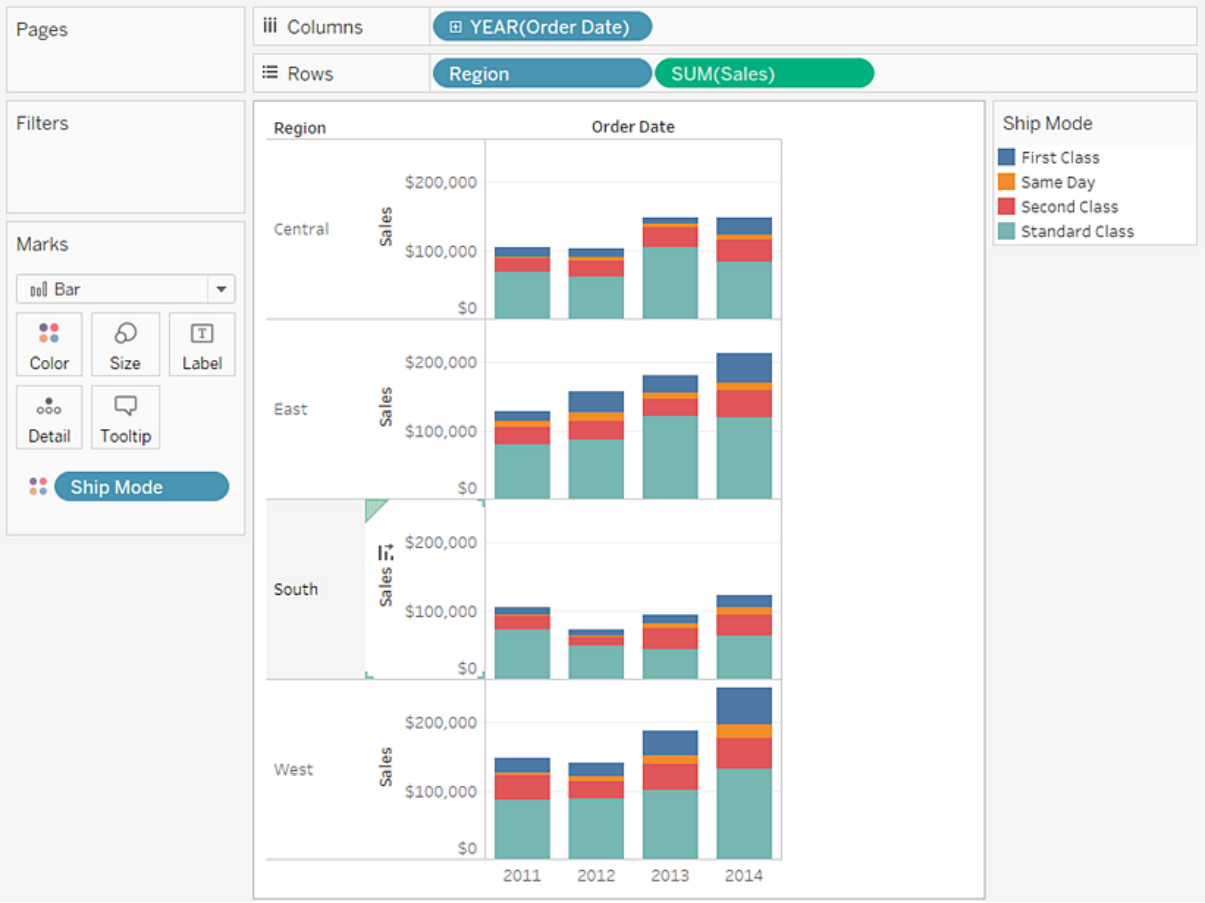


4. Drag the **Ship Mode** dimension to **Color** on the **Marks** card.

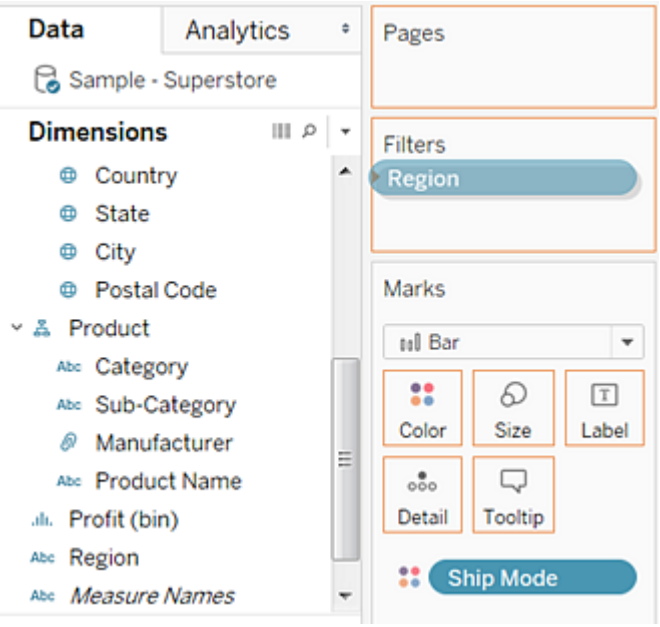
   The view shows how different shipping modes have contributed to total sales over time. The ratios look consistent from year to year.



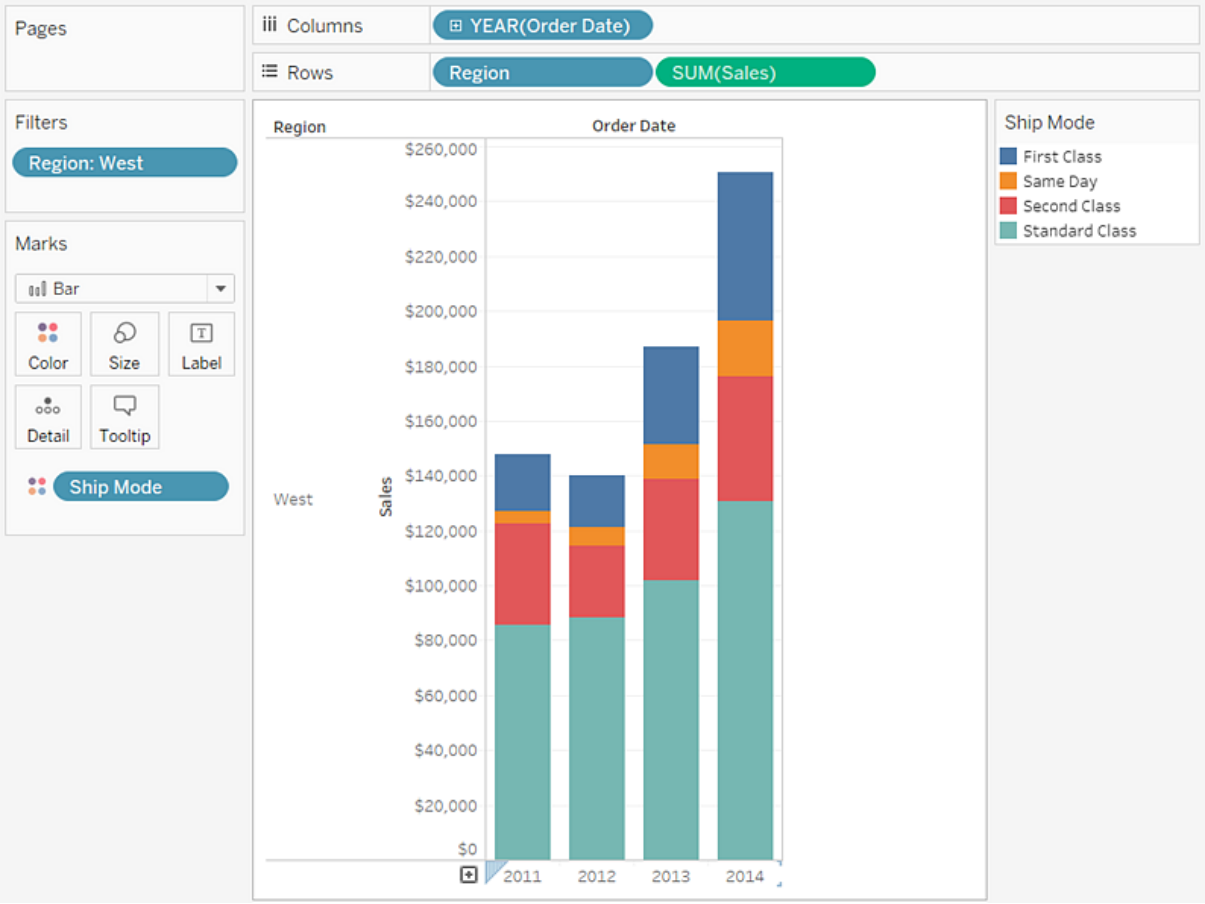
5. Drag the **Region** dimension to **Rows**, and drop it to the left of **Sales** to produce multiple axes for sales by region.



6. To view data in the West region only, you can filter out the other regions. To do this, drag the **Region** dimension again, this time from the **Data** pane to the **Filters** shelf.



7. In the Filter [Region] dialog box, clear the **Central**, **East**, and **South** check boxes, and then click **OK**.

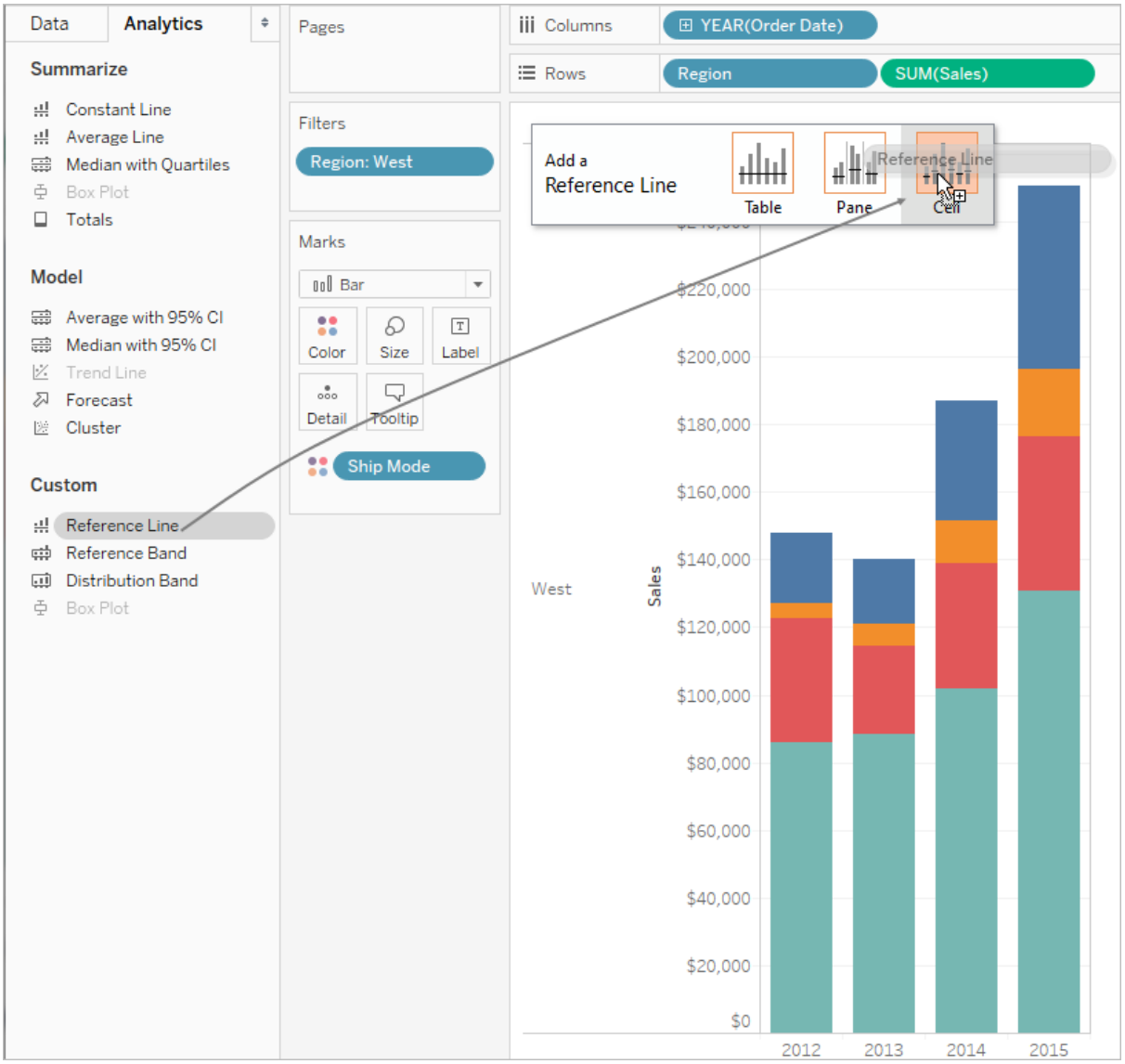


Add Totals To Stacked Bars

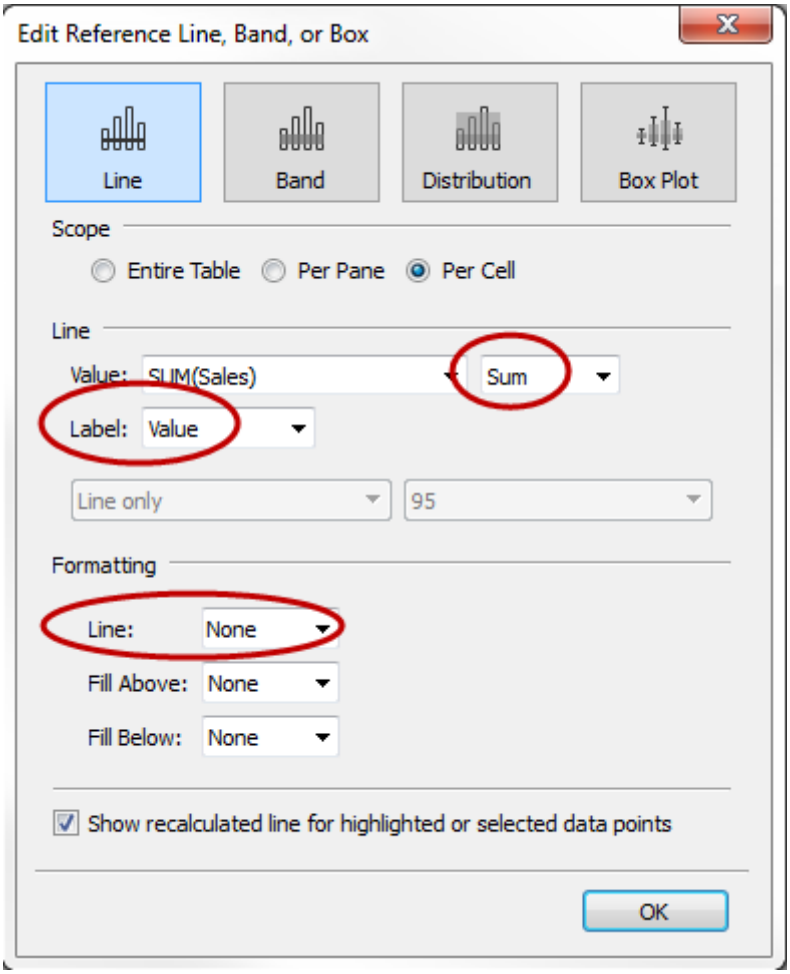
Adding totals to the tops of bars in a chart is sometimes as simple as clicking the **Show Mark Labels** icon in the toolbar.

- when the bars are broken down by color or size, each individual segment would labeled, rather than the total for the bar.
- With a few steps, you can add a total label at the top of every bar even when the bars are subdivided as in the view you just created.

1. From the **Analytics** pane, drag a **Reference Line** into the view and drop it on **Cell**.

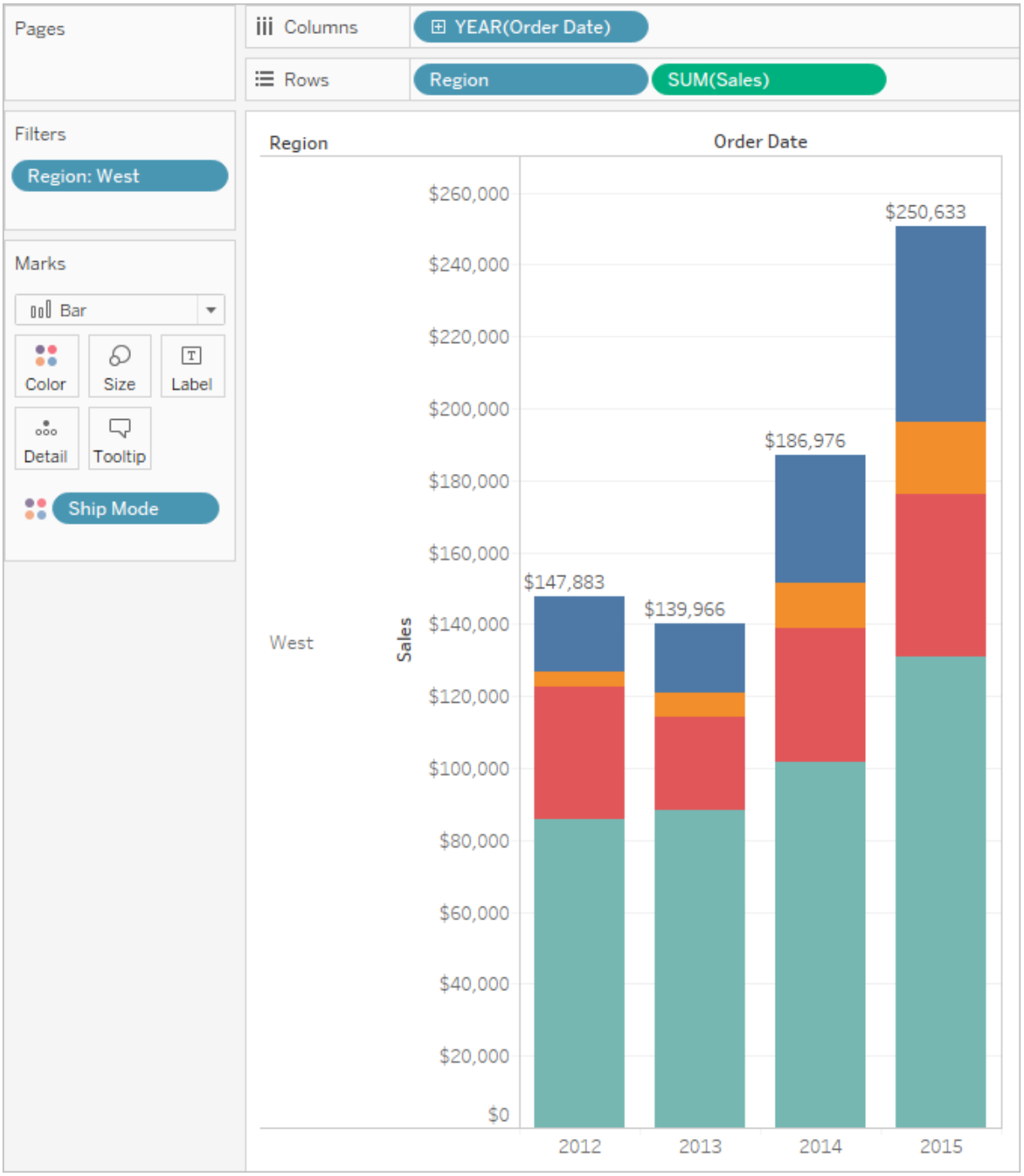


2. In the Edit Line, Band, or Box dialog box, set the aggregation for **SUM(Sales)** to **Sum**, set **Label** to **Value**, and set **Line** under Formatting to **None**:



Then click **OK** to close the Edit Reference Line, Band, or Box dialog box.

Your view now has currency totals at the top of each bar:

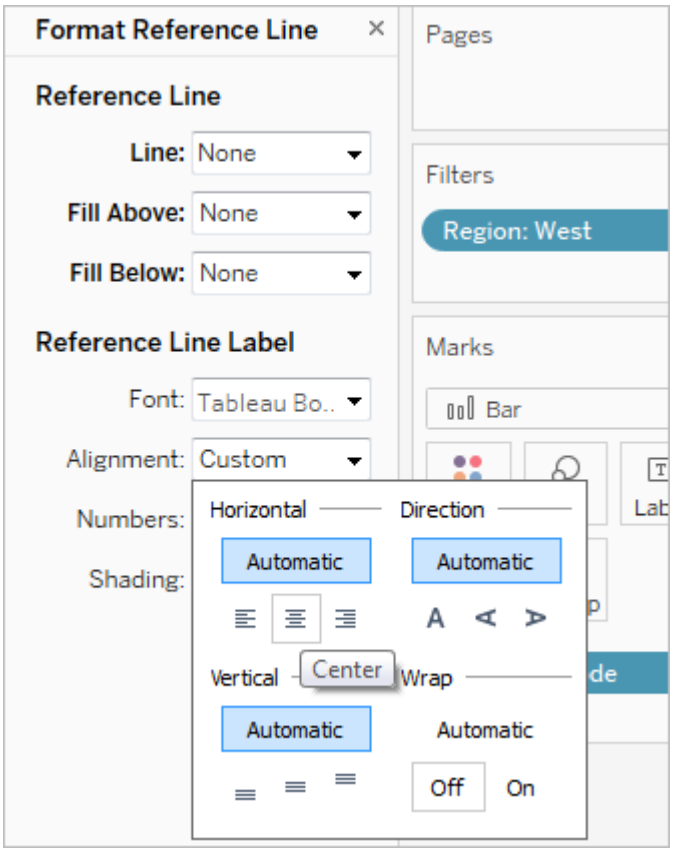


You may need to adjust the view to make it look just right.

If the bars are too narrow, the numbers are truncated; to fix this, press Ctrl + Right on the keyboard to make the bars wider. Or if you want to center the totals over the bars—by default, they are left-aligned. Do the following:

3. Right-click any of the totals on the bar chart and select **Format**.

4. In the Format window, in the **Reference Line Label** area, open the **Alignment** control and select the Center option for Horizontal alignment:



Result: Thus, Bar chart is created and executed.

Ex : 2 Create a Pie Chart

Date :

Aim:

To create a pie chart view that shows how different product categories contribute to total sales.

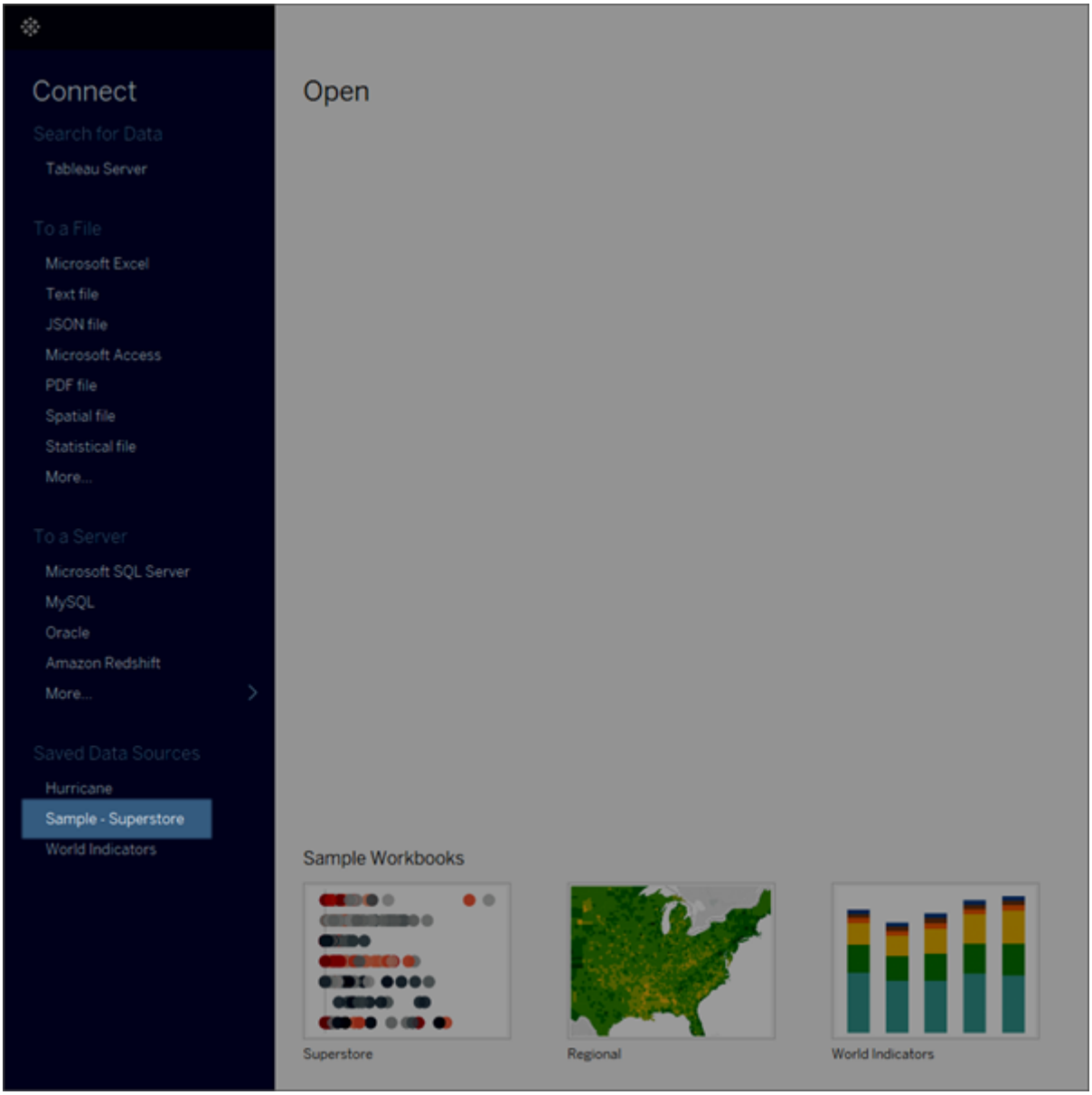
Use pie charts to show proportions of a whole.

The basic building blocks for a pie chart are as follows:

Mark type:	Pie
Color:	Dimension
Angle:	Measure

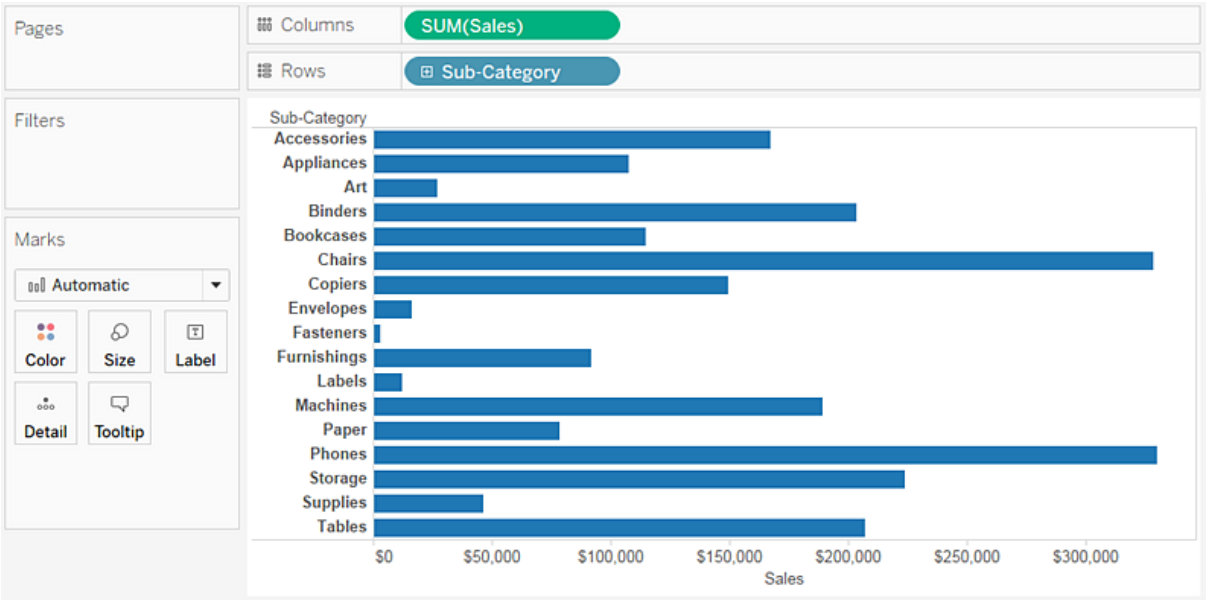
Algorithm:

1. Connect to the **Sample - Superstore** data source.



2. Drag the **Sales** measure to **Columns** and drag the **Sub-Category** dimension to **Rows**.

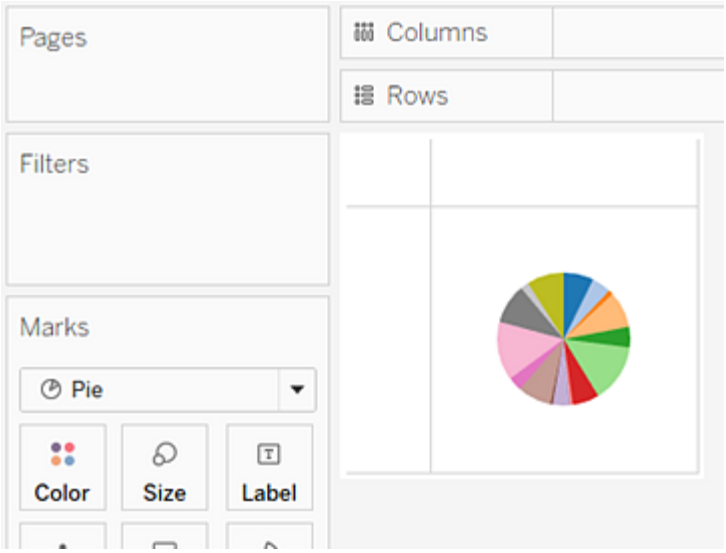
   Tableau aggregates the **Sales** measure as a sum. By default, Tableau displays a bar chart.



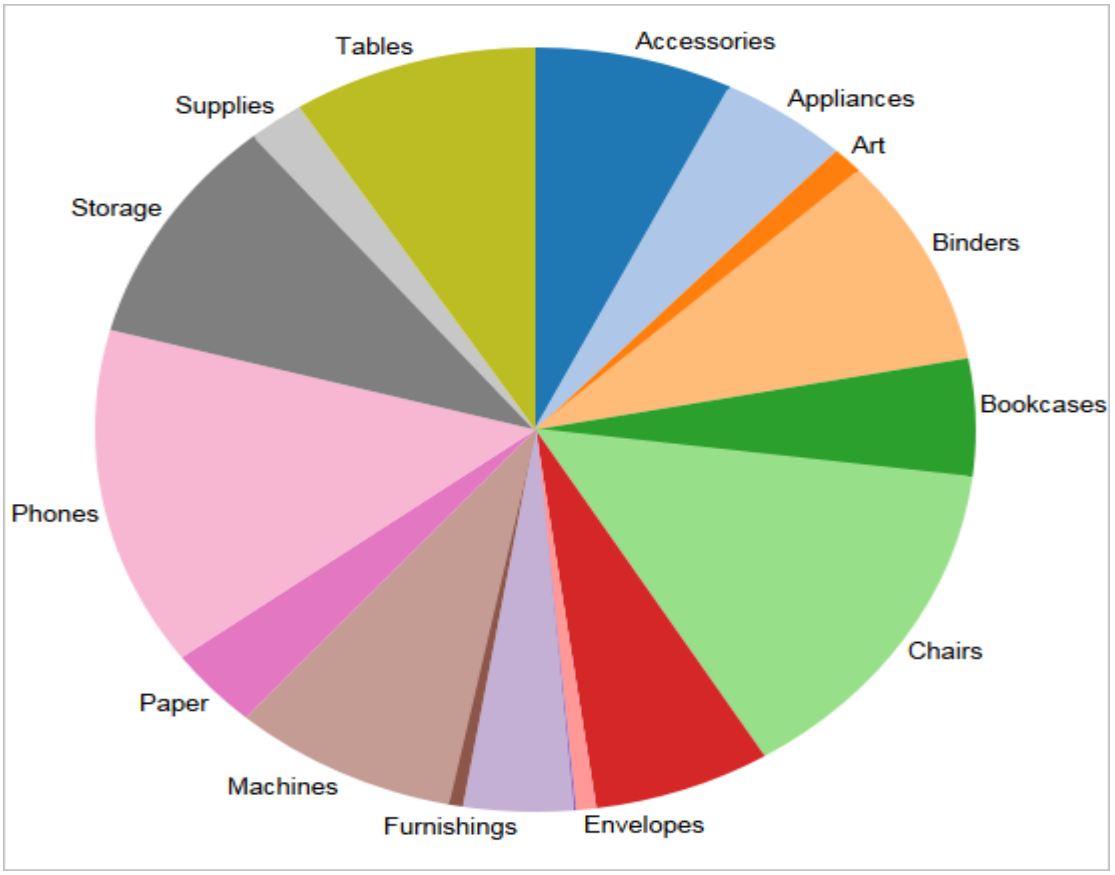
3. Click **Show Me** on the toolbar, then select the pie chart type. Pie charts require at least one or more dimensions and one or two measures. Aggregate fields, such as Profit Ratio, don't contribute to those requirements.

The result is a rather small pie. To make the chart bigger, navigate to the

Fit menu in the toolbar and select **Entire View.**



4. Add labels by dragging the **Sub-Category** dimension from the **Data** pane to **Label** on the **Marks** card.



Result: Thus, Pie Chart is created and executed.

Ex : 3 Create a Scatter Chart

Date:

Aim:

To use scatter plots and trend lines to compare sales to profit.

Creates a Simple Scatter Plot

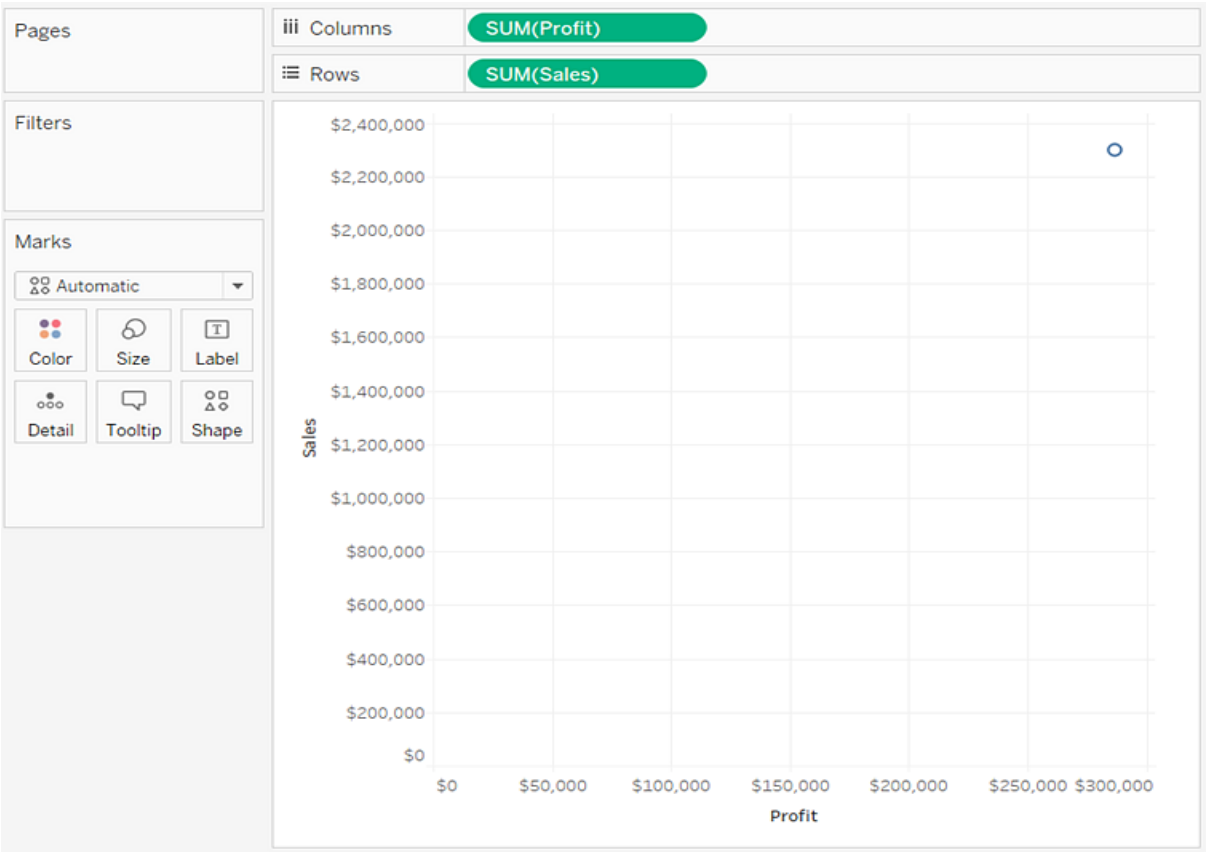
Creates Matrix of Scatter Plots

Algorithm

1. Open the **Sample - Superstore** data source.
2. Drag the **Profit** measure to **Columns**.

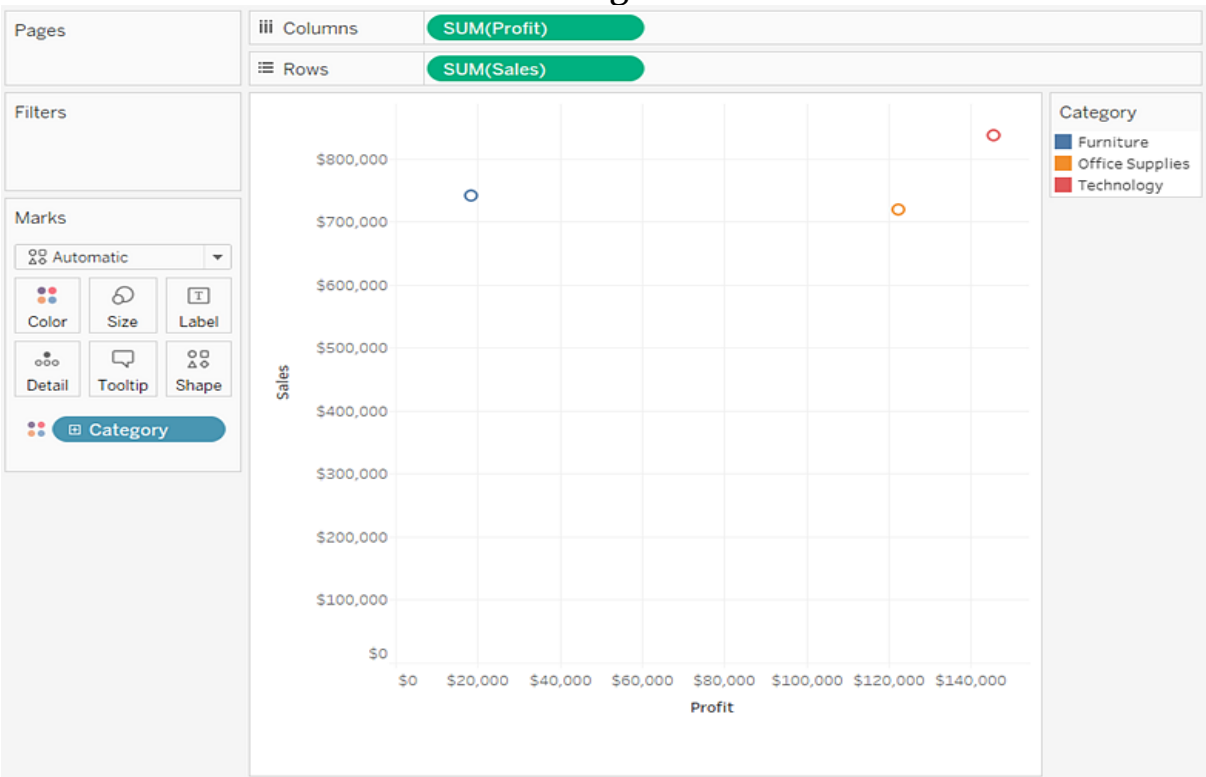
   Tableau aggregates the measure as a sum and creates a horizontal axis.
3. Drag the **Sales** measure to **Rows**.

   Tableau aggregates the measure as a sum and creates a vertical axis.
   Measures can consist of continuous numerical data. When you plot one number against another, you are comparing two numbers; the resulting chart is analogous to a Cartesian chart, with x and y coordinates.
   Now you have a one-mark scatter plot:



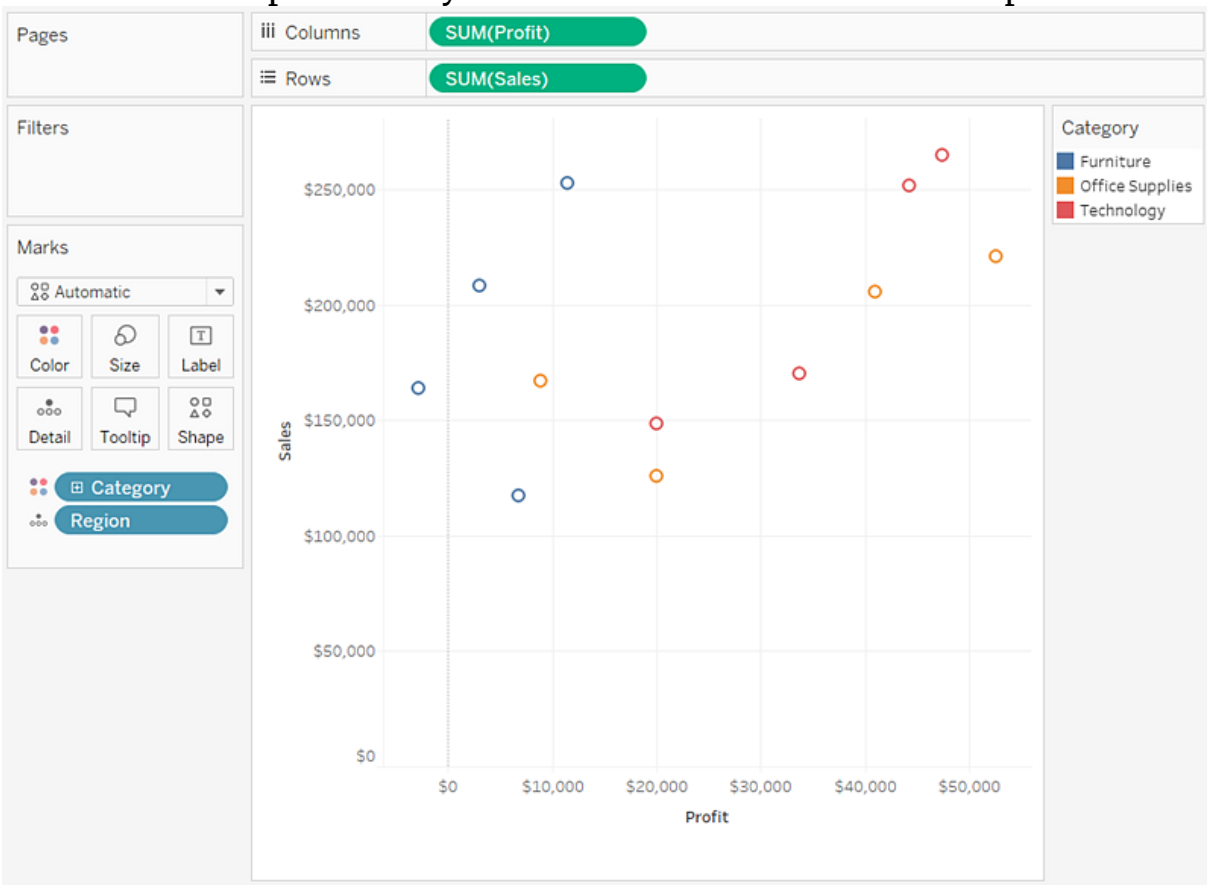
4. Drag the **Category** dimension to **Color** on the Marks card.

   This separates the data into three marks—one for each dimension member—and encodes the marks using color.

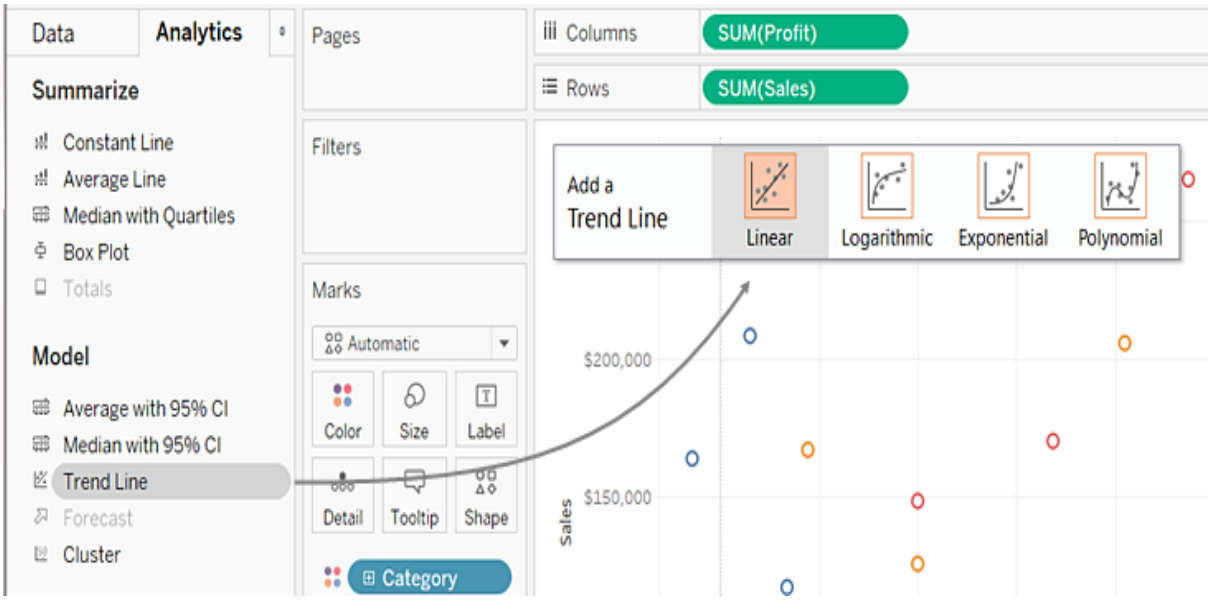


5. Drag the **Region** dimension to **Detail** on the **Marks** card.

- The number of marks is equal to the number of distinct regions in the data source multiplied by the number of departments.

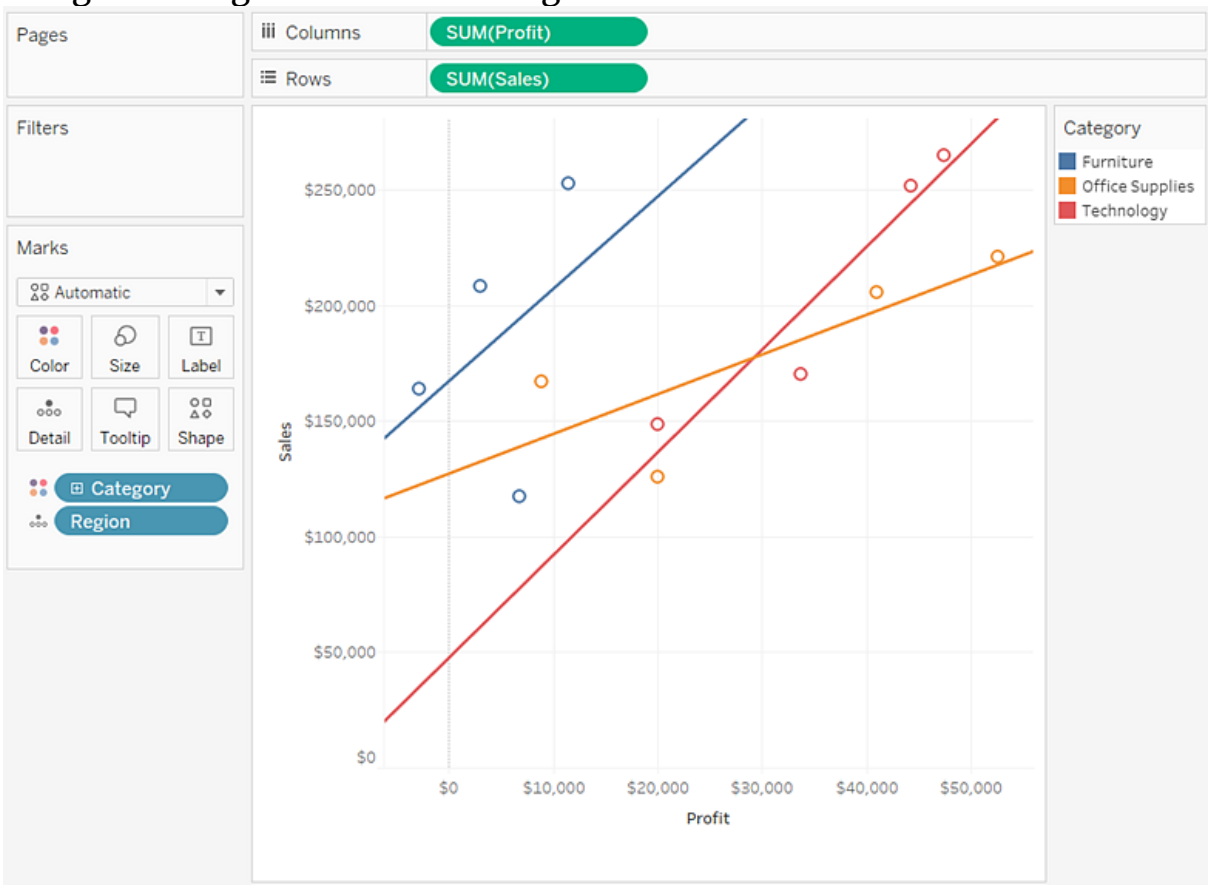


6. To add trend lines, from the **Analytics** pane, drag the **Trend Line** model to the view, and then drop it on the model type.

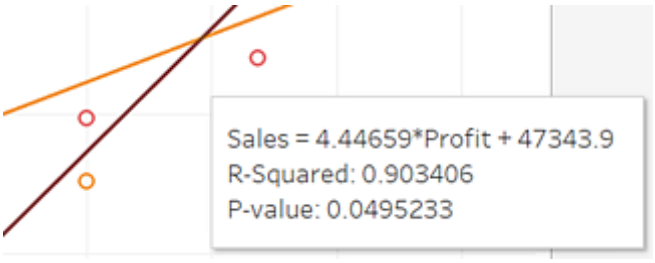


A trend line can provide a statistical definition of the relationship between two numerical values. To add trend lines to a view, both axes must contain a field that can be interpreted as a number—by definition, that is always the case with a scatter plot.

Tableau adds three linear trend lines—one for each color that you are using to distinguish the three categories.



7. Hover the cursor over the trend lines to see statistical information about the model that was used to create the line:



Result: Thus, Scatter chart is created and executed.

Ex : 4 Create a Time Series Chart

Date:

Aim:

To build exponential smoothing models for time series data. Data uses an exponential smoothing model for forecasting (more recent observations are given greater weight), and have a quick drag-n-drop prediction.

To use Tableau to build exponential smoothing models, the dataset must qualify for several prerequisites:

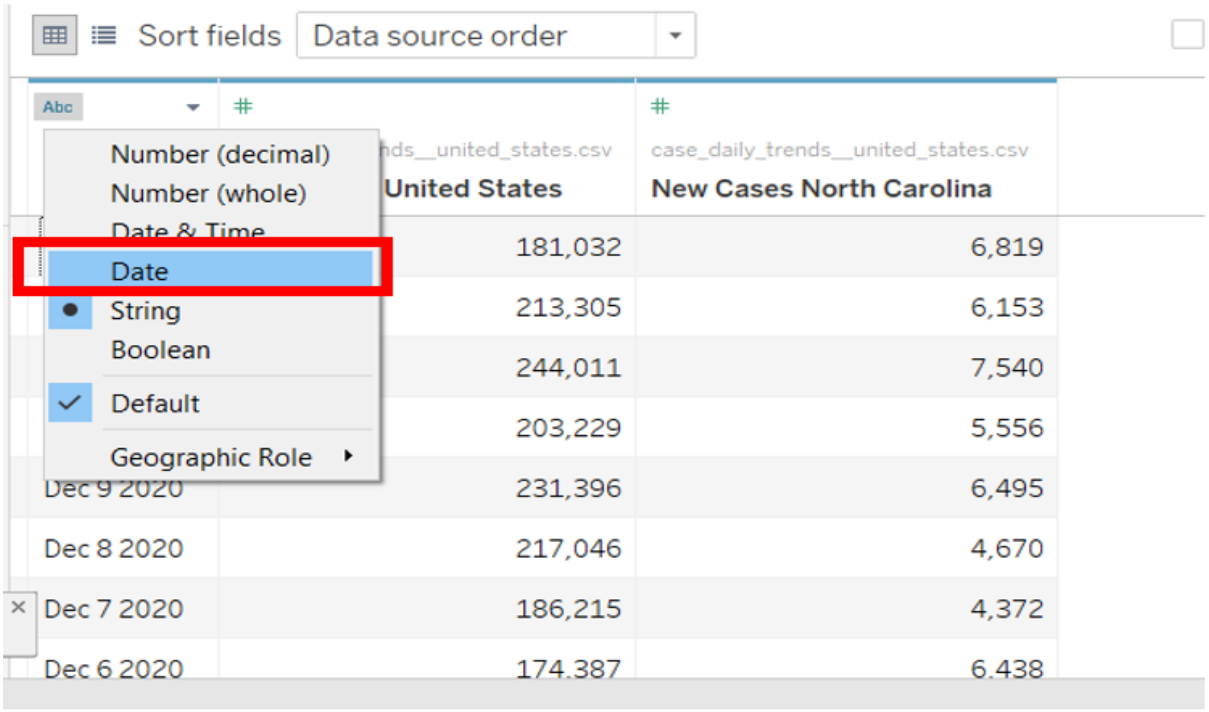
- At least one continuous Date
- At least one measure
- At least five data points
- At least two seasons (if seasonality is involved)

Algorithm:

Step 1. Connect data to Tableau

Open Tableau Desktop and connect the downloaded dataset to Tableau. Combined the data for the United States and North Carolina beforehand

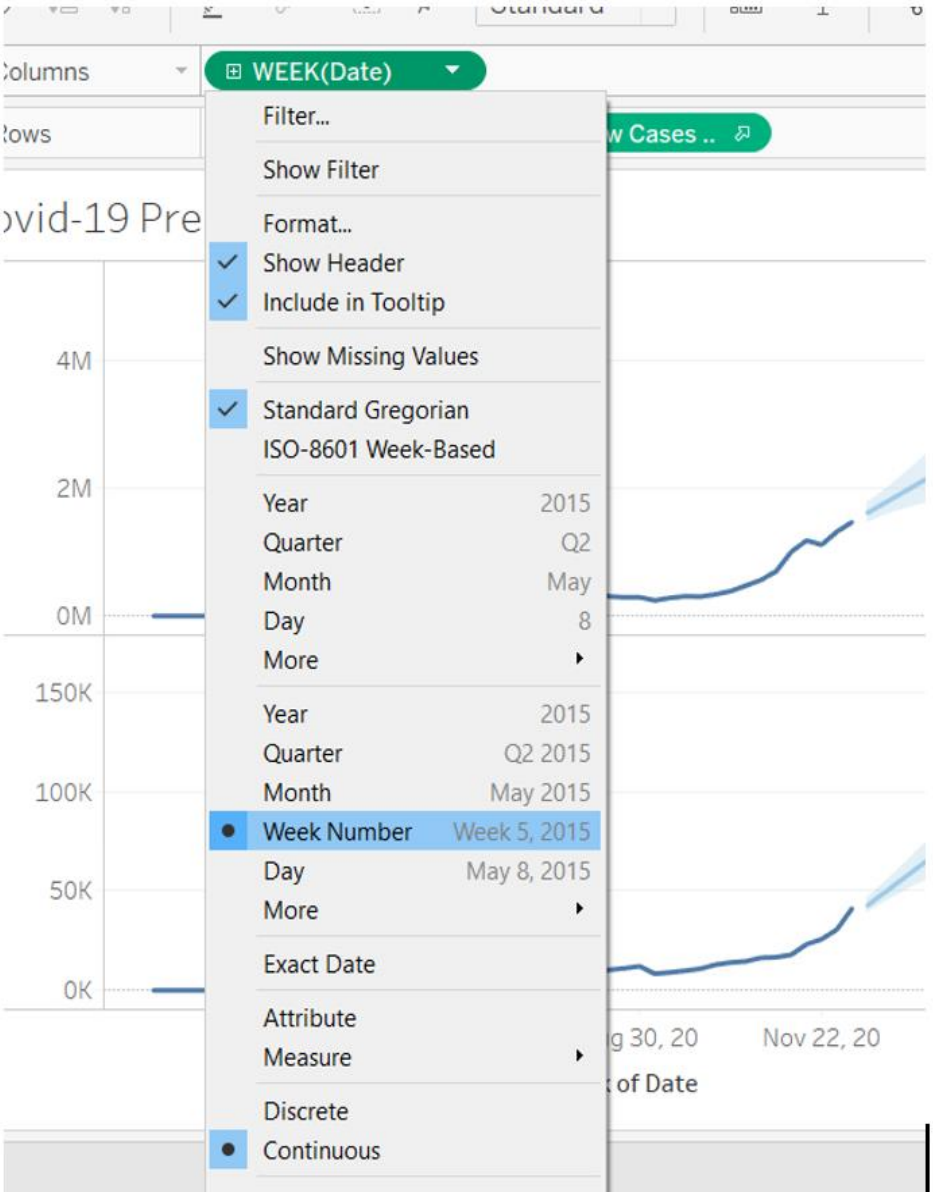
- The Date variable in the dataset is a string. Click the "Abc" on the data column and change the type to "Date."



Step 2. Build a visualization

Go to Sheet 1, drag "Date" to the columns shelf, then drag "New Cases United States" and "New Cases North Carolina" to the rows shelf.

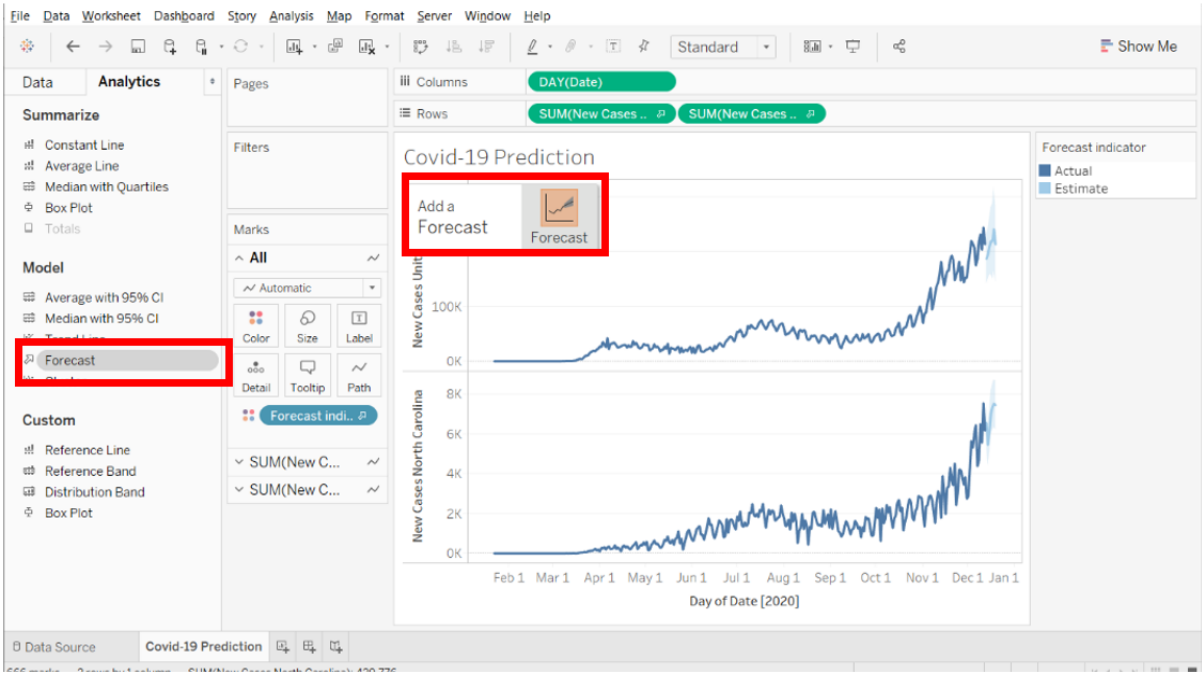
- Date is a dimension in Tableau. we want to see weekly new cases, click the drop-down menu and select the continuous "Week Number" with the format of Week 5, 2015.


Columns
WEEK(Date)
Rows
Filter...
Show Filter
Format...
Show Header
Include in Tooltip
Show Missing Values
Standard Gregorian
ISO-8601 Week-Based
Year 2015
Quarter Q2
Month May
Day 8
More
Year 2015
Quarter Q2 2015
Month May 2015
Week Number Week 5, 2015
Day May 8, 2015
More
Exact Date
Attribute
Measure
Discrete
Continuous
4M
2M
0M
150K
100K
50K
0K
Nov 22, 20
of Date

Step 3. Add forecasting to visualization

- Choose the "Analytics Pane" in the left column and drag "Forecast" to the view. Hover over the Forecast icon in the "Add a Forecast" dialog and make sure you see it turn orange before you drop it into the view.

- If you have multiple measures to compare (in this case, we want to compare US and NC Covid-19 cases), make sure you first select "All" on the marks card so both datasets will be predicted.



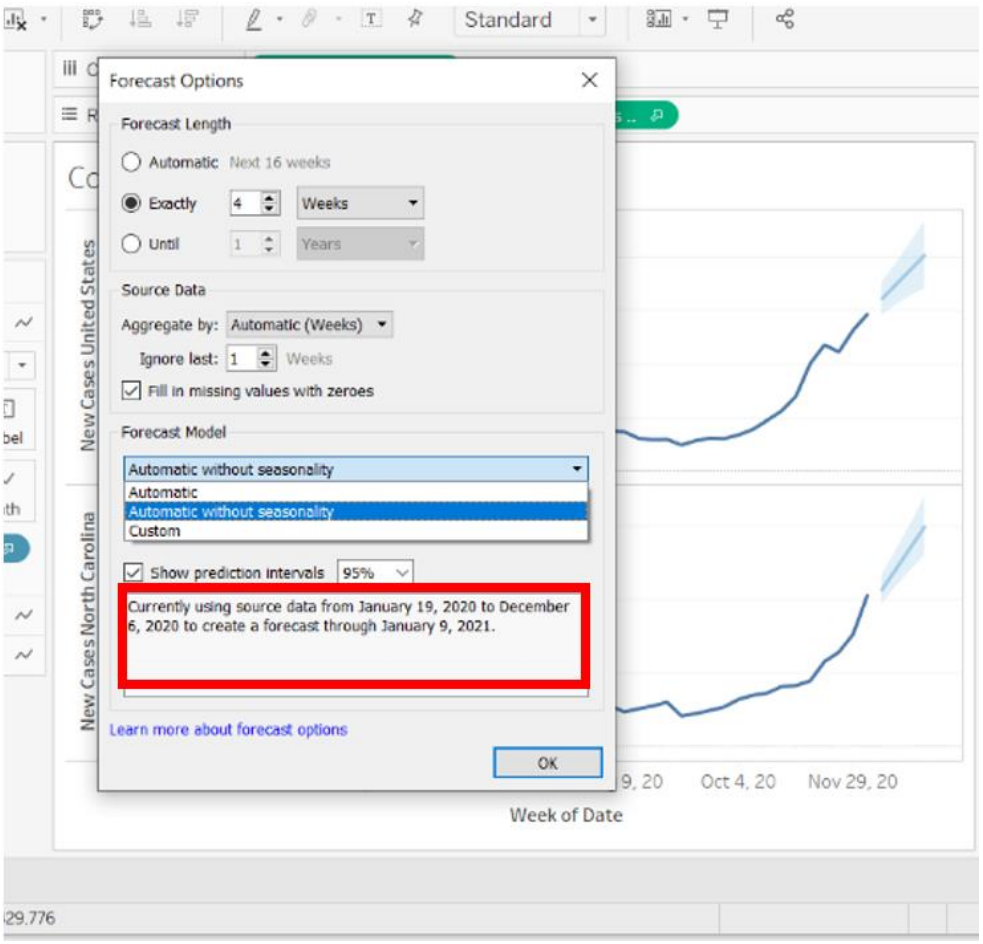
Step 4. Change forecast options (if applicable)

By default, Tableau will automatically choose the best model based on the data provided, but you can change the parameters in the "Forecast Options" dialog.

Right-click anywhere in the view, select "Forecast," then "Forecast Options."

In the "Forecast Option" menu, you can change forecast options as follows:

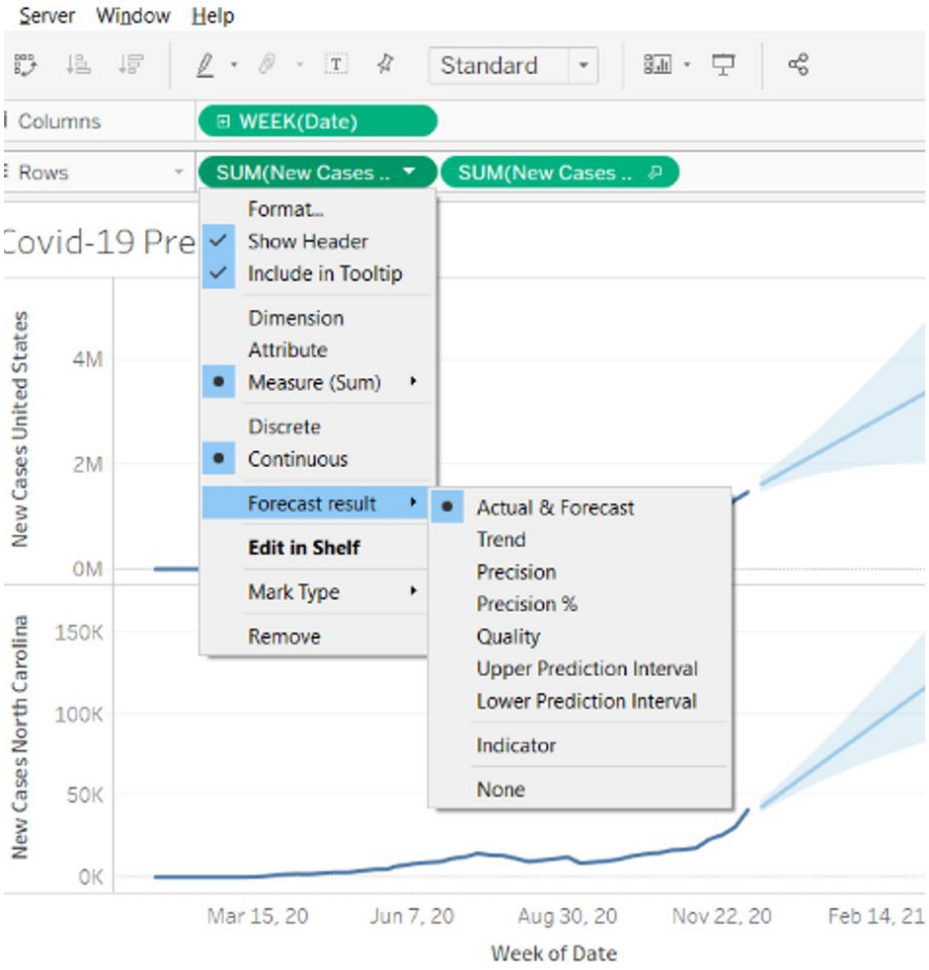
1. **Forecast Length**: Change the length to predict the new case numbers in the next four weeks.
2. **Forecast Model**: Choose "Automatic without seasonality" .
3. **Prediction Interval**: Choose a 90%, 95%, or 99% PI for the model.



Step 5. Change forecast result (optional)

To the forecast result based on need. To do this, right-click on "New Case" pill in the Rows shelf and select Forecast result. Tableau provides a series of different forecast options, including the most common Actual & Forecast, Trend, Precision, Precision %, etc.

For our Covid-19 new cases prediction use the default "Actual & Forecast" option.

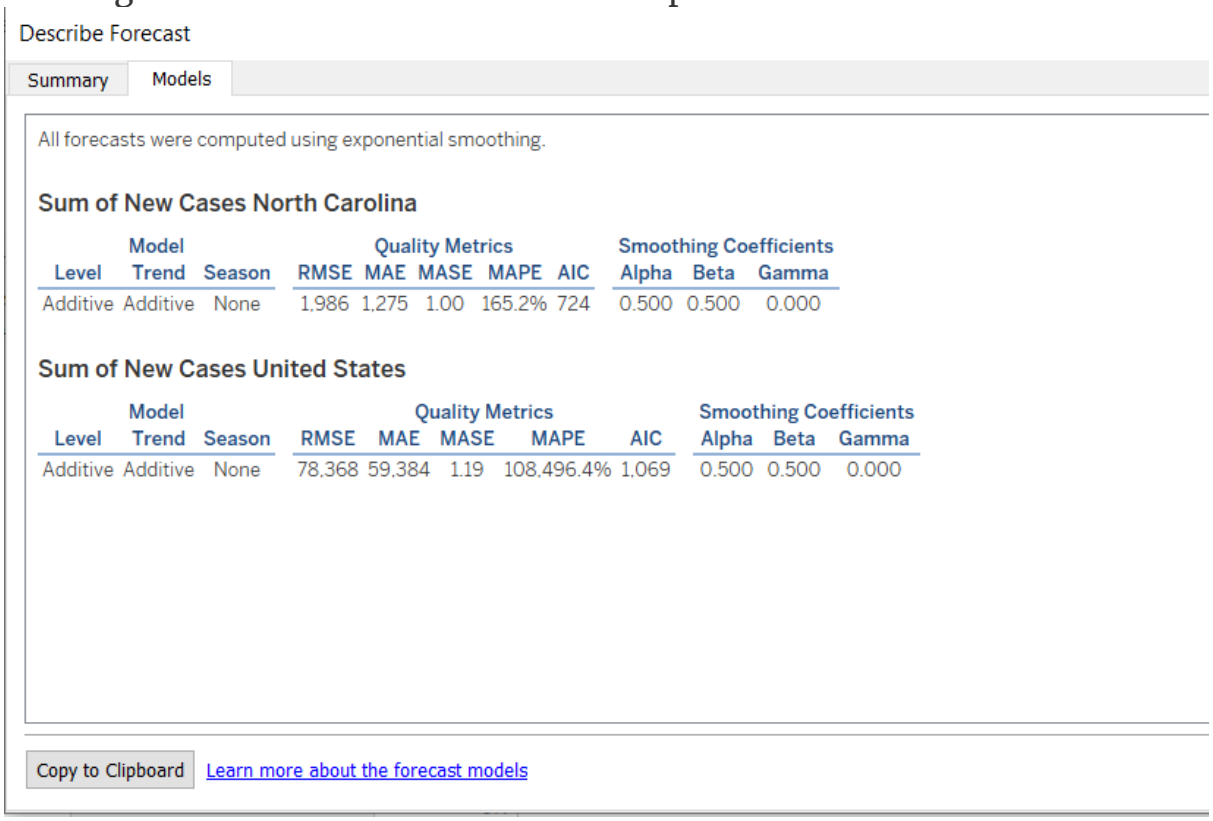


Step 6. Model diagnostic statistics
To Evaluate the model by looking at the metrics provided by Tableau.

In the Analysis menu, click "Forecast" then "Describe Forecast." In the Model tab, you can find all the diagnostic metrics used by Tableau.

In the dialogue box at the bottom of the "Options Used to Create Forecasts," Tableau indicates that it uses the last week's data as the hold-out sample, which will evaluate the model's performance.

Clicking on the Model tab provides additional information



Result: Thus, Time Series Chart is created and executed.

Ex : 5 Create a Bullet Chart

Date:

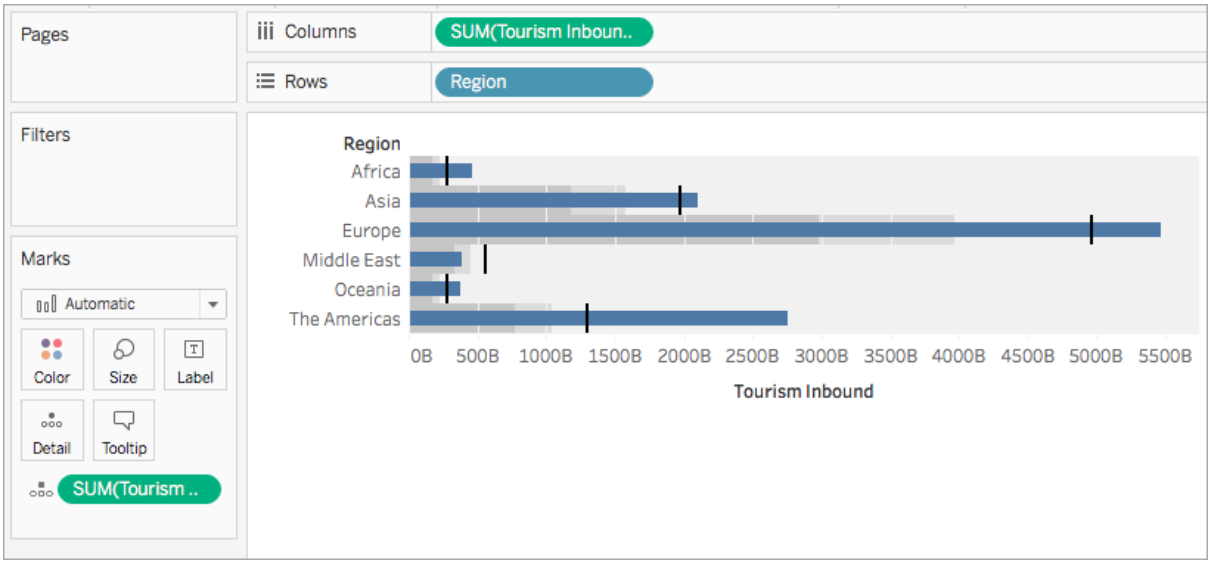
Aim:

Single bullet graph showing how actual sales compared to estimated sales.

Algorithm:

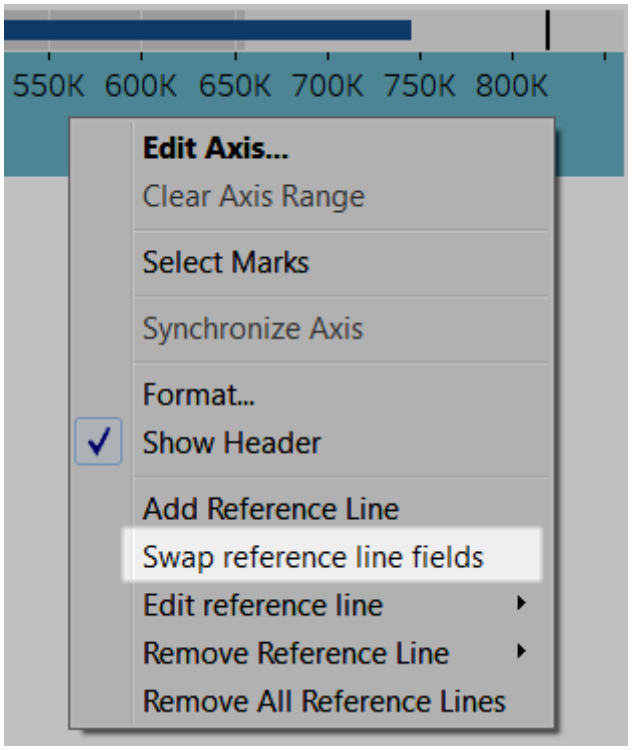
1. Open Tableau Desktop and connect to the **World Indicators** data source.
2. Navigate to a new worksheet.
3. Hold down Shift on your keyboard and then, on the **Data** pane, under **Development** select **Tourism Inbound** and **Tourism Outbound**.
4. In the upper-right corner of the application, click **Show Me**.
5. In Show Me, select the **Bullet Graph** image.
6. Click **Show Me** again to close it.
7. From the **Data** pane, drag **Region** to the **Rows** shelf.

   The graph updates to look like the following:



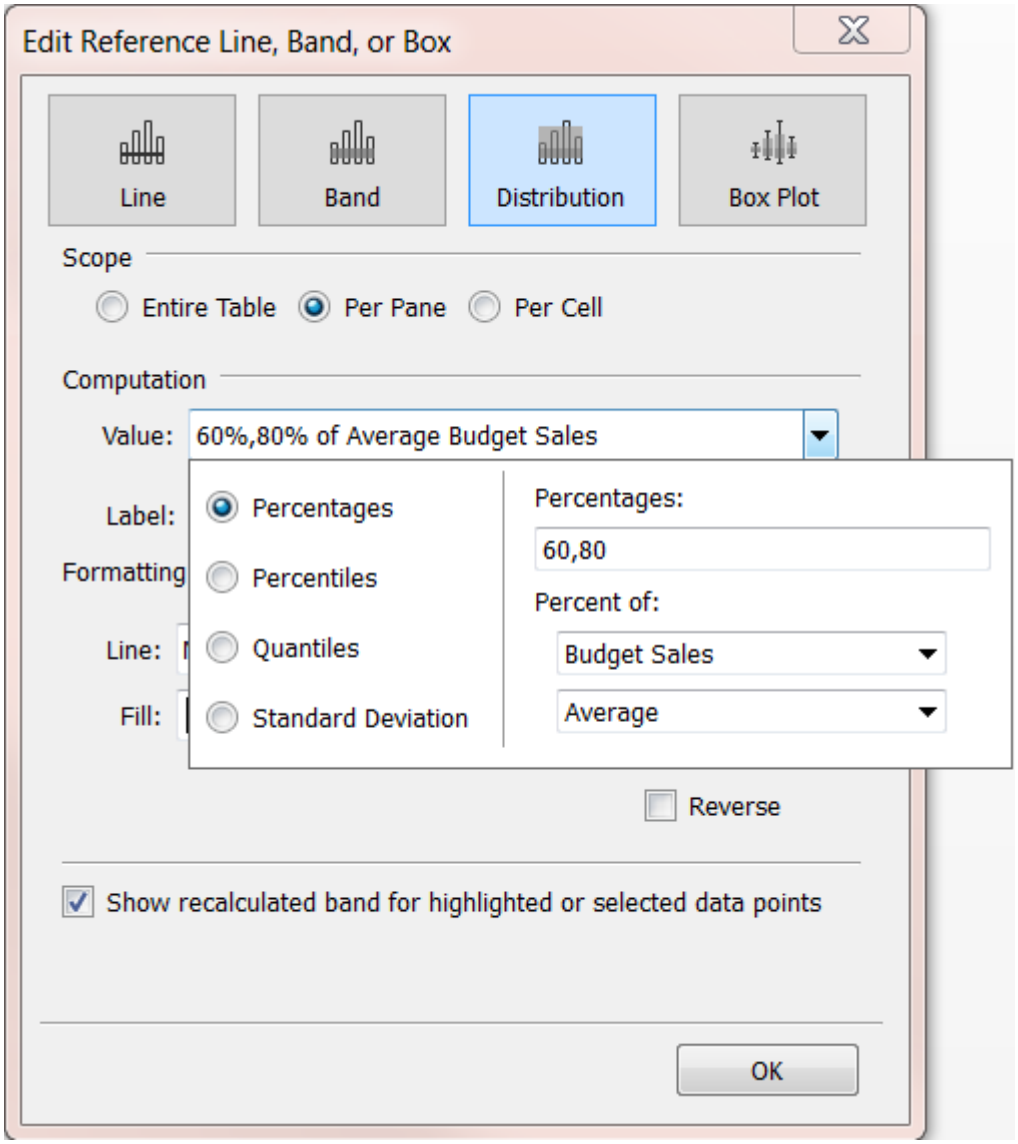
Swap reference line fields

To swap the two measures, right-click (control-click on the Mac) the axis and select **Swap Reference Line Fields**.



Edit the distribution

Right-click (control-click on the Mac) the axis in the view and select **Edit Reference Line**, and then select one of the reference lines to modify.



Result: Thus, Bullet Chart is created and executed.

Ex : 6 Create a Area Chart

Date:

Aim:

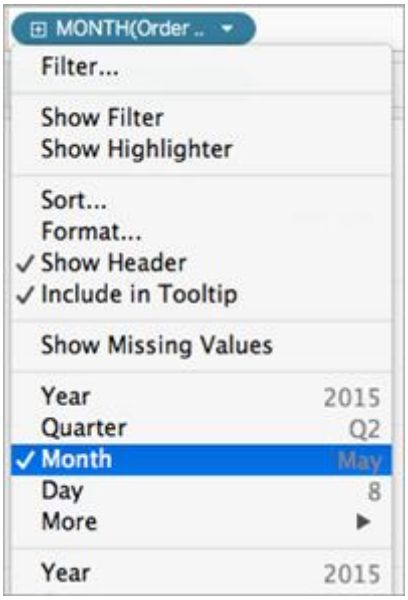
An area chart is a line chart where the area between the line and the axis are shaded with a color. These charts are typically used to represent accumulated totals over time and are the conventional way to display stacked lines.

The basic building blocks for an area chart are as follows:

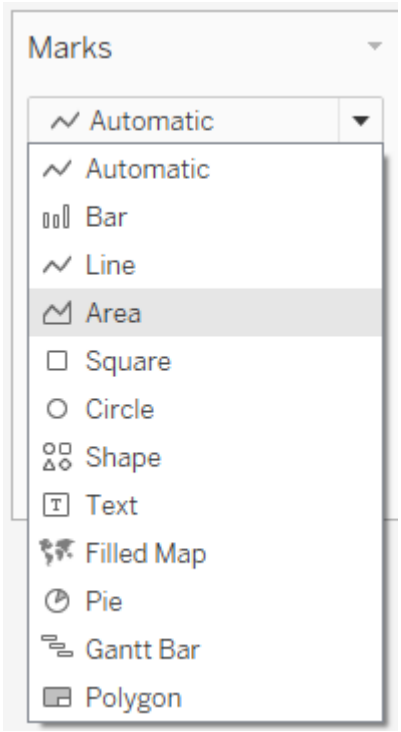
Mark type:	Area
Columns shelf:	Dimension
Rows shelf:	Measure
Color:	Dimension

Algorithm:

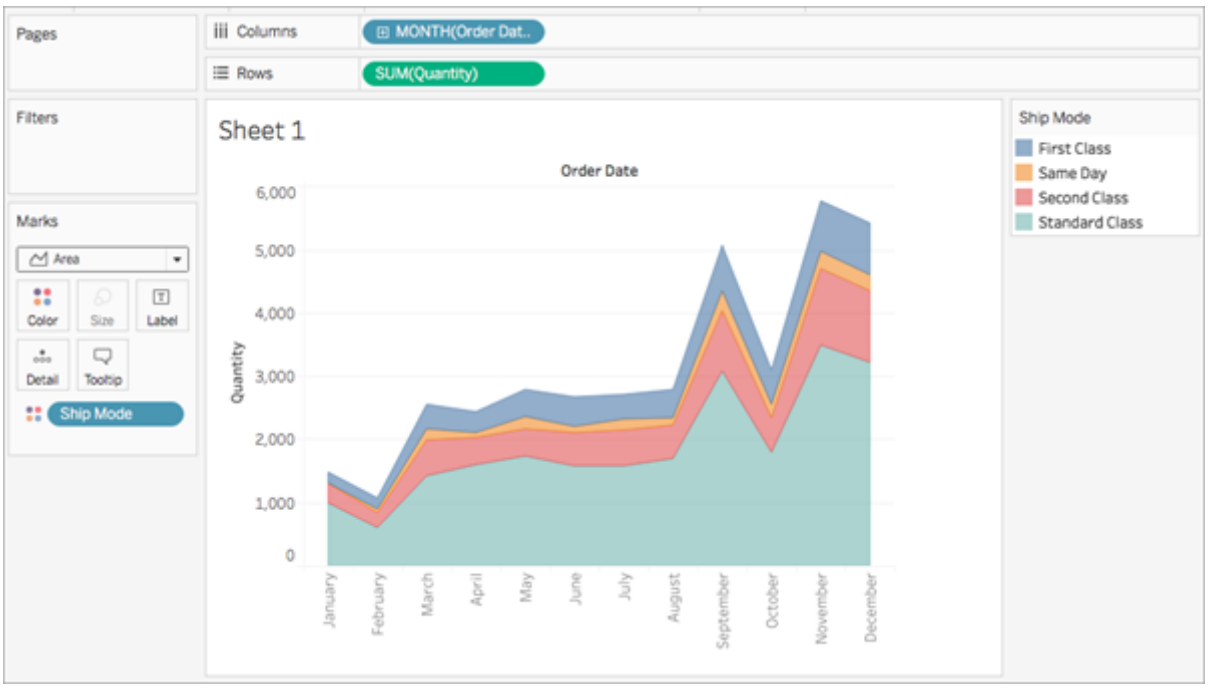
1. Open Tableau Desktop and connect to the **Sample - Superstore** data source.
2. Navigate to a new worksheet.
3. From the **Data** pane, drag **Order Date** to the **Columns** shelf.
4. On the Columns shelf, right-click **YEAR(Order Date)** and select **Month**.



5. From the **Data** pane, drag **Quantity** to the **Rows** shelf.
6. From the **Date** pane, drag **Ship Mode** to **Color** on the Marks card.
7. On the Marks card, click the Mark Type drop-down and select **Area**.



The visualization updates to the following:



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Format at the Worksheet Level

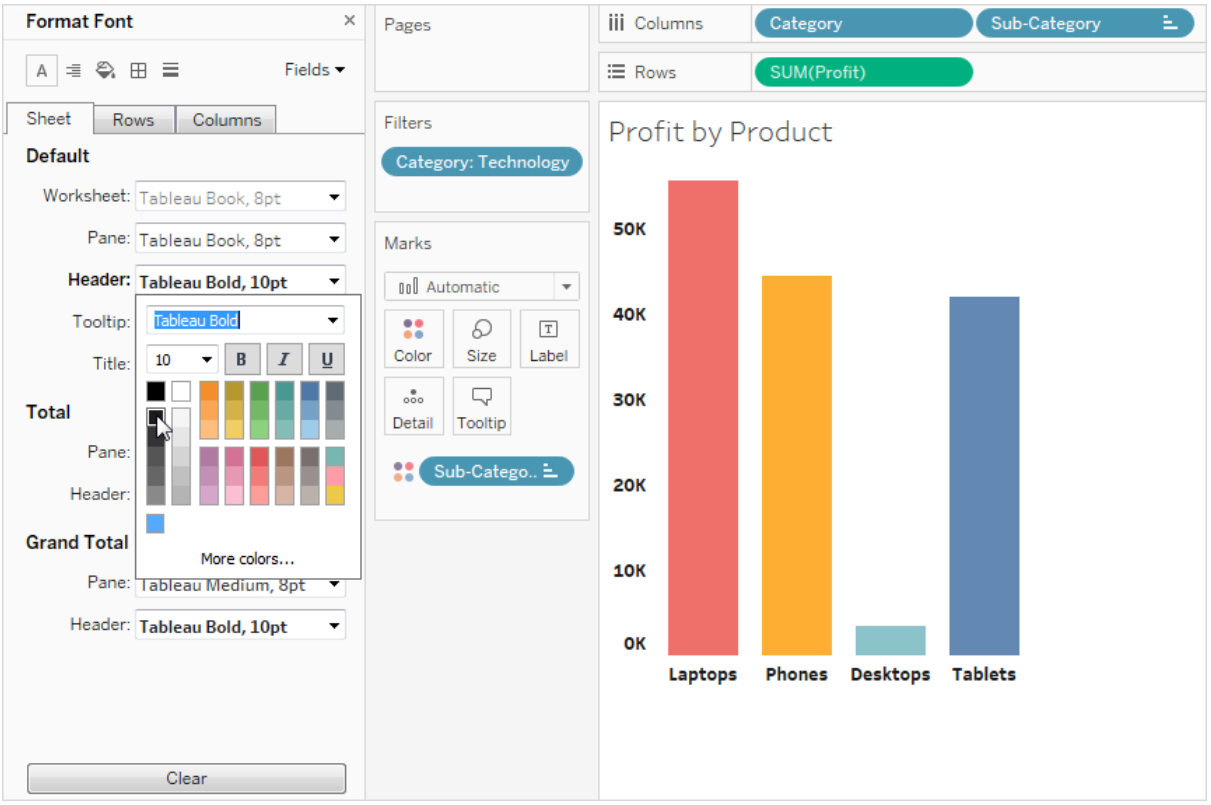
- To format settings for fonts, alignment, shading, borders, lines and tooltips at the worksheet level.

Access worksheet formatting settings from Tableau Desktop

1. Display a worksheet or dashboard.
2. From the **Format** menu, choose the part of the view to format, such as **Font**, **Borders**, or **Filters**.

Format fonts

For a view, specify the font, style, size, and color for either the pane text or header text, or both.



Result: Thus, Area chart is created and executed.

Ex : 7 Create a Heat Map

Date:

Aim:

To create a highlight table to explore how profit varies across regions, product sub-categories, and customer segments, follow these steps:

To create a highlight table by placing one or more dimensions on the **Columns** shelf and one or more dimensions on the **Rows** shelf. You then select **Square** as the mark type and place a measure of interest on the **Color** shelf. To enhance this basic highlight table by setting the size and shape of the table cells to create a heat map.

Algorithm:

1. Connect to the **Sample - Superstore** data source.
2. Drag the **Segment** dimension to **Columns**.

   Tableau creates headers with labels derived from the dimension member names.
3. Drag the **Region** and **Sub-Category** dimensions to **Rows**, dropping **Sub-Category** to the right of **Region**.

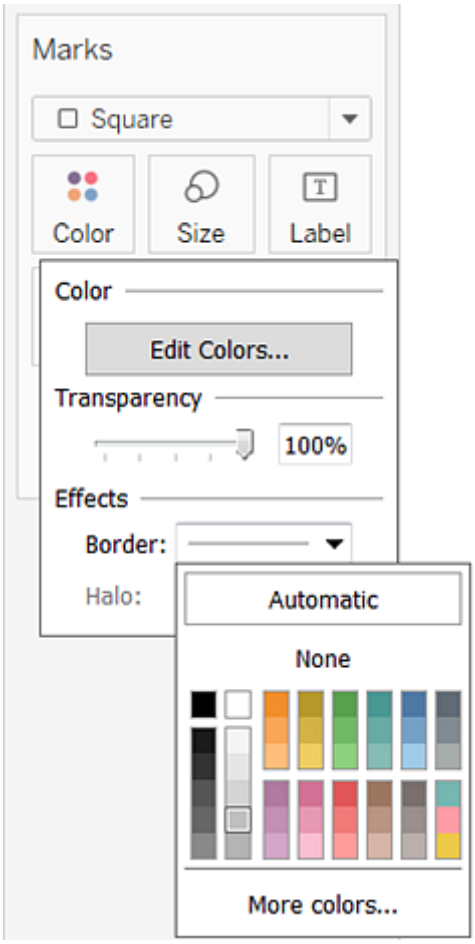
   Now you have a nested table of categorical data (that is, the **Sub-Category** dimension is nested within the **Region** dimension).
4. Drag the **Profit** measure to **Color** on the **Marks** card.

   Tableau aggregates the measure as a sum. The color legend reflects the continuous data range.

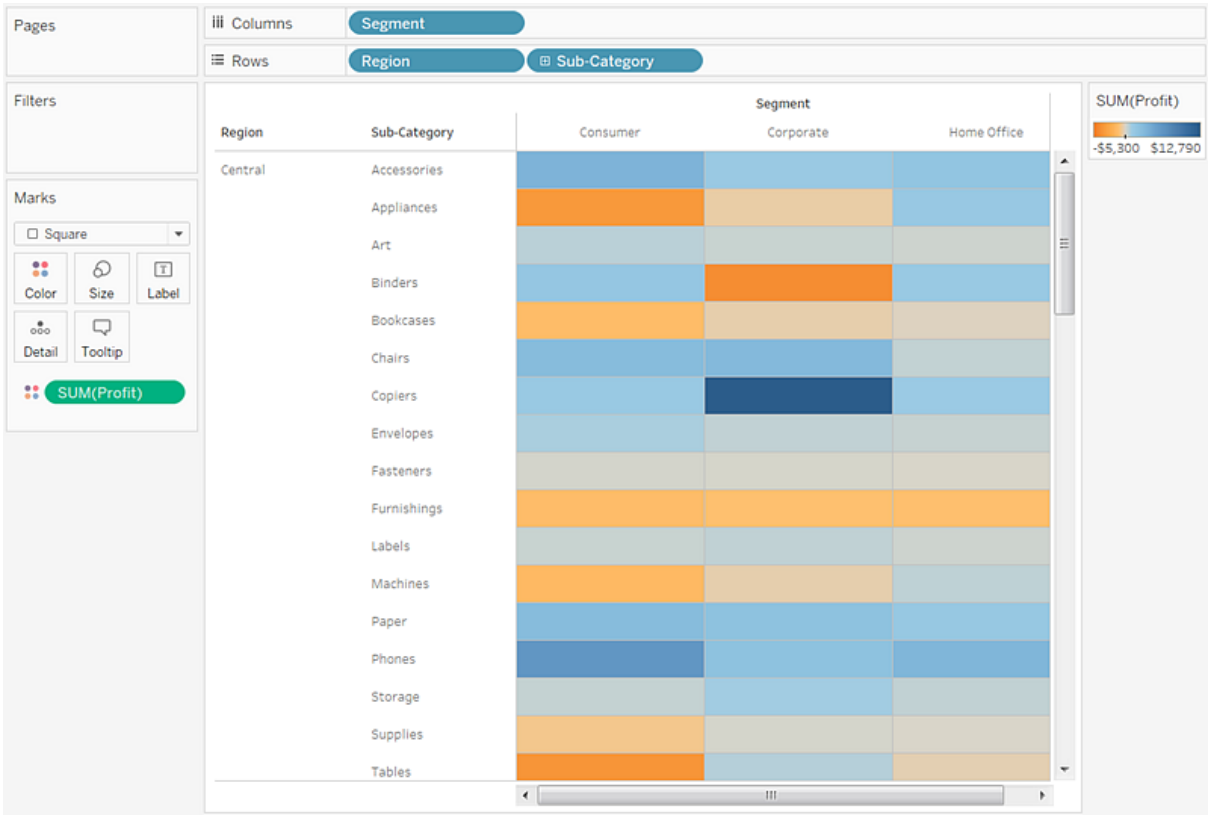
In this view, you can see data for only the Central region. Scroll down to see data for other regions.

In the Central region, copiers are shown to be the most profitable sub-category, and binders and appliances the least profitable.

5. Click **Color** on the **Marks** card to display configuration options. In the **Border** drop-down list, select a medium gray color for cell borders, as in the following image:



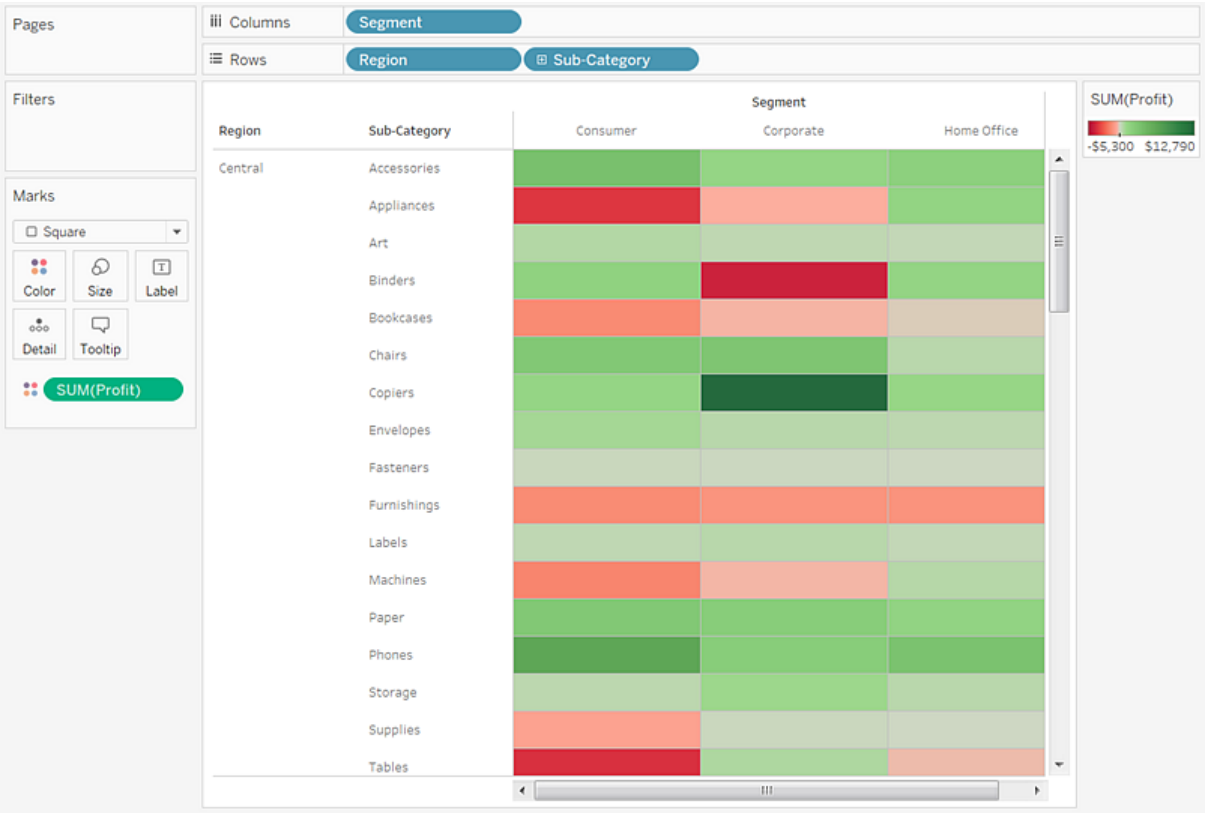
Now it's easier to see the individual cells in the view:



6. The default color palette is Orange-Blue Diverging. A Red-Green Diverging palette might be more appropriate for profit. To change the color palette and to make the colors more distinct, do the following:
    - Hover over the **SUM(Profit)** color legend, then click the drop-down arrow that appears and select **Edit Colors**.
    - In the **Edit Colors** dialog box, in the **Palette** field, select **Red-Green Diverging** from the drop-down list.
    - Select the **Use Full Color Range** check box and click **Apply** and then click **OK**.

When you select this option, Tableau assigns the starting number a full intensity and the ending number a full intensity. If the range is from -10 to 100, the color representing negative numbers changes in shade much more quickly than the color representing positive numbers.

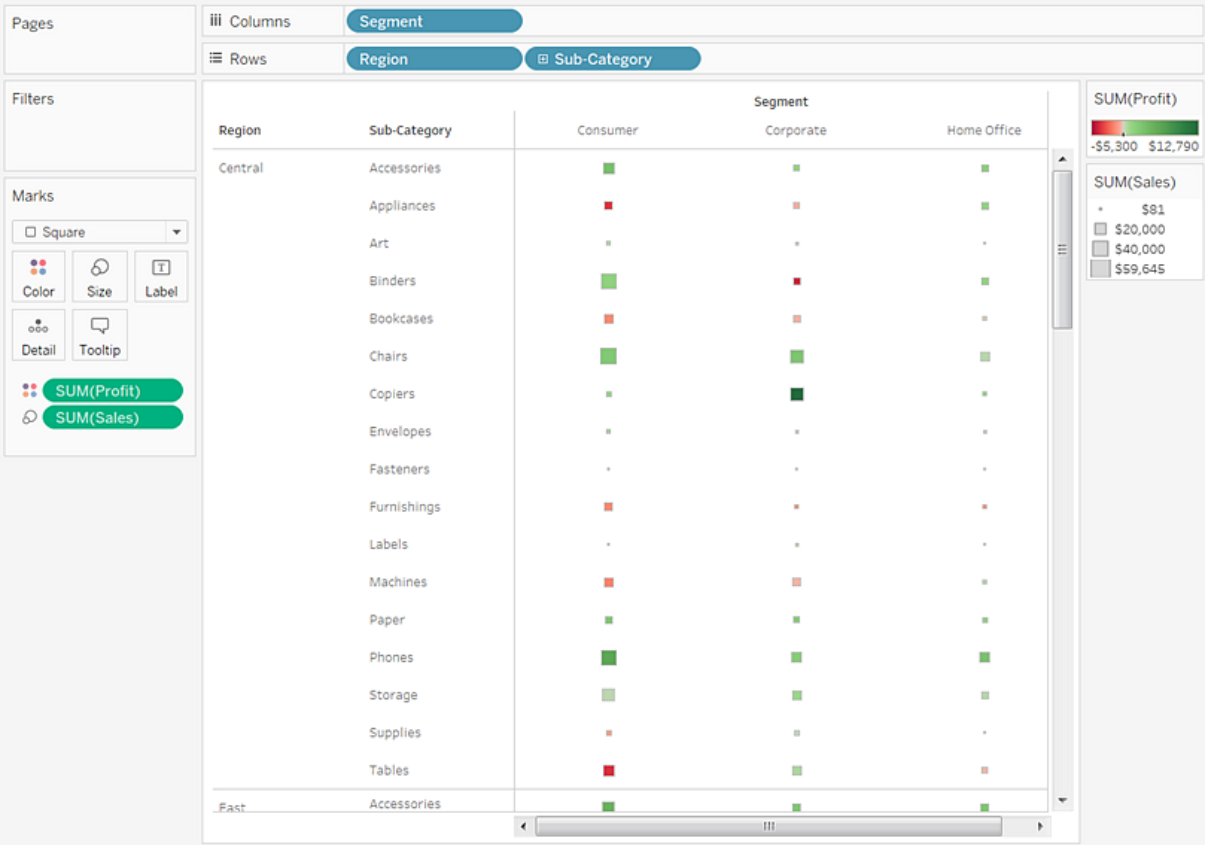
When you do not select **Use Full Color Range**, Tableau assigns the color intensity as if the range was from -100 to 100, so that the change in shade is the same on both sides of zero. The effect is to make the color contrasts in your view much more distinct.



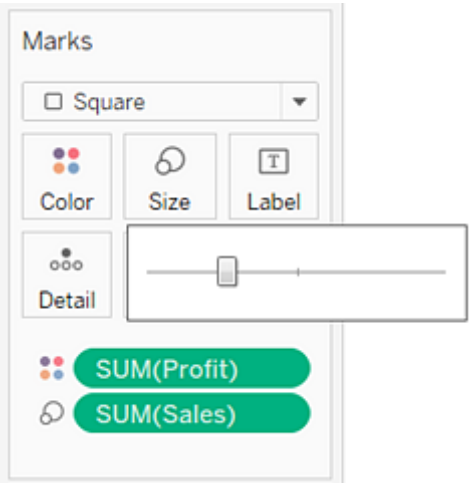
Modify the size to create a heat map

7. Drag the **Sales** measure to **Size** on the **Marks** card to control the size of the boxes by the Sales measure. You can compare absolute sales numbers (by size of the boxes) and profit (by color).

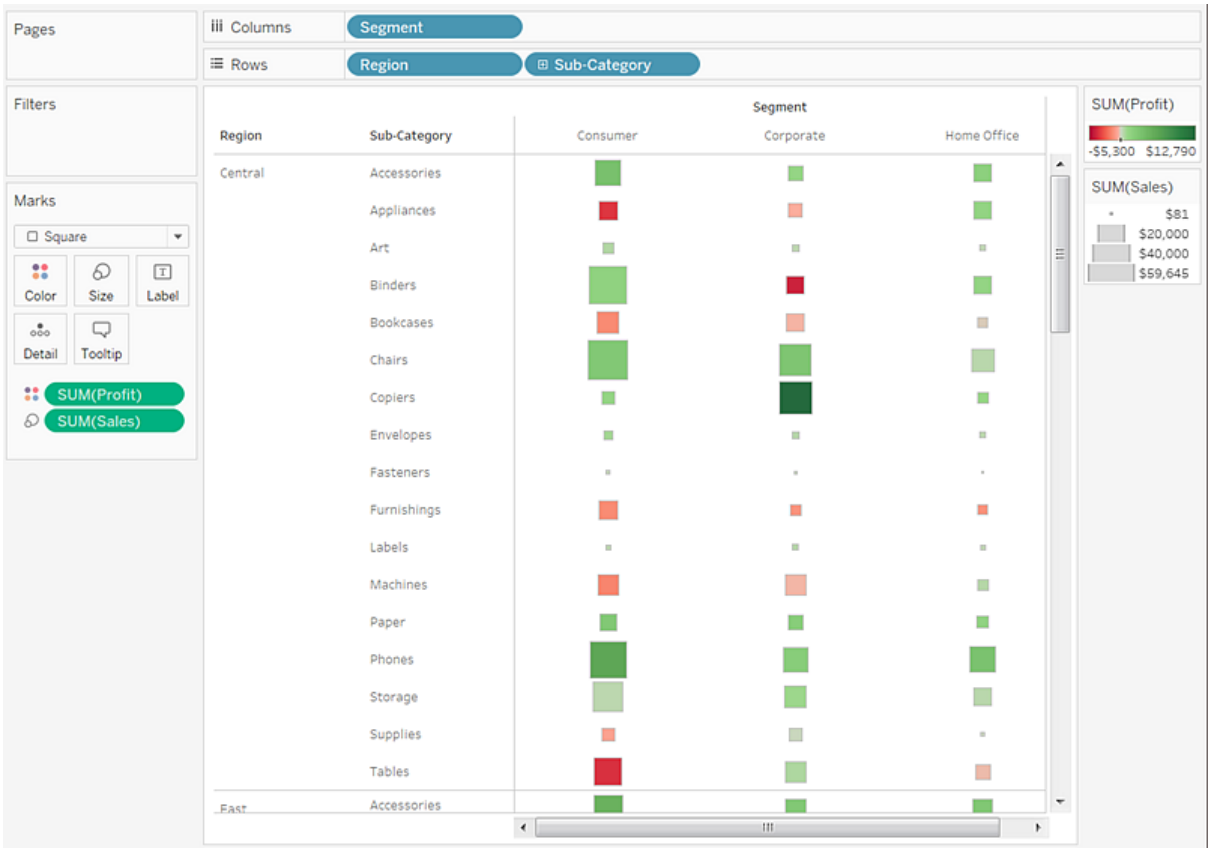
Initially, the marks look like this:



8. To enlarge the marks, click **Size** on the **Marks** card to display a size slider:



Drag the slider to the right until the boxes in the view are the optimal size. Now your view is complete:



Result: Thus, Heat Map is created and executed.

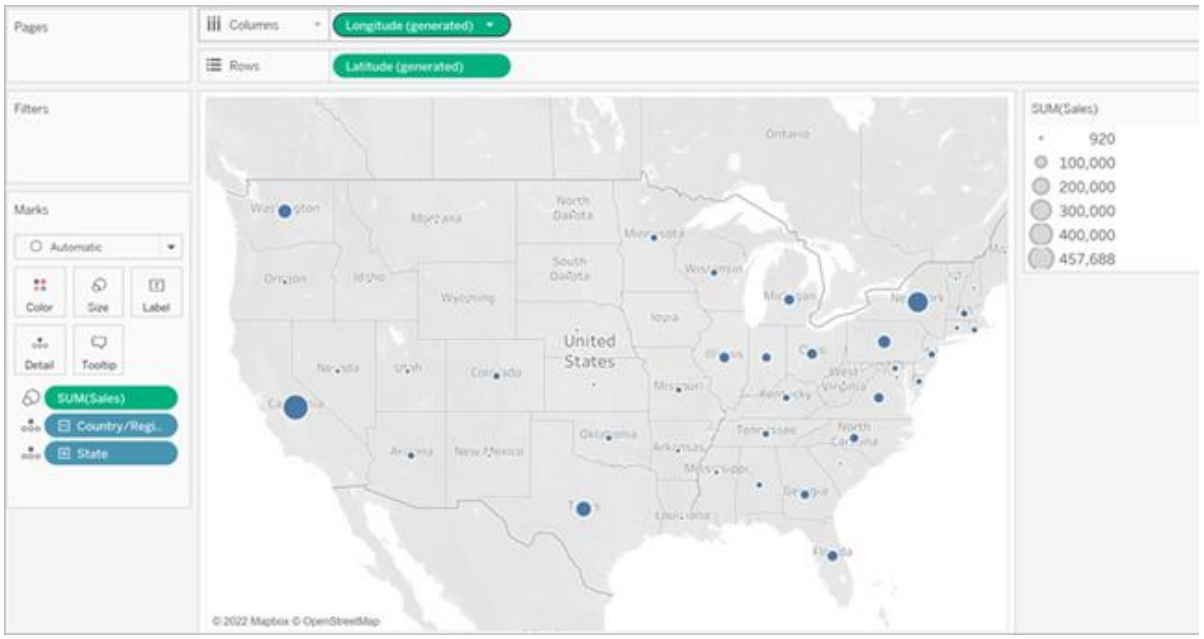
Ex : 8 Create a Geo Map

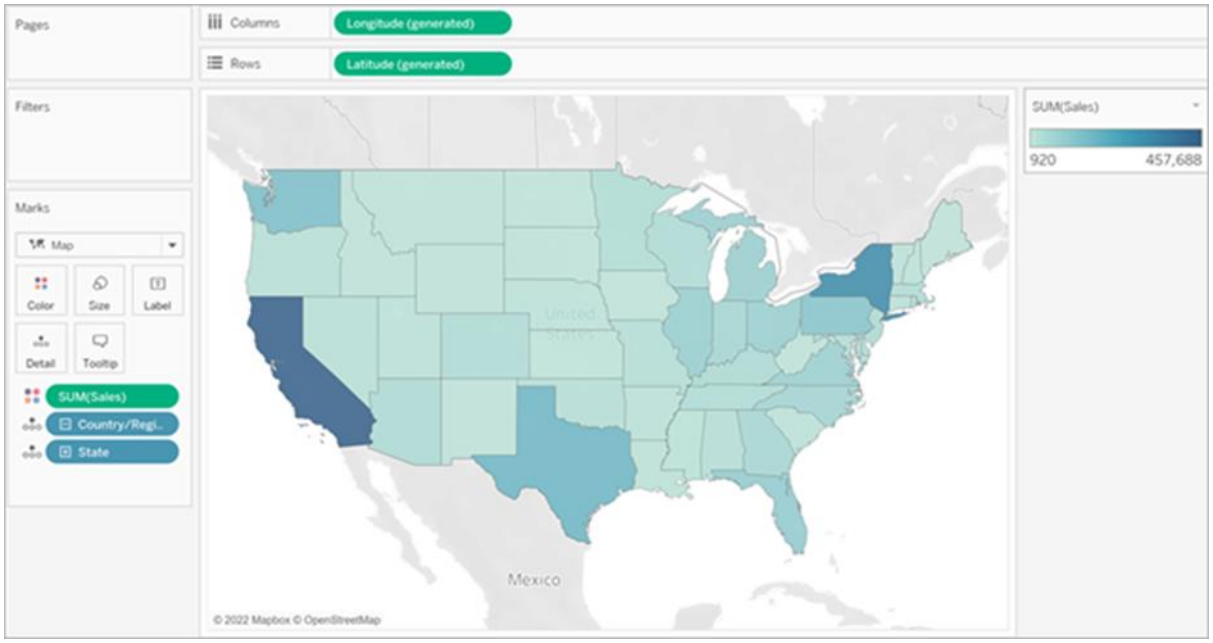
Date:

Aim:

To build a simple map, data source must contain location data (for example, location names or latitude and longitude coordinates).

If data source doesn't contain location data, see the Map Data(Link opens in a new window) section for ways you can connect to location data.





Algorithm:

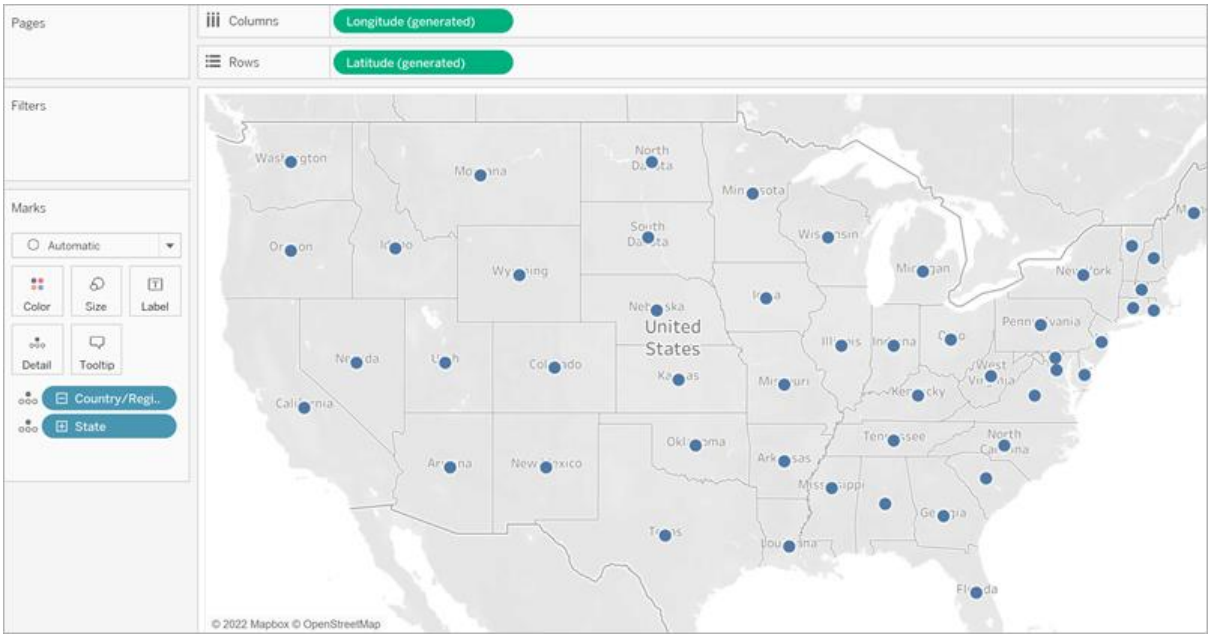
Build a simple point map

1. connect to the **Sample-Superstore** data source, which comes with Tableau.

2. Navigate to a worksheet.

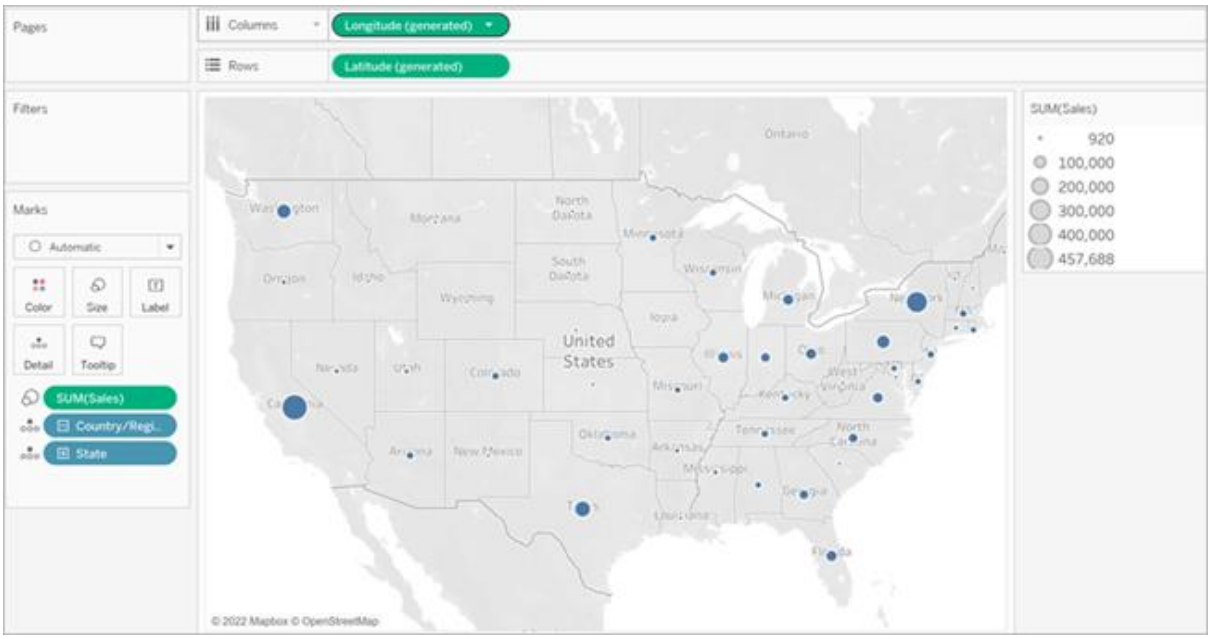
2. In the **Data** pane, open the Location folder and double-click **State**.

   A map view is automatically created because the State field is a geographic field.



3. From the Orders table in the **Data** pane, drag **Sales** to **Size** on the Marks card.

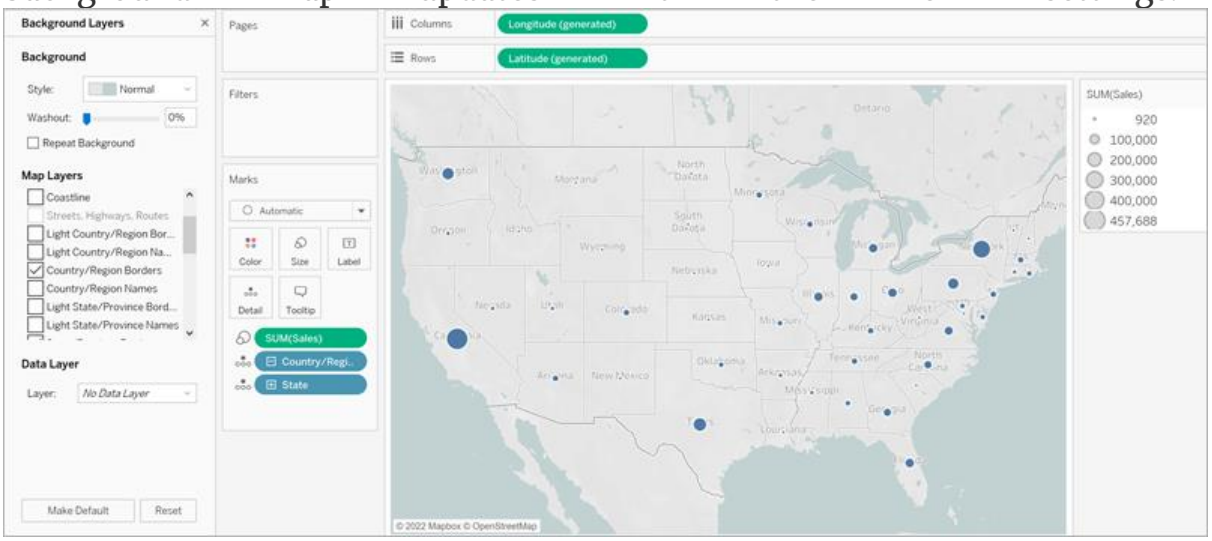
   The data points on the map update to show the amount of sales proportionally.



4. Select **Maps** > **Background Layers**.

5. In the Background pane, click the **Style** drop-down and select **Normal**.

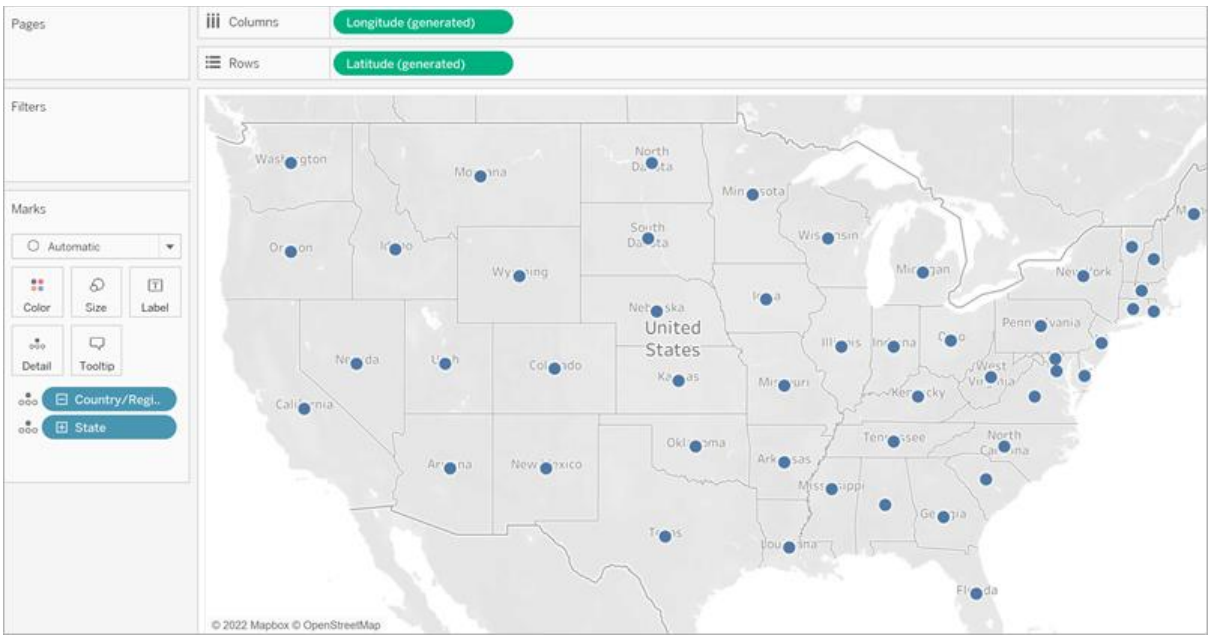
6. Under Background Map Layers, clear **Country/Region Names**. The background map updates with the new settings.



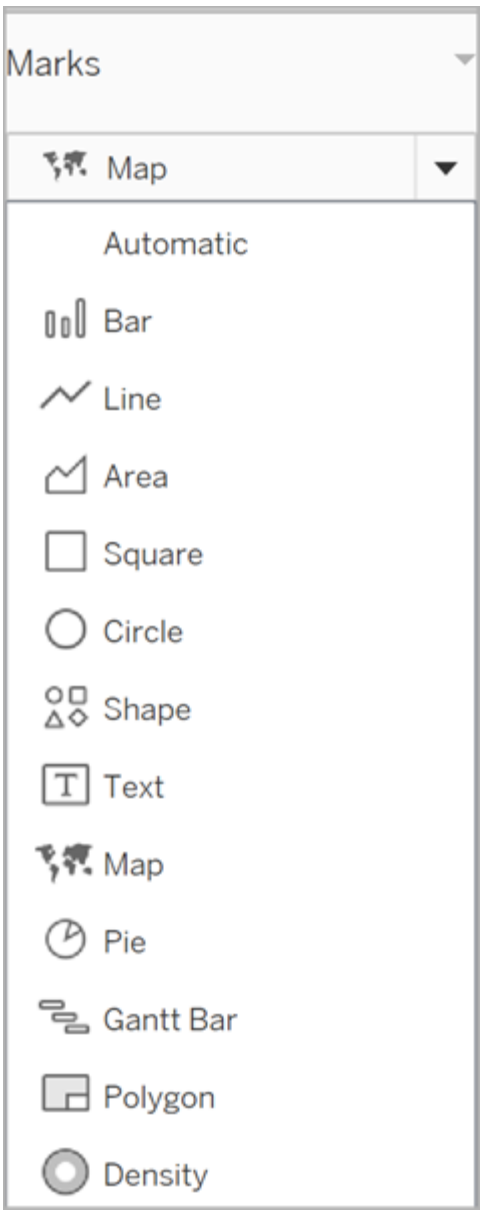
Build a simple filled (polygon) map

1. Navigate to a new worksheet.
2. In the **Data** pane, open the Location folder and double-click **State**.

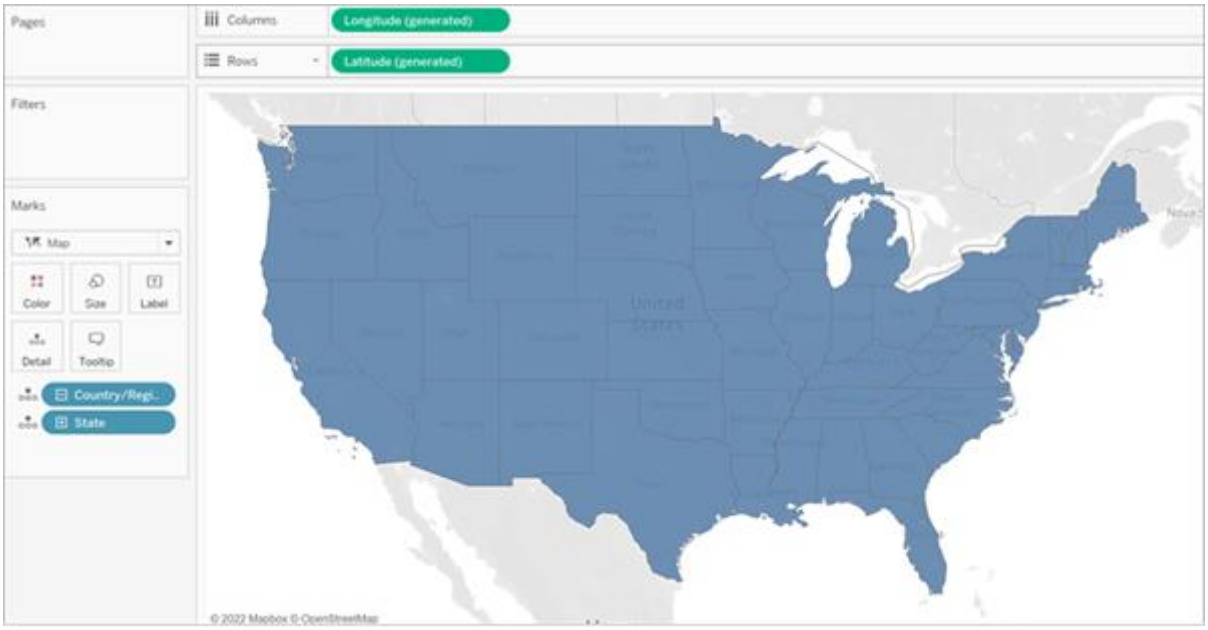
   A map view is automatically created.



3.On the **Marks** card, click the Mark Type drop-down and select **Map**.

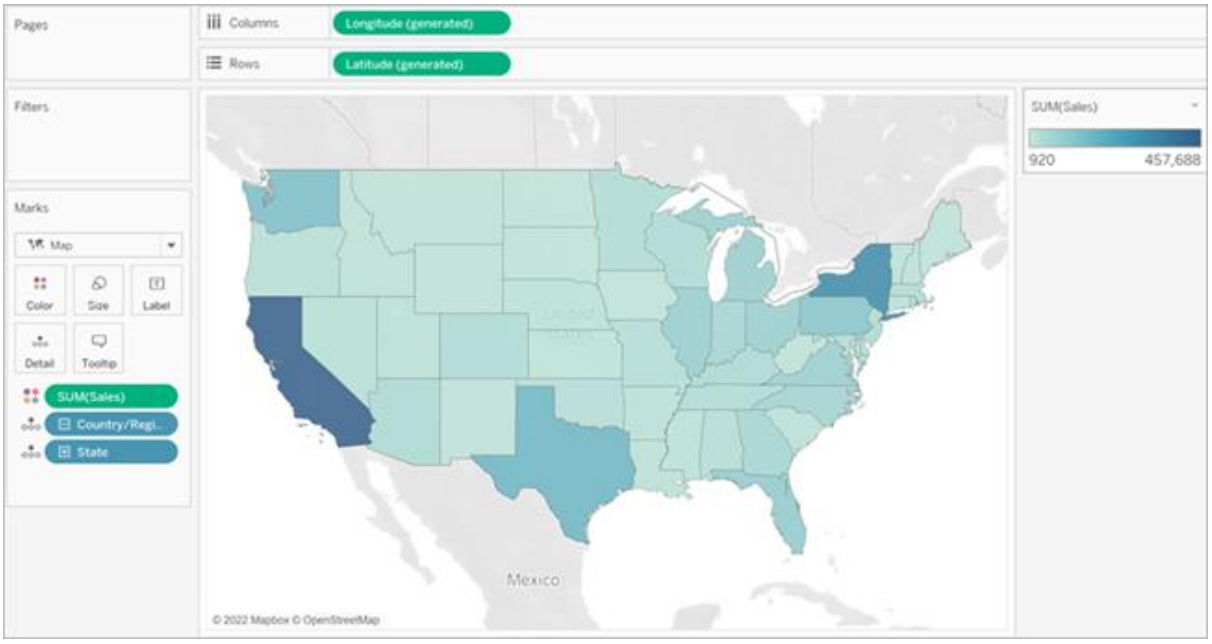


The map view updates to a filled (polygon) map.



4. From the Orders table in the **Data** pane, drag **Sales** to **Color** on the Marks card.

   The polygons on the map update to show the amount of sales using color.

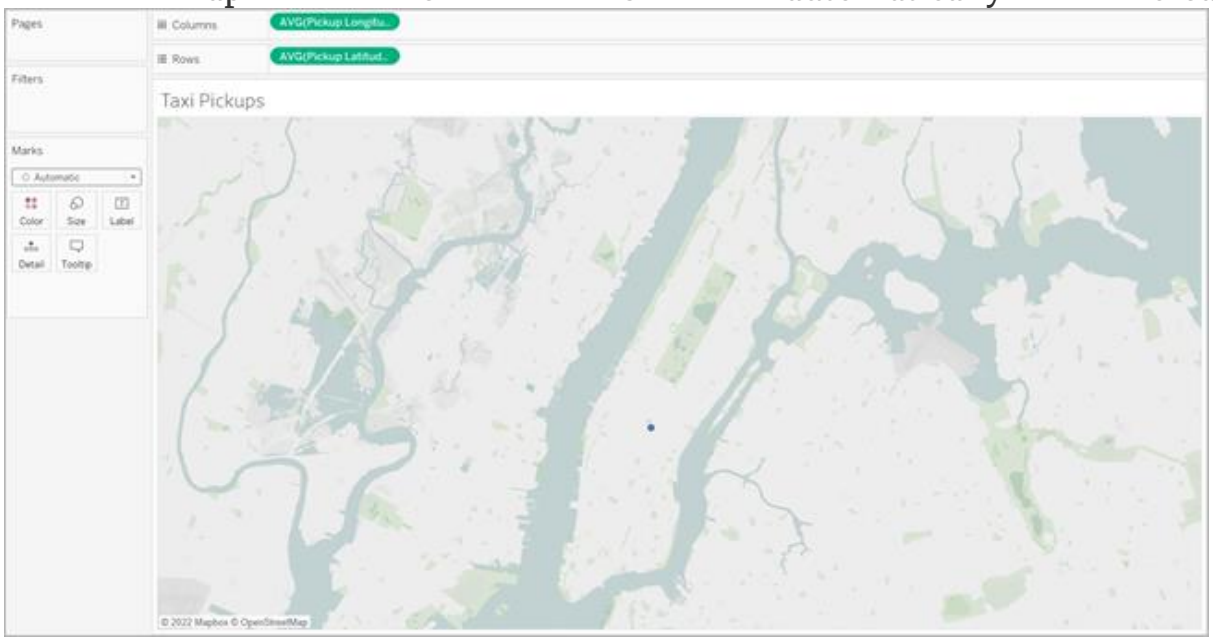


Build a heatmap (density map)

1. Navigate to a new worksheet.

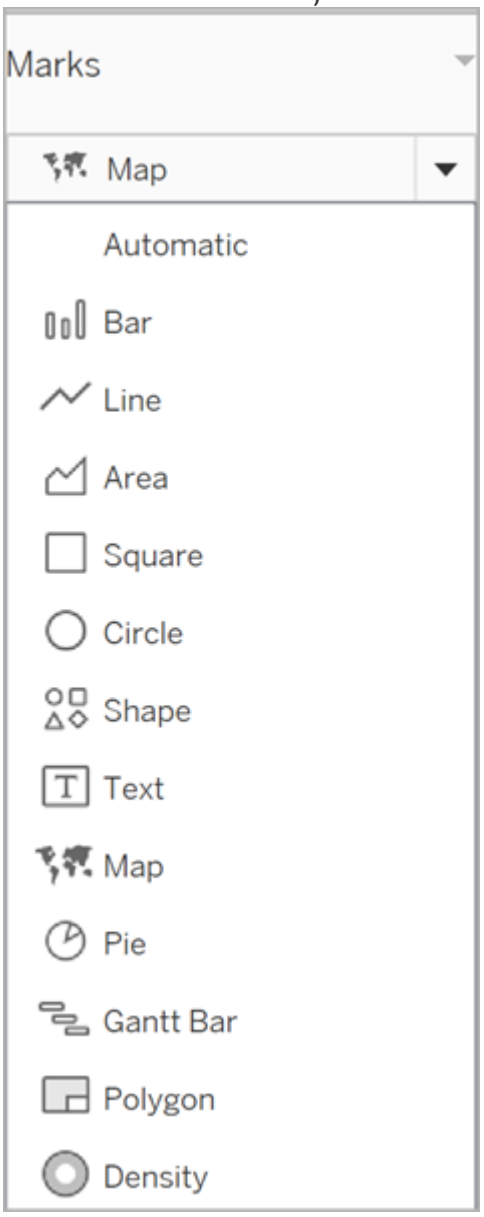
2. From the **Data** pane, drag both Pickup Latitude and Pickup Longitude onto the canvas.

A map view is automatically created.

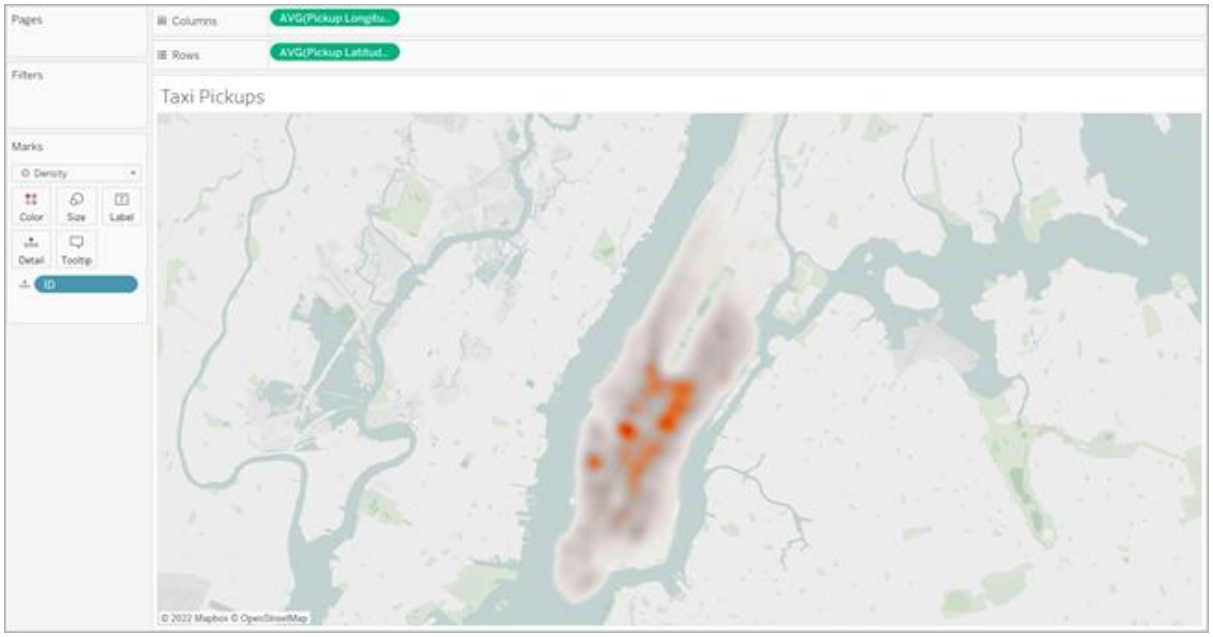


3. Drag a measure field, such as ID, to **Detail** on the Marks card.

4. On the Marks card, click the Mark Type drop-down and select **Density**.



The marks update on the map to show the concentration of taxi pickups per location. The darker colors indicate locations with more pickups, and the lighter colors indicate locations with fewer pickups.



Result: Thus, Geo Map is created and executed.

Ex : 9 Create a Filled Map

Date:

Aim:

To Create Filled Maps with Pie Charts in Tableau

The pie mark type is used with the filled maps mark type to show the percentage of profit for office supplies, furniture, and technology, relative to the total profits by state. It uses the Sample-Superstore data source that comes with Tableau Desktop.

Algorithm:

Build the map view using layers

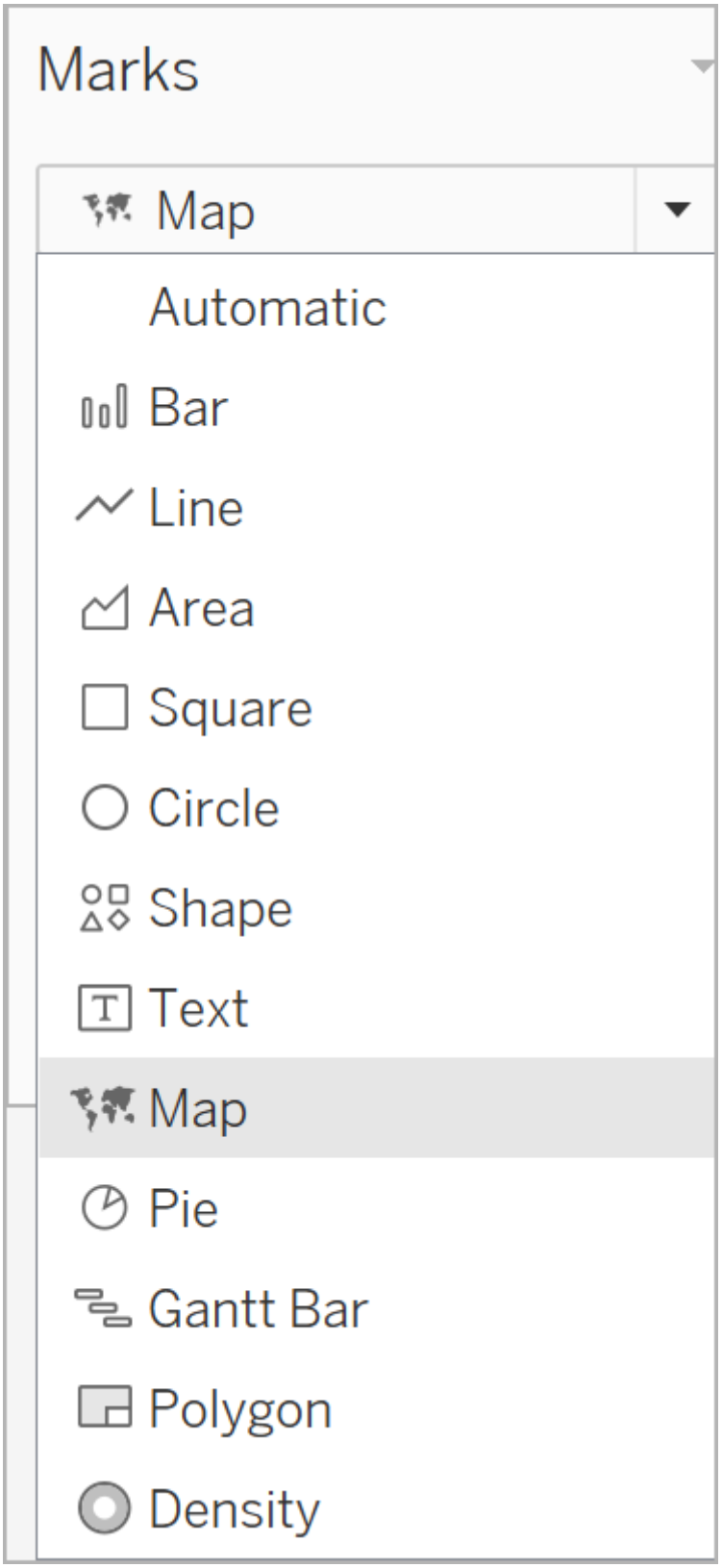
1. In Tableau, open a new workbook and connect to the Sample-Superstore data source.

2. On the Data Source page, click **Sheet 1** to go to a new worksheet.

3. In the Data pane, under the Orders table, open the Location folder and double-click **State**.

   Tableau creates a symbol map with a data point for each state in the Sample-Superstore data source.

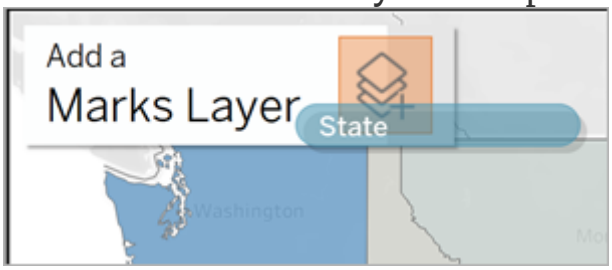
4. On the Marks card, click the Mark type drop-down and select the **Map** mark type.



5. From the Data pane, drag **Profit** to **Color** on the Marks card.

6. From the Data pane, under the Orders table, open the Location folder and drag **State** to the map. When the field is over the map, you'll see an option

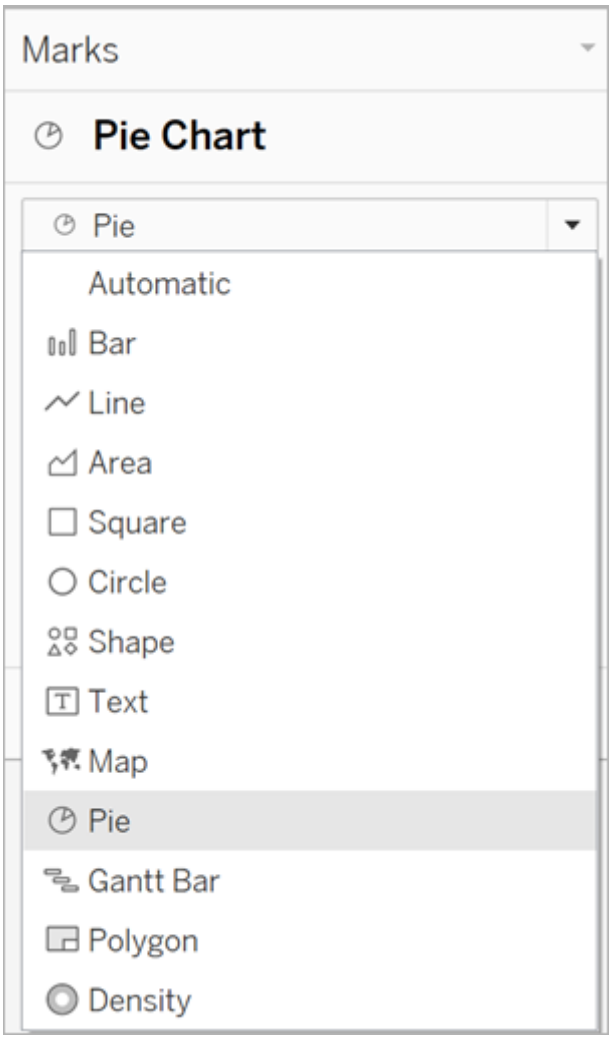
to **Add a Marks Layer**. Drop **State** here to make a new layer.



You now have a map with two layers: filled state polygons showing Profit and point locations in the middle of each states.

7. To organize and name your layers, click the drop-down arrow to the right of the layer name, select **Rename**, and rename the layer to a name that reflects its content, for example, "Pie Chart."

8. On the Pie Chart layer, click the Mark type drop-down and select the **Pie** mark type.

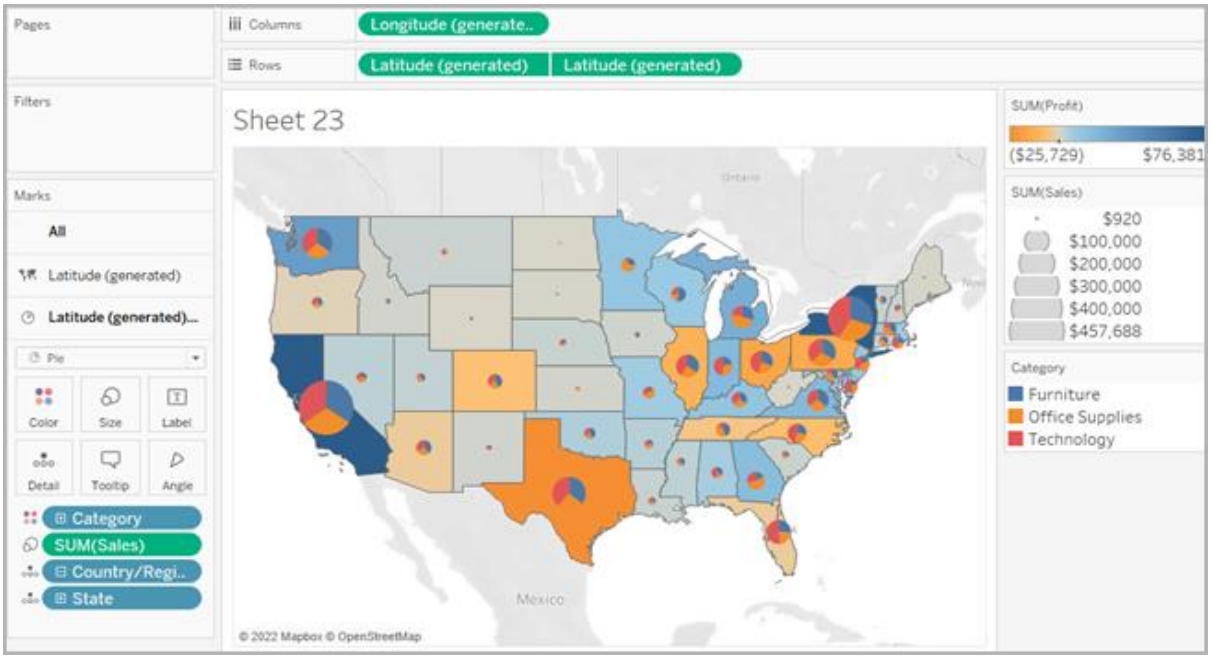


9. From the Orders table in the Data pane, drag **Sales** to **Size** on the Marks card on the Pie Chart layer.

   The sum of sales for each state is shown in a proportionally sized circle.

10. Under the Orders table in the Data pane, open the Product folder and drag **Category** to **Color** on the Marks card.

    If pie charts are too small, click **Size** on the Marks card and adjust the size. The map updates to show the sum of profit and the sum of sales for each category and state.



Build the map view using a dual axis

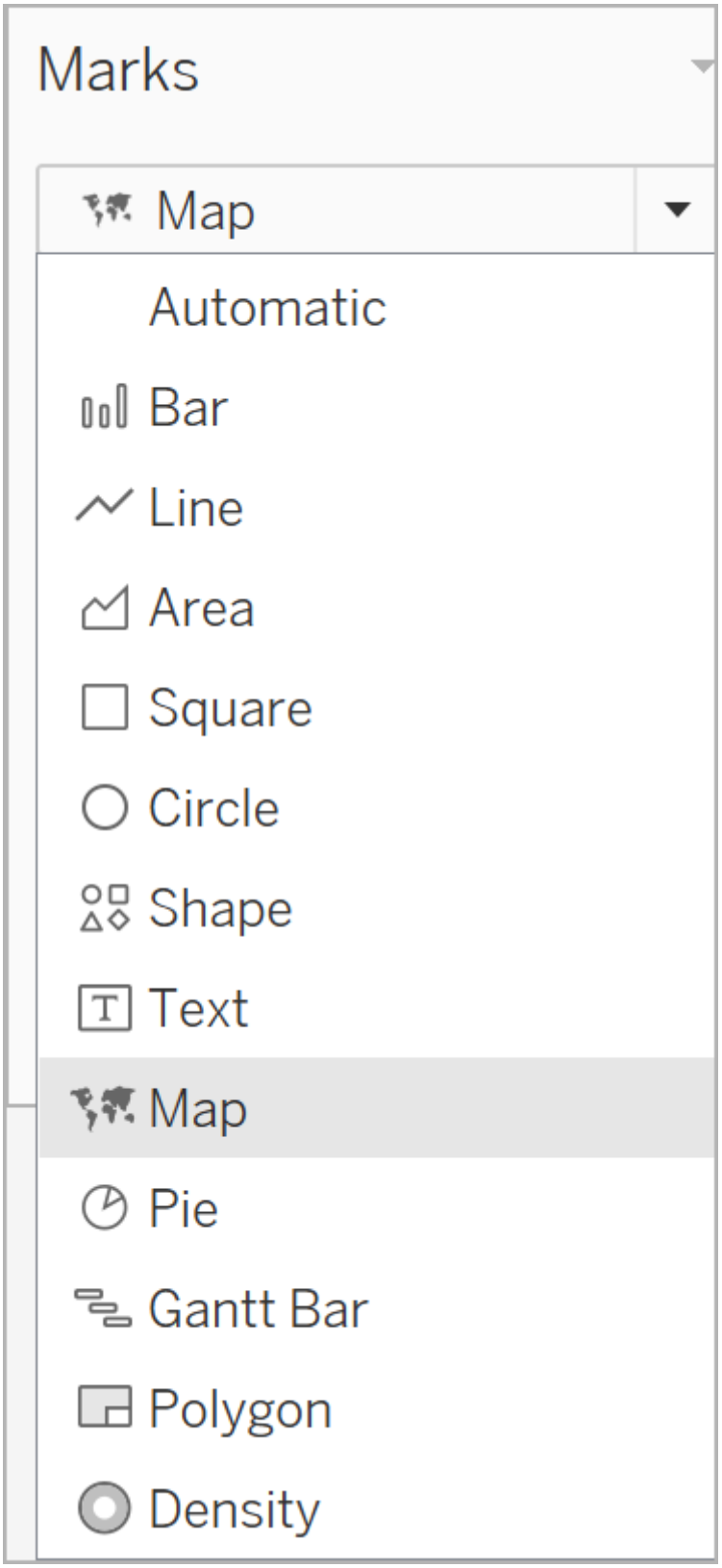
1. In Tableau, open a new workbook and connect to the Sample-Superstore data source.

2. On the Data Source page, click **Sheet 1** to go to a new worksheet.

3. In the Data pane, under the Orders table, open the Location folder and double-click **State**.

   Tableau creates a symbol map with a data point for each state in the Sample-Superstore data source.

4. On the Marks card, click the Mark type drop-down and select the **Map** mark type.



5. From the Data pane, drag **Profit** to **Color** on the Marks card.

6. From the Data pane, drag **Latitude (generated)** to the **Rows** shelf, and place it to the right of the other Latitude field.

You now have two identical map views.

7. On the Rows shelf, right-click the second **Latitude** field and select **Dual Axis**.

   The second map is now layered on top of the first map. There are now three drop-downs on the Marks card: one for each map view, and one for both views (All). These are three separate marks cards that you can use to control the visual detail for each of the map views.

8. On the Marks card, click one of the **Latitude (generated)** tabs, and then click the Mark type drop-down and select the **Pie** mark type.

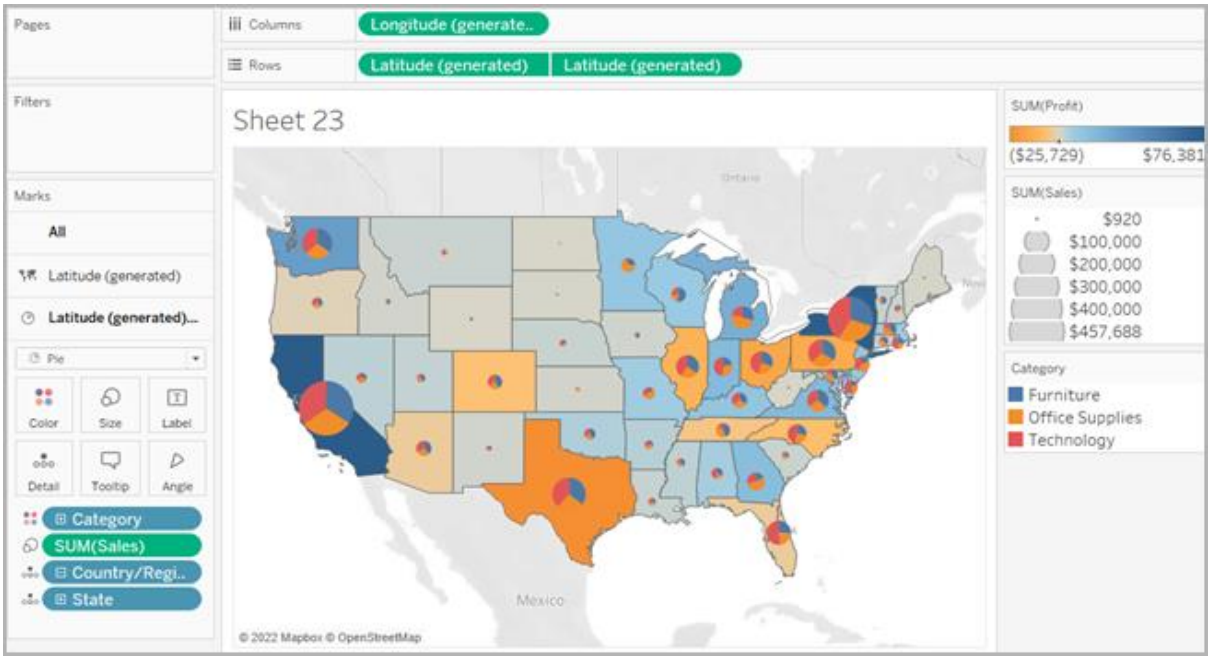
9. From the Orders table in the Data pane, drag **Sales** to **Size** on the Latitude (generated) Marks card you selected.

   The sum of sales for each state is shown in a proportionally sized circle.

10. Under the Orders table, open the Product folder and drag **Category** to **Color** on the same Marks card.

    Tip: If the pie charts are too small, click **Size** on the Marks card to adjust the size.

    The map view now shows the sum of profit, as well as the sum of sales for each category, for each state.



Result: Thus, Filled Map is created and executed.

Ex : 10 Create a Dashboard and Format

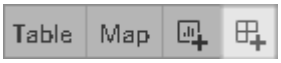
Date:

Aim:

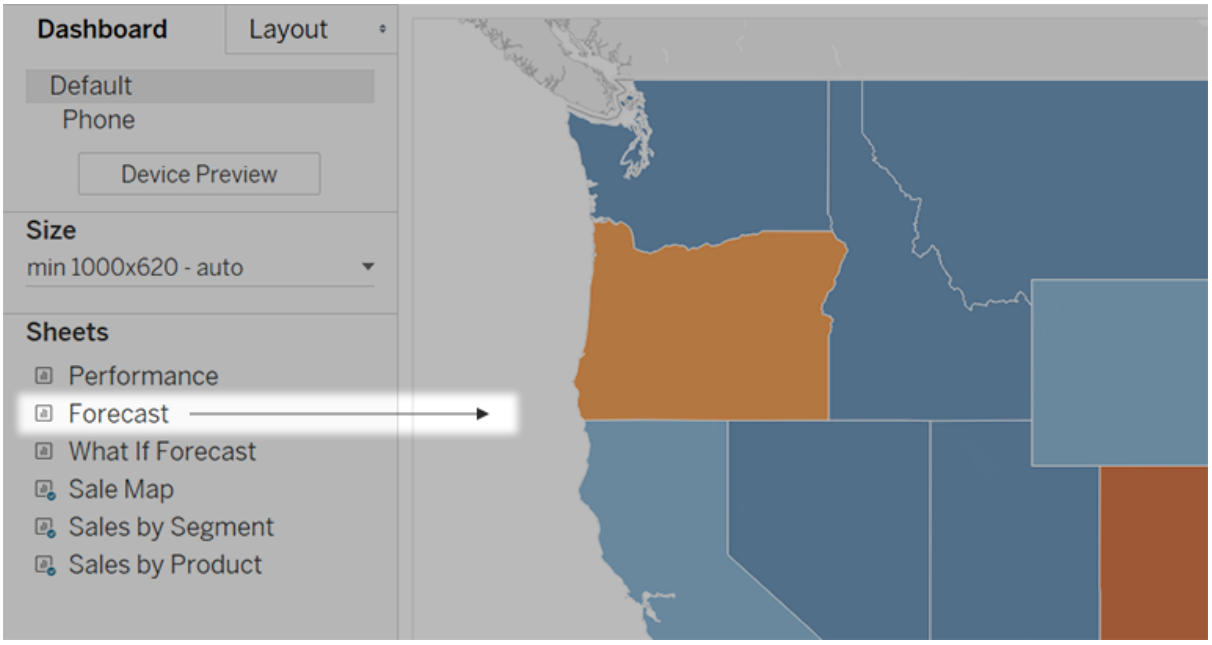
To Create a dashboard, and add or replace sheets.

Algorithm:

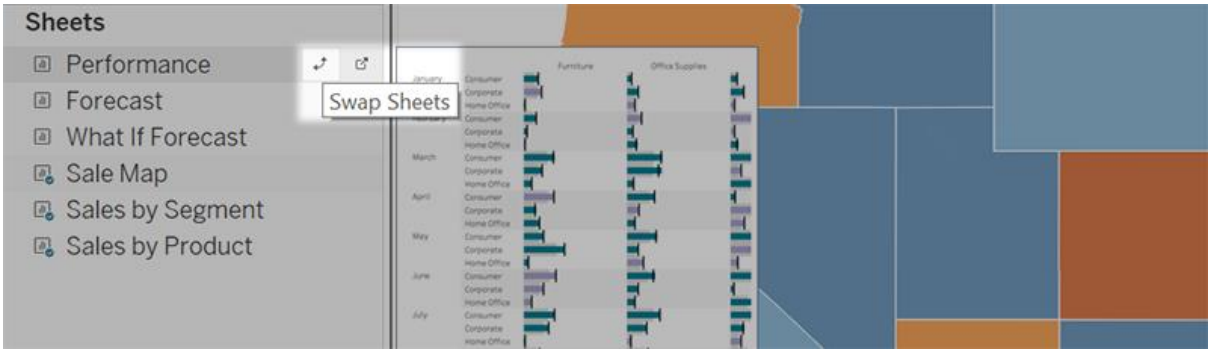
1. At the bottom of the workbook, click the **New Dashboard** icon:



2. From the **Sheets** list at left, drag views to your dashboard at right.



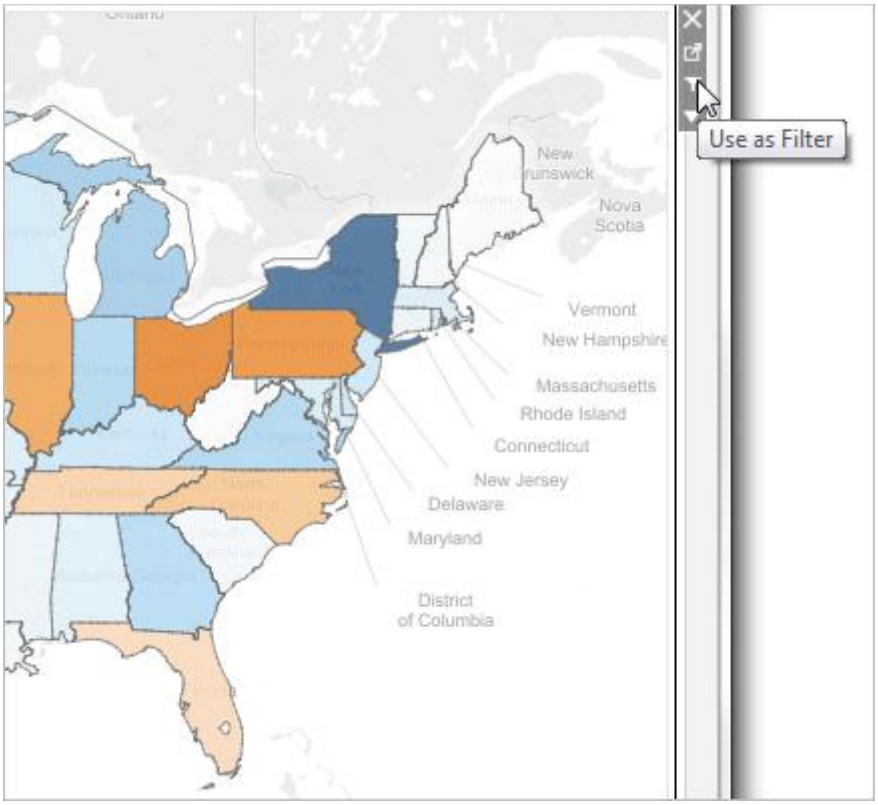
3. To replace a sheet, select it in the dashboard at right. In the Sheets list at left, hover over the replacement sheet, and click the **Swap Sheets** button.



Add interactivity

You can add interactivity to dashboards to enhance users' data insights.

In the upper corner of sheet, enable the **Use as Filter** option to use selected marks in the sheet as filters for other sheets in the dashboard.



- When authoring in Tableau Desktop, add actions to use multiple sheets as filters, navigate from one sheet to another, display web pages, and more.

Add dashboard objects and set their options

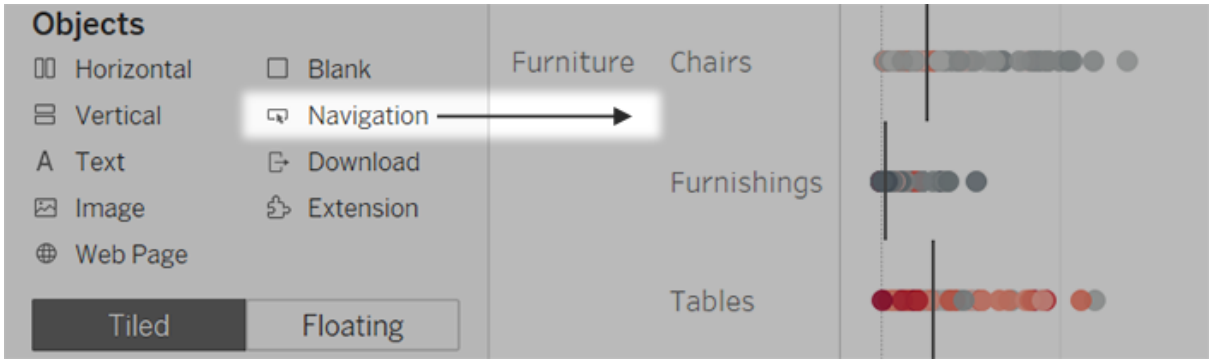
- **Horizontal** and **Vertical** objects provide layout containers that let you group related objects together and fine-tune how your dashboard resizes when users interact with them.
- **Text** objects can provide headers, explanations, and other information.
- **Image** objects add to the visual flavor of a dashboard, and you can link them to specific target URLs.
- **Web Page** objects display target pages in the context of your dashboard

- **Blank** objects help you adjust spacing between dashboard items.
- **Navigation** objects let your audience navigate from one dashboard to another, or to other sheets or stories. You can display text or an image to indicate the button's destination to your users, specify custom border and background colors, and provide informational tooltips.
- **Download** objects let your audience quickly create a PDF file, PowerPoint slide, or PNG image of an entire dashboard, or a crosstab of selected sheets. Formatting options are similar to Navigation objects.

- **Extension** objects let you add unique features to dashboards or integrate them with applications outside Tableau.
- **Ask Data** objects let users enter conversational queries for specific data source fields, which authors optimize for specific audiences such as sales, marketing, and support staff.

Add an object

From the **Objects** section at left, and drag an item to the dashboard on the right:



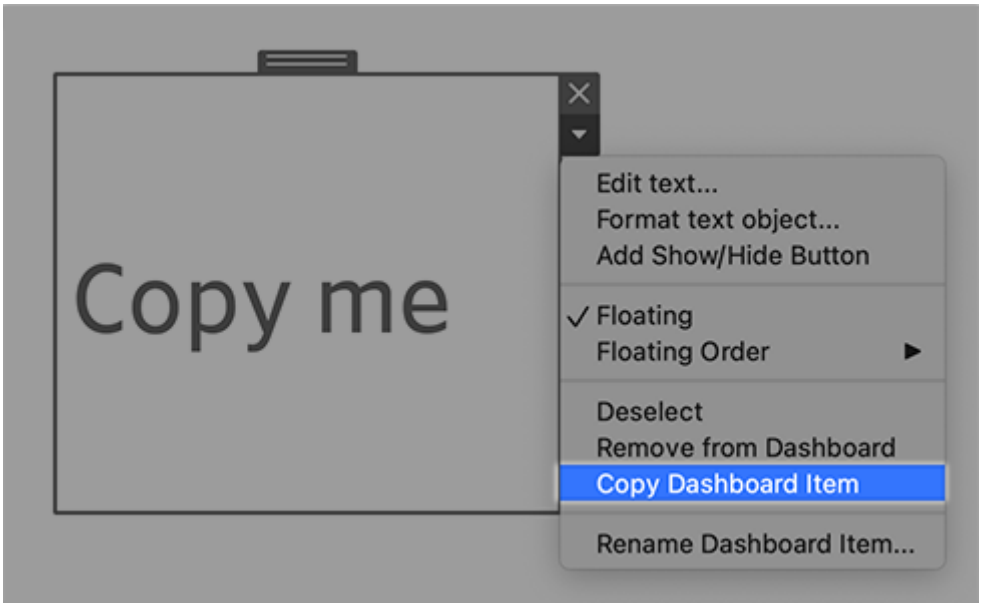
Copy objects

You can copy and paste objects either within the current dashboard, or from dashboards in other sheets and files. You can even copy objects between Tableau Desktop and Tableau in your web browser.

- Sheets in a dashboard

- Items that rely on a specific sheet, such as filters, parameters, and legends
- Layout containers with something you can't copy inside them, like a sheet or filter
- Objects on a device layout
- Dashboard titles

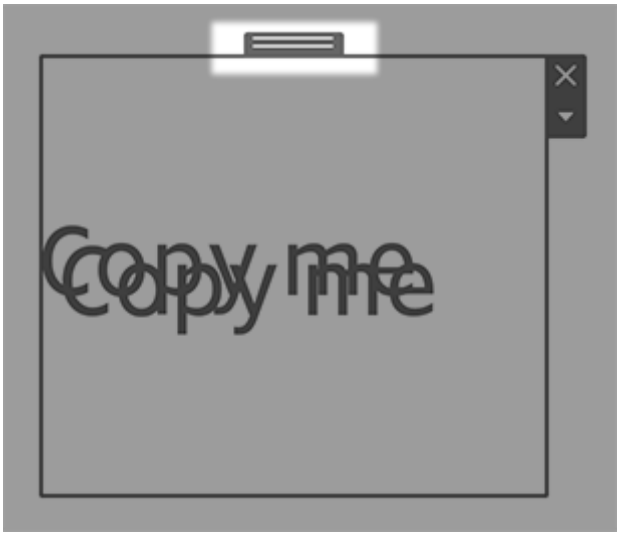
1. Select a dashboard object, and from the object menu, select **Copy Dashboard Item**. Or from the main menu, select **Dashboard** > **Copy Selected Dashboard Item**.



2. Go to the dashboard where you want to paste the object. Then either select nothing to paste in the upper-left corner of the dashboard, or select an existing item to paste next to.

3. In Tableau Desktop, choose **File** > **Paste**. In a browser, either choose **Edit** > **Paste** or use the keyboard shortcut for pasting.

4. The object is pasted 10 pixels below and to the right of the upper-left corner of the dashboard or the selected object. To move the pasted object, drag the handle at the top.



Set options for objects

Click the object to select it. Then click the arrow in the upper corner to open the shortcut menu. (The menu options vary depending on the object.)

Result: Thus, Dashboard is created and executed.