

**DATA AND
ARTIFICIAL INTELLIGENCE**

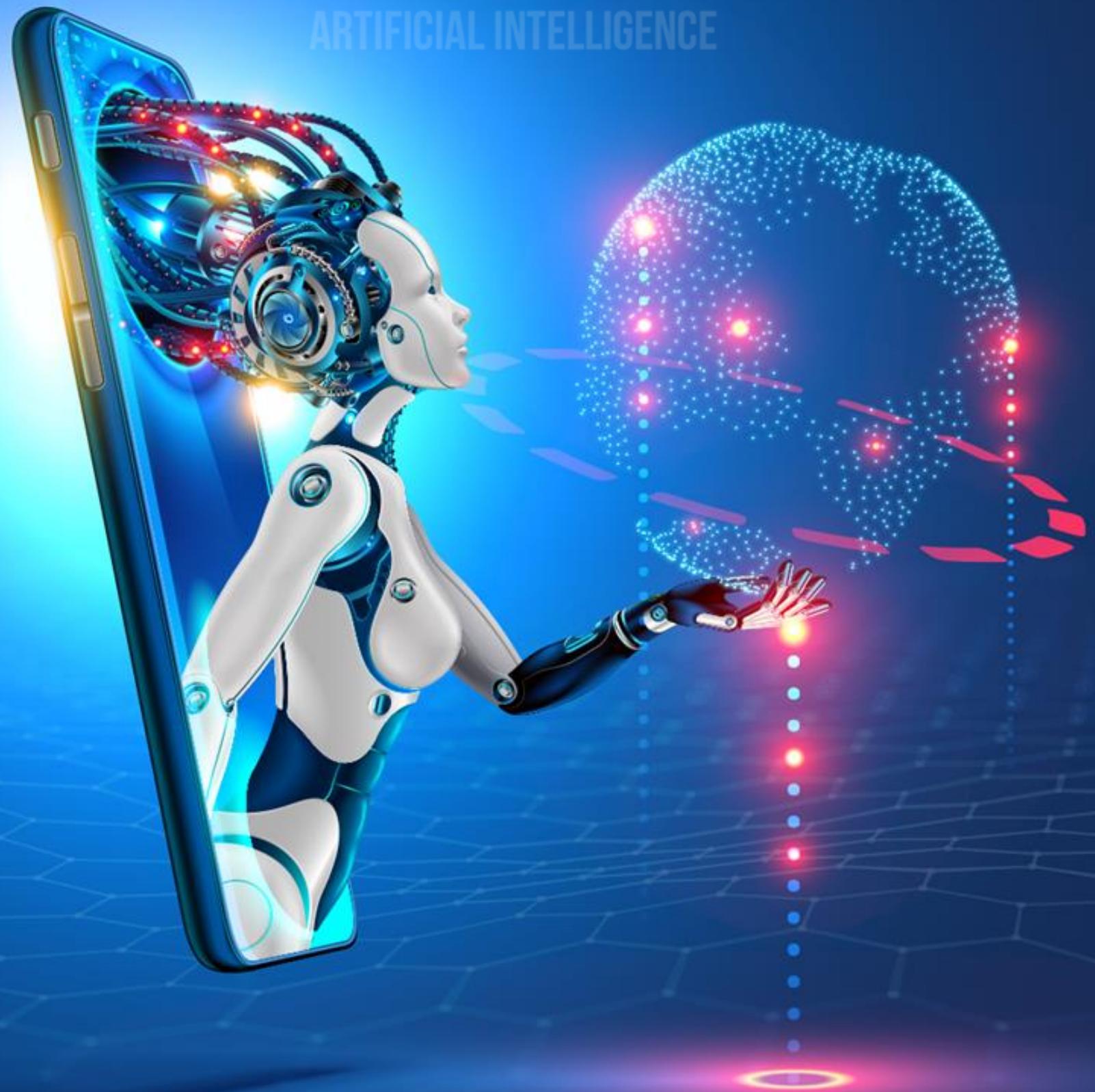
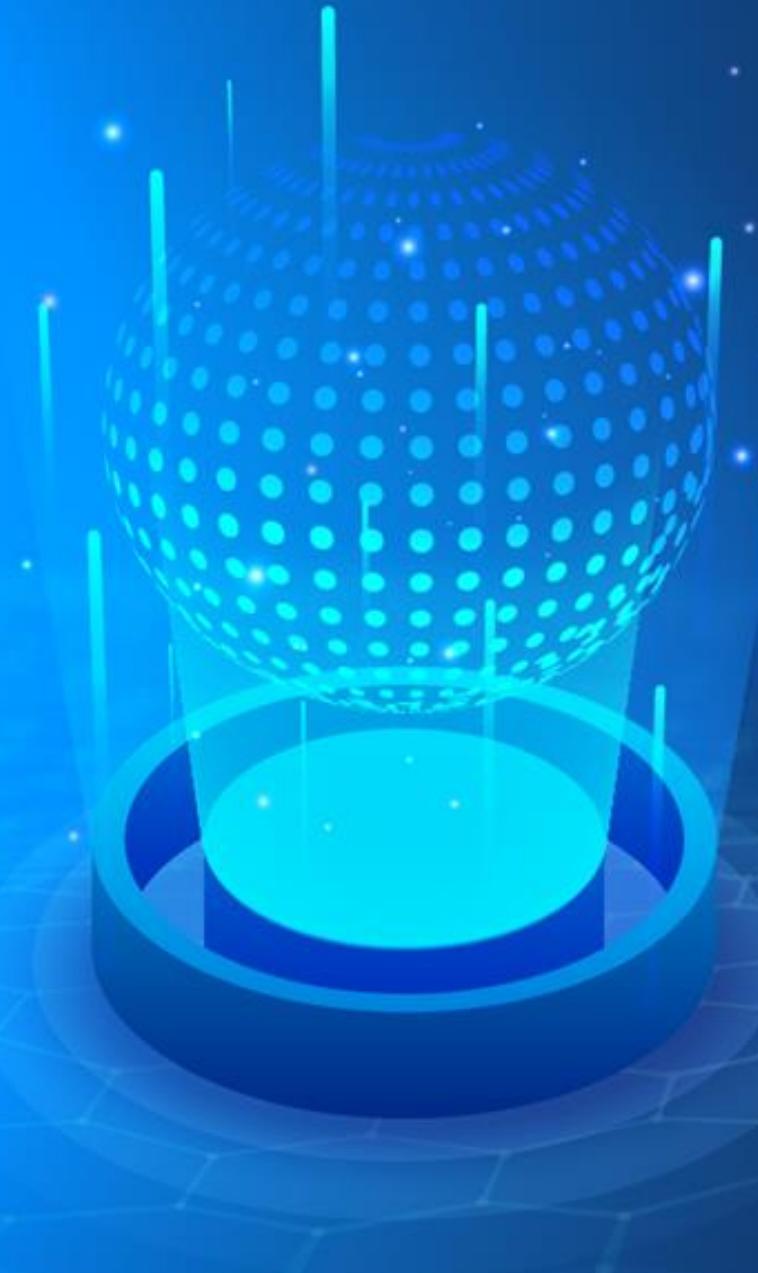


Tableau Training

DATA AND ARTIFICIAL INTELLIGENCE



Advanced Visual Analytics

Learning Objectives

By the end of this lesson, you will be able to:

- Use parameter controls to change variables
- Create tooltip visualization in a Tableau worksheet
- Identify the relevant data analysis strategy
- Create charts and graphs to visualize the data



A Day in the Life of a Data Analyst



You are working as a data analyst at an organization, and you are required to develop simple and understandable visualizations using visual analytics tools.

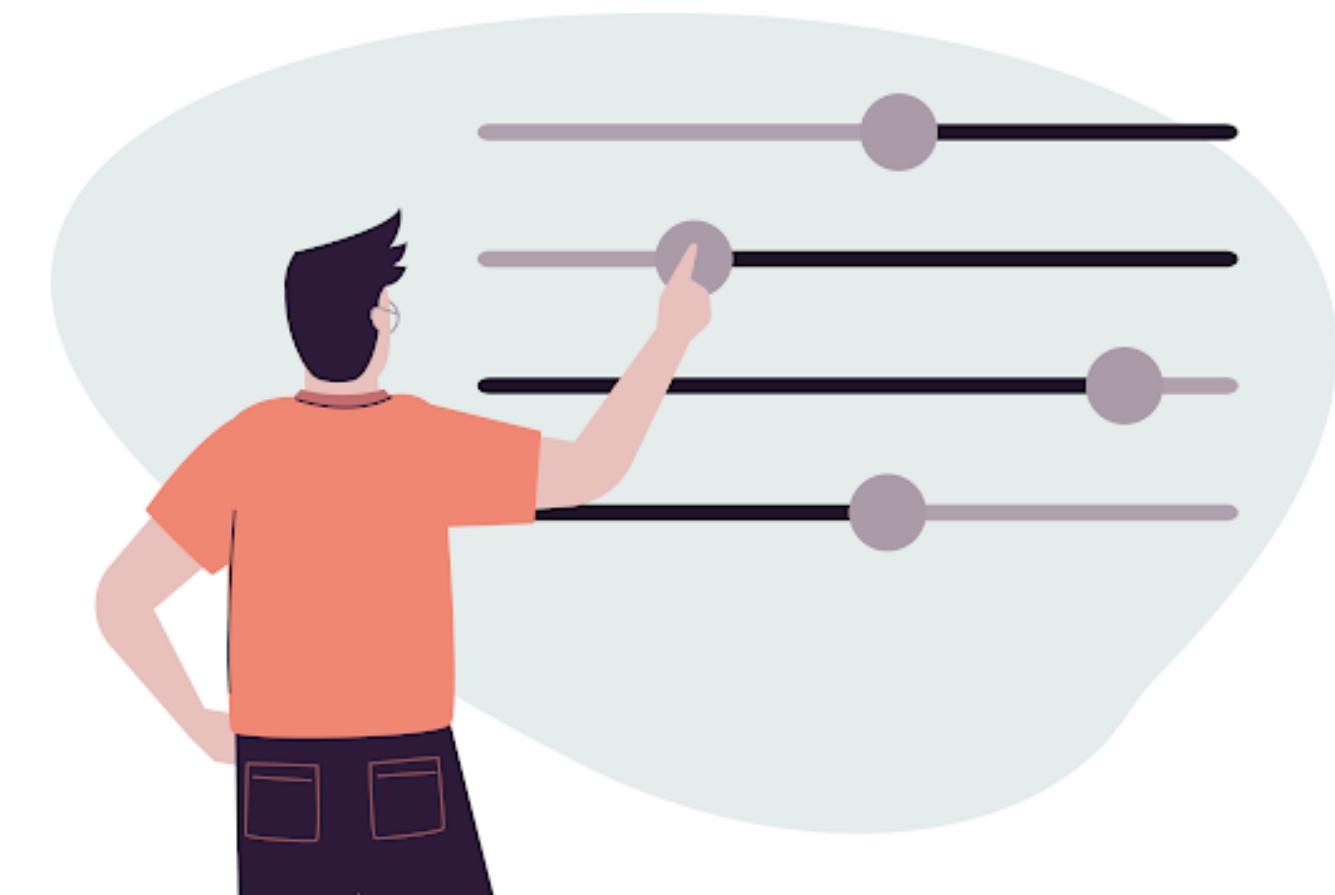
The goal is to use parameter controls to change variables, create tooltip visualizations, identify the relevant data analysis strategy, and create charts and graphs to visualize the data.

You will learn a few concepts in this lesson that will help you find a solution for the given scenario to achieve all of the above, as well as some additional features.

Parameters

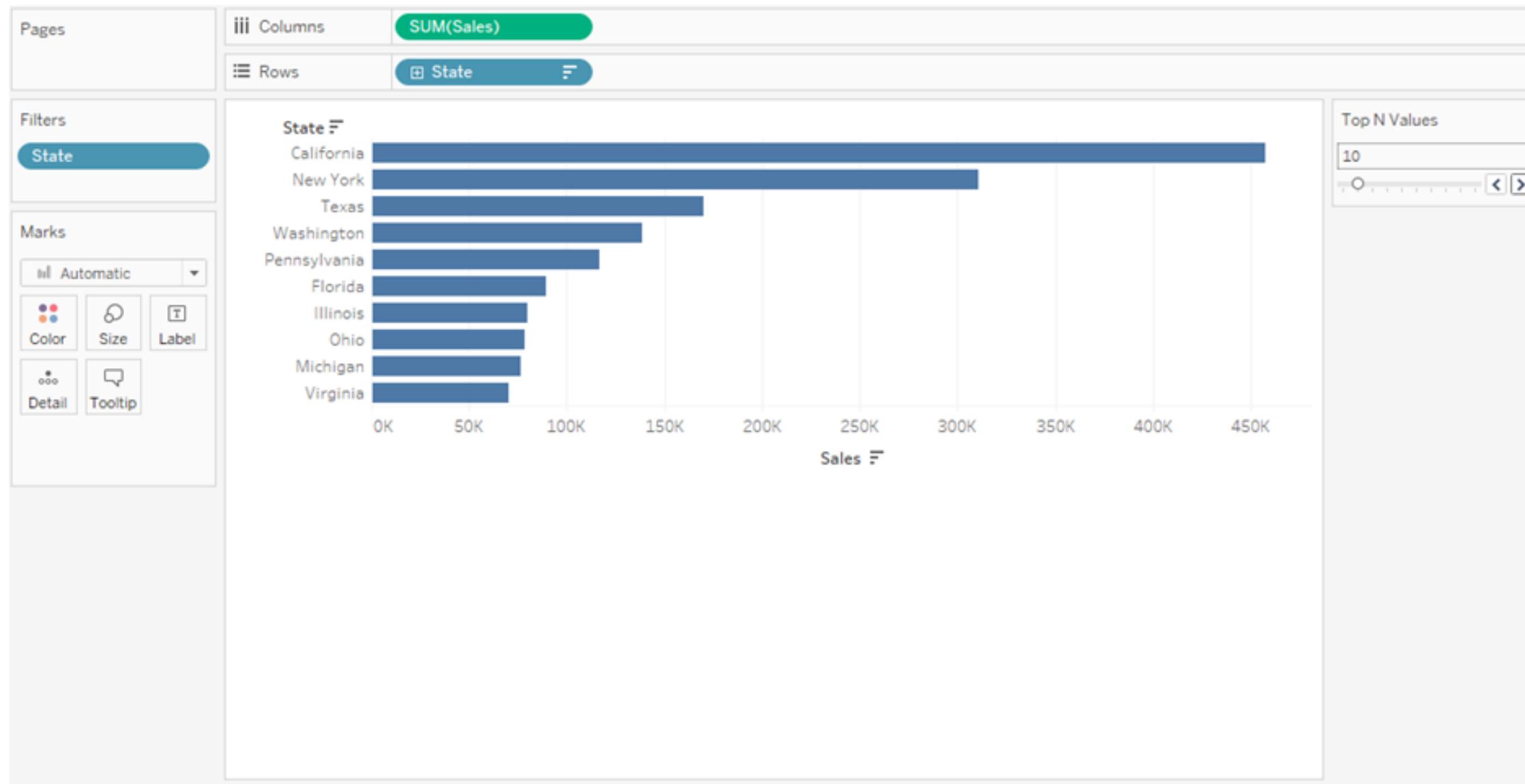
Parameters

Parameters are variables that can be changed at run time by the user using the parameter controls.



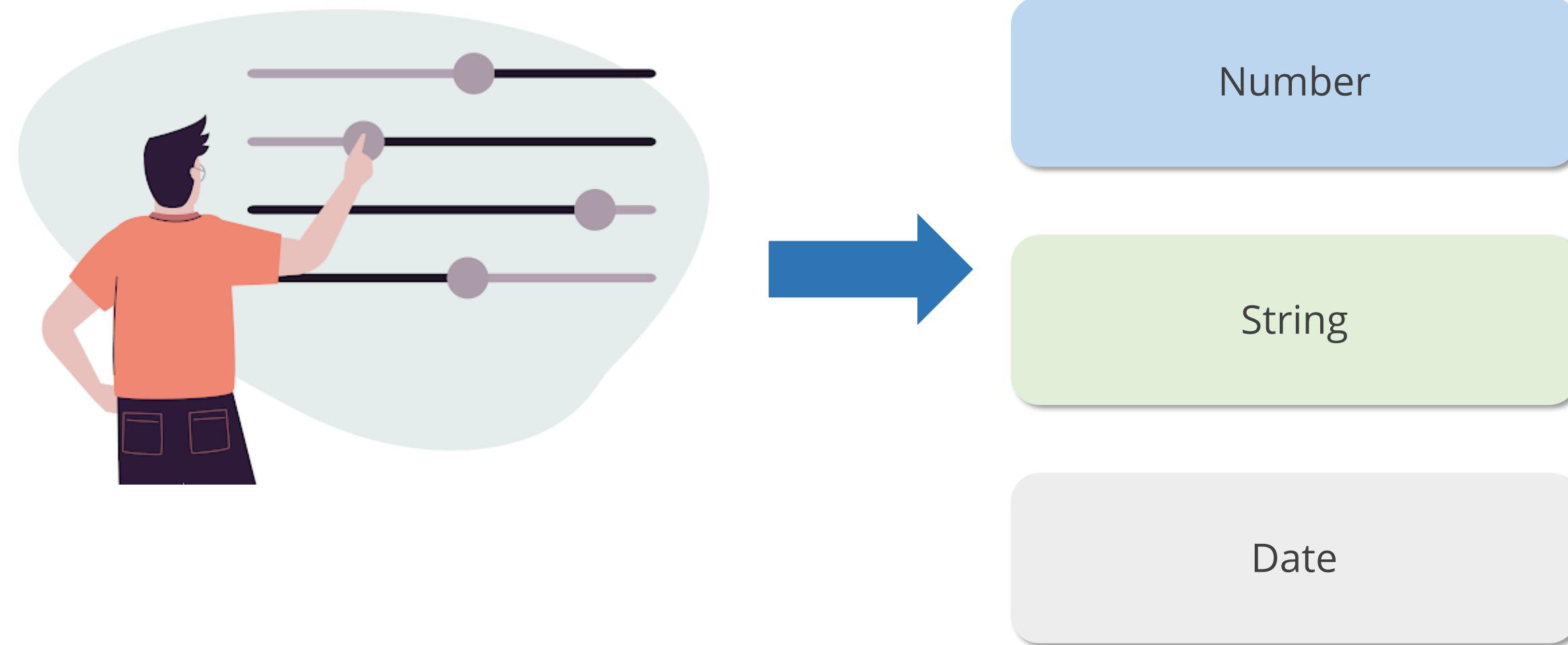
Parameters

Parameters provide interactivity and flexibility to a report and the ability to test out different scenarios.



Parameters

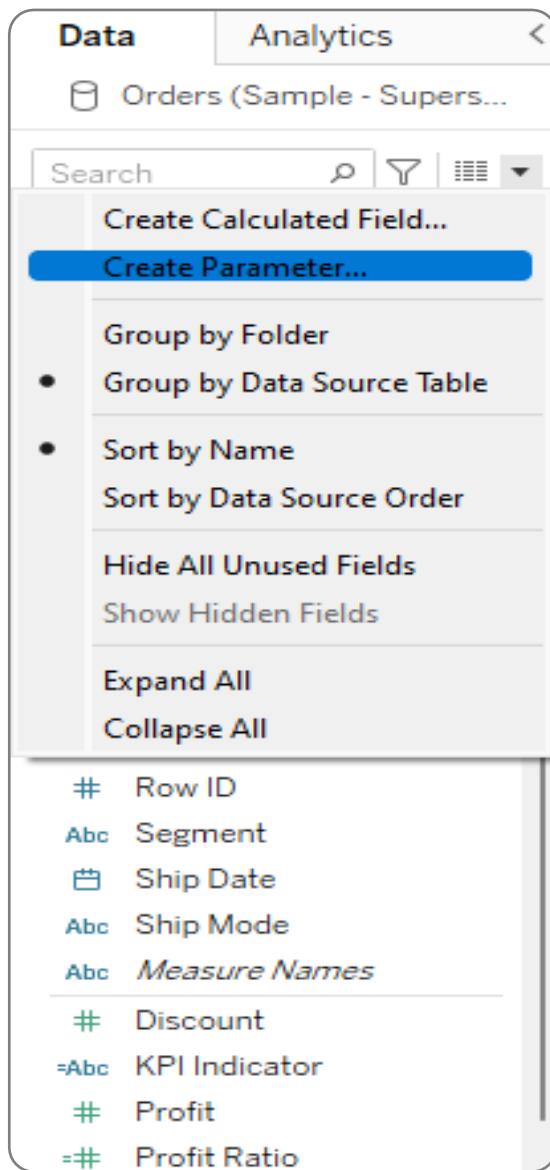
The values selected in parameters can replace constants in a calculated field.



Creating Parameters

Creating Parameters

Steps to create parameters from the data pane:

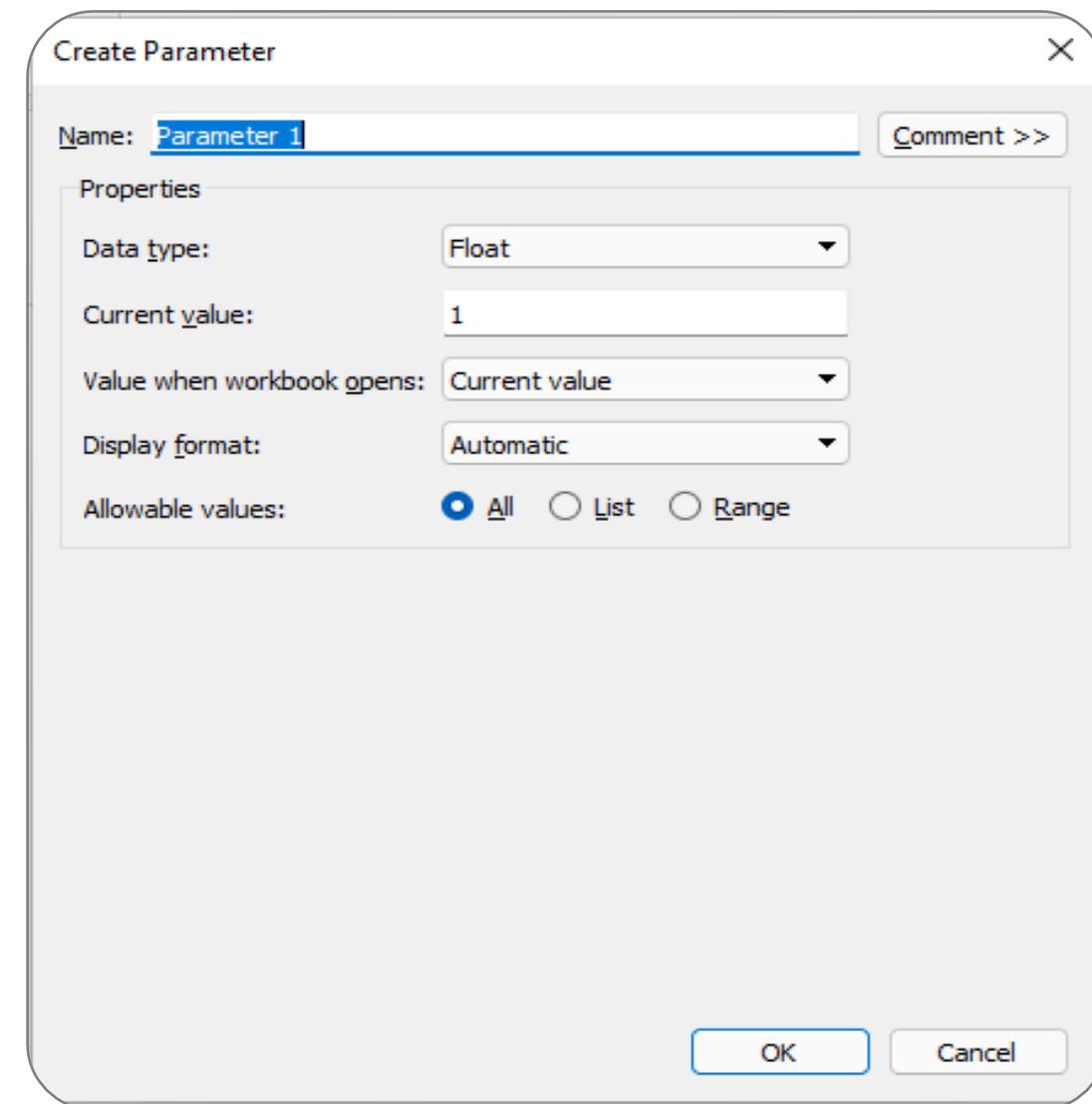


Step 1

Right-click on **Data** pane and select
Create Parameter

Creating Parameters

Steps to create parameters from the data pane:



Step 2

Create Parameter dialog box opens

Creating Parameters

Steps to create parameters from the data pane:

Create Parameter X

Name: Top N Values [Comment >>](#)

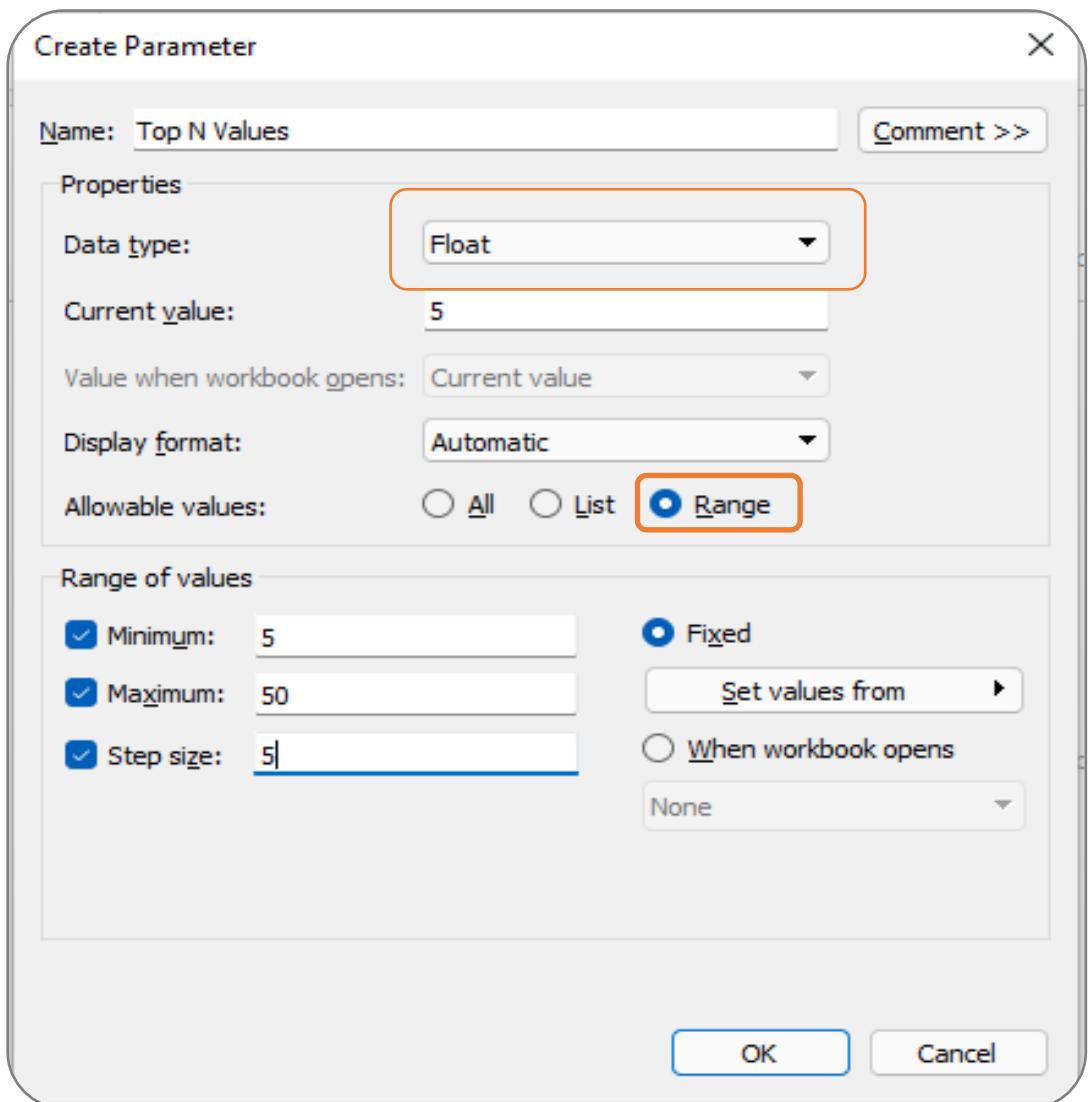
[Properties](#)

Step 3

Enter a name for the parameter

Creating Parameters

Steps to create parameters from the data pane:

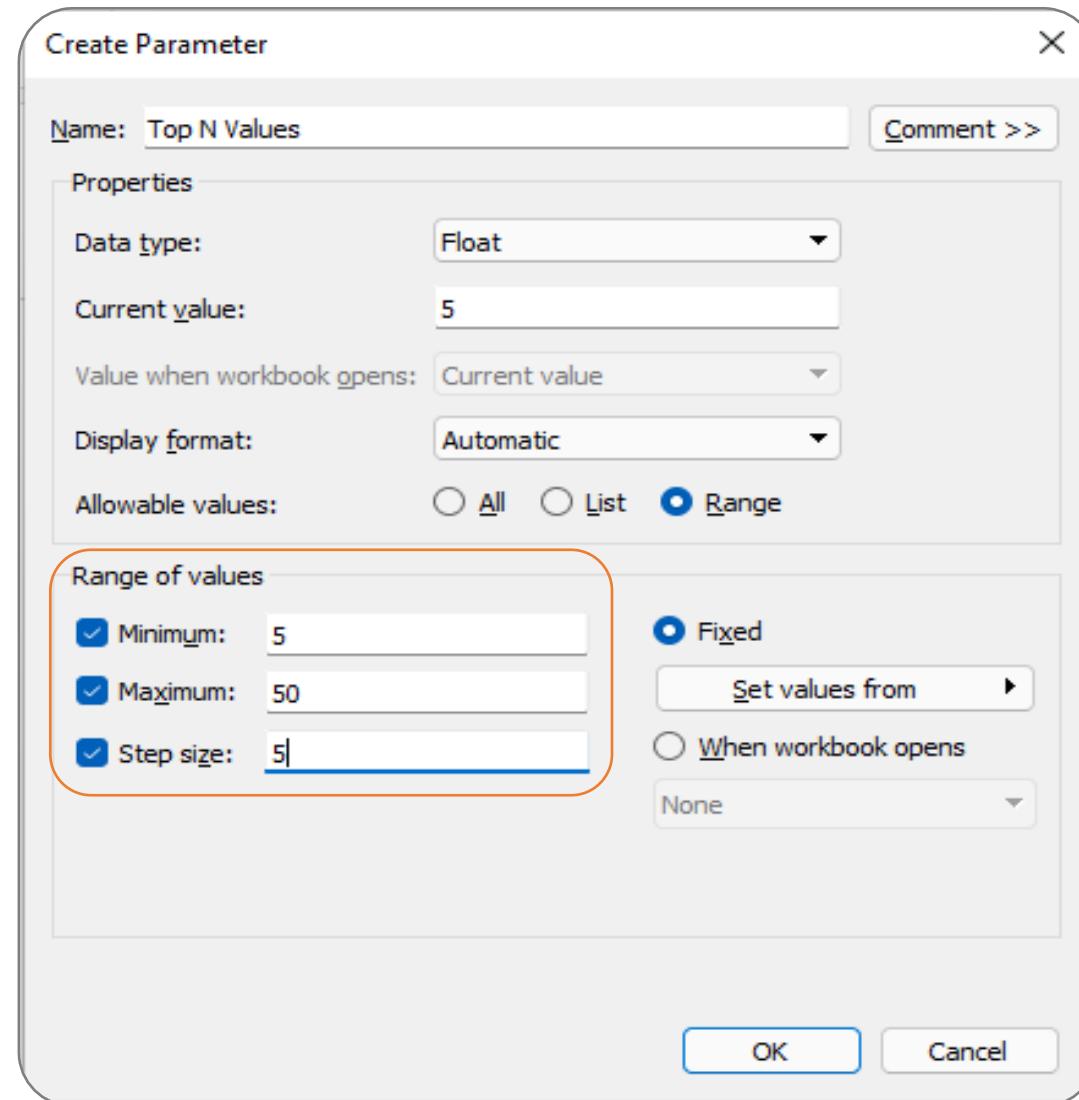


Step 4

Select the type as **Float** and click on the **Range** radio button

Creating Parameters

Steps to create parameters from the data pane:

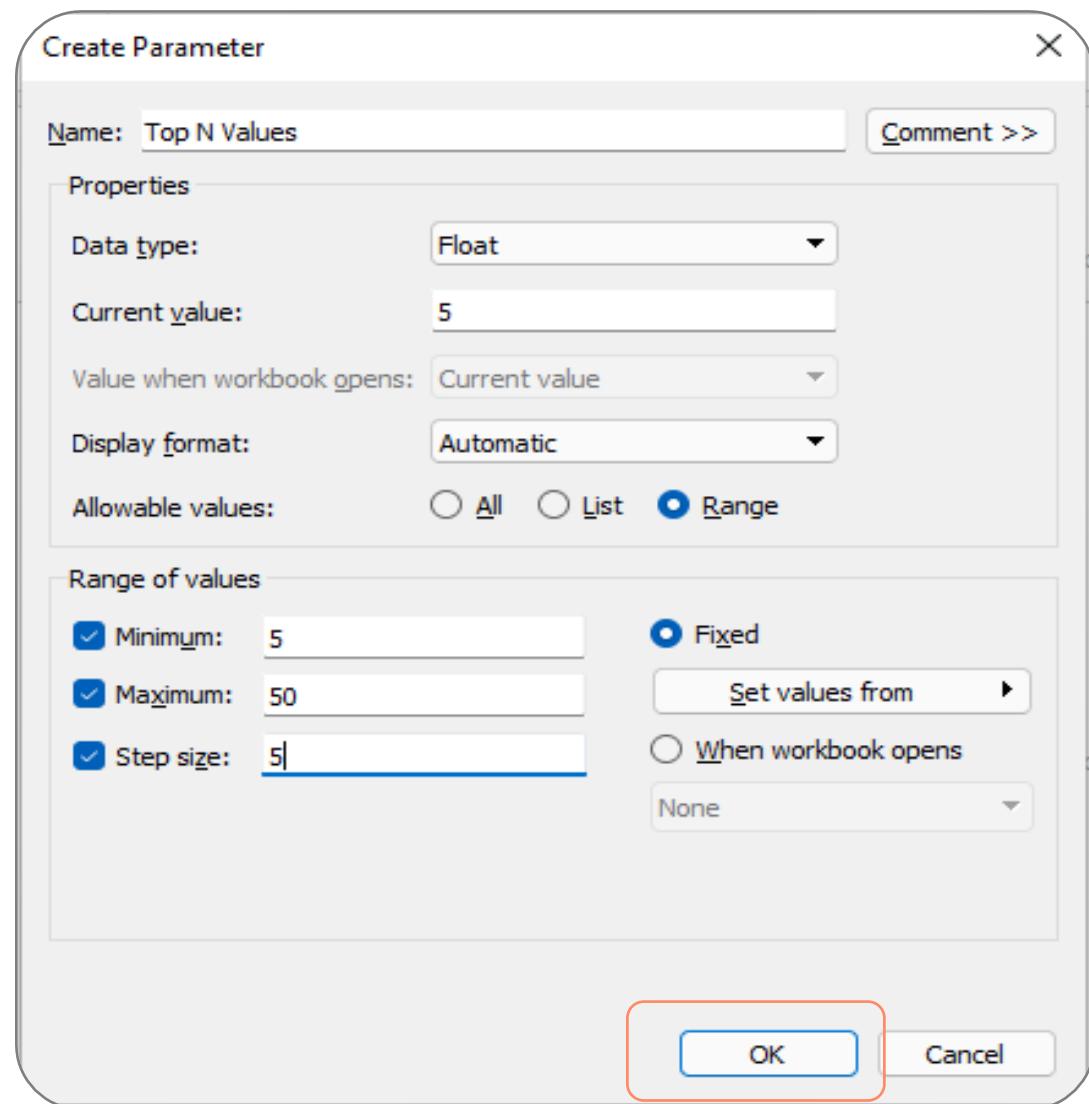


Step 5

Enter **Minimum** as 5, **Maximum** as 50,
and **Step size** as 5

Creating Parameters

Steps to create parameters from the data pane:



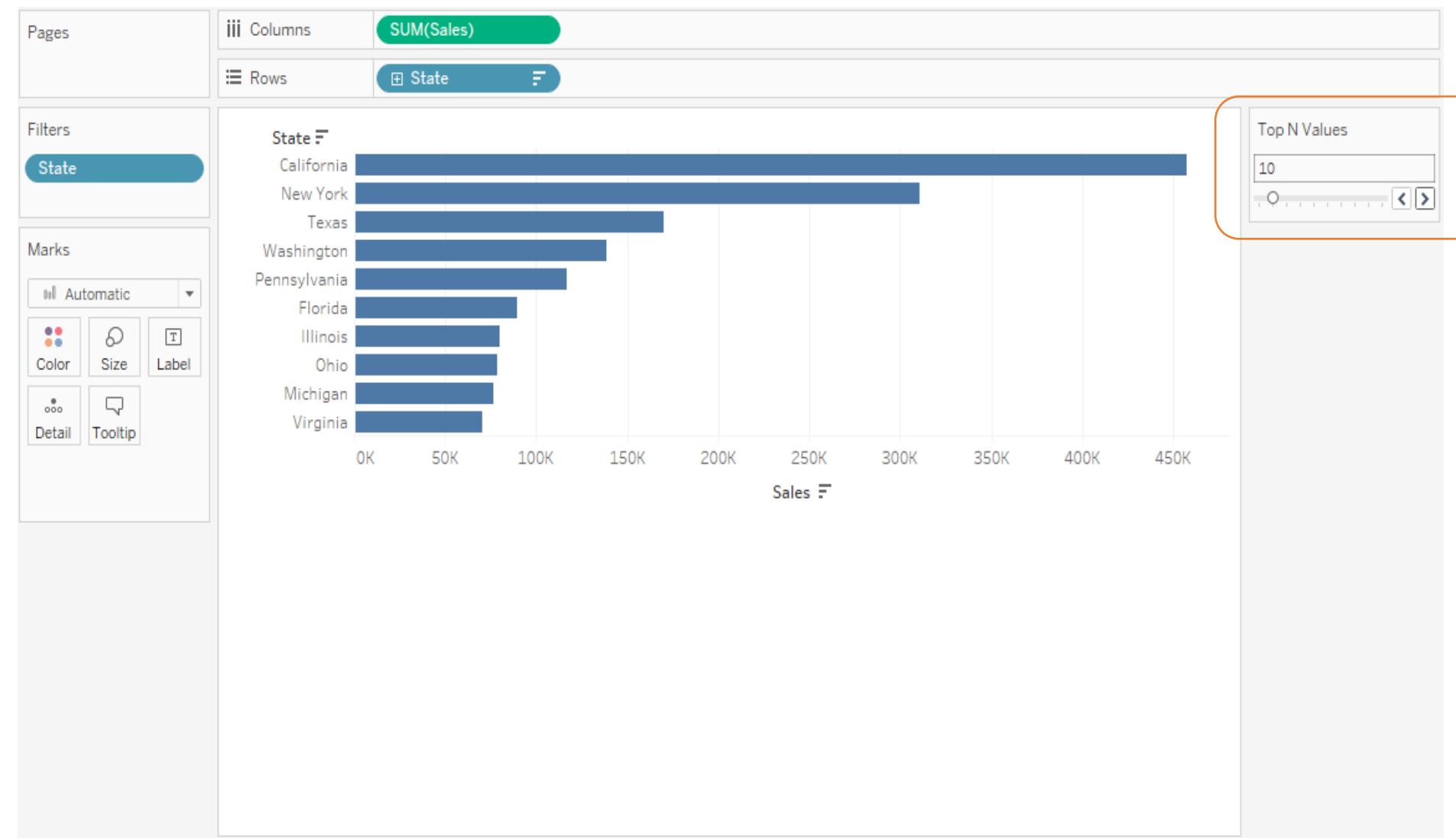
Step 6

Click **OK**

Parameters with Filters

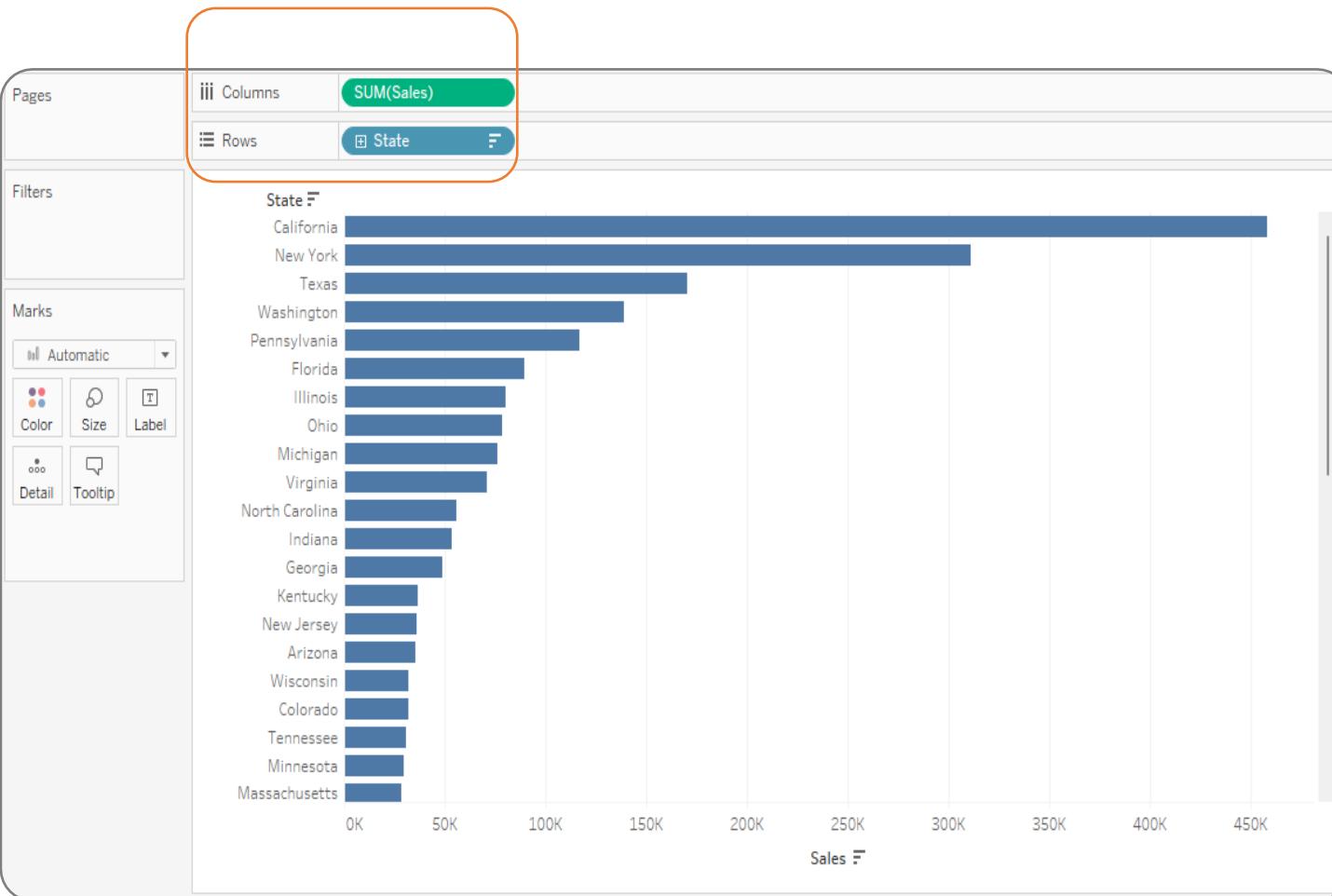
Parameters with Filters

Parameters are used as user inputs in filters. Below is one such scenario where a parameter selects the number of values to be displayed in a filter.



Parameters with Filters

The steps to create Top N filter are:

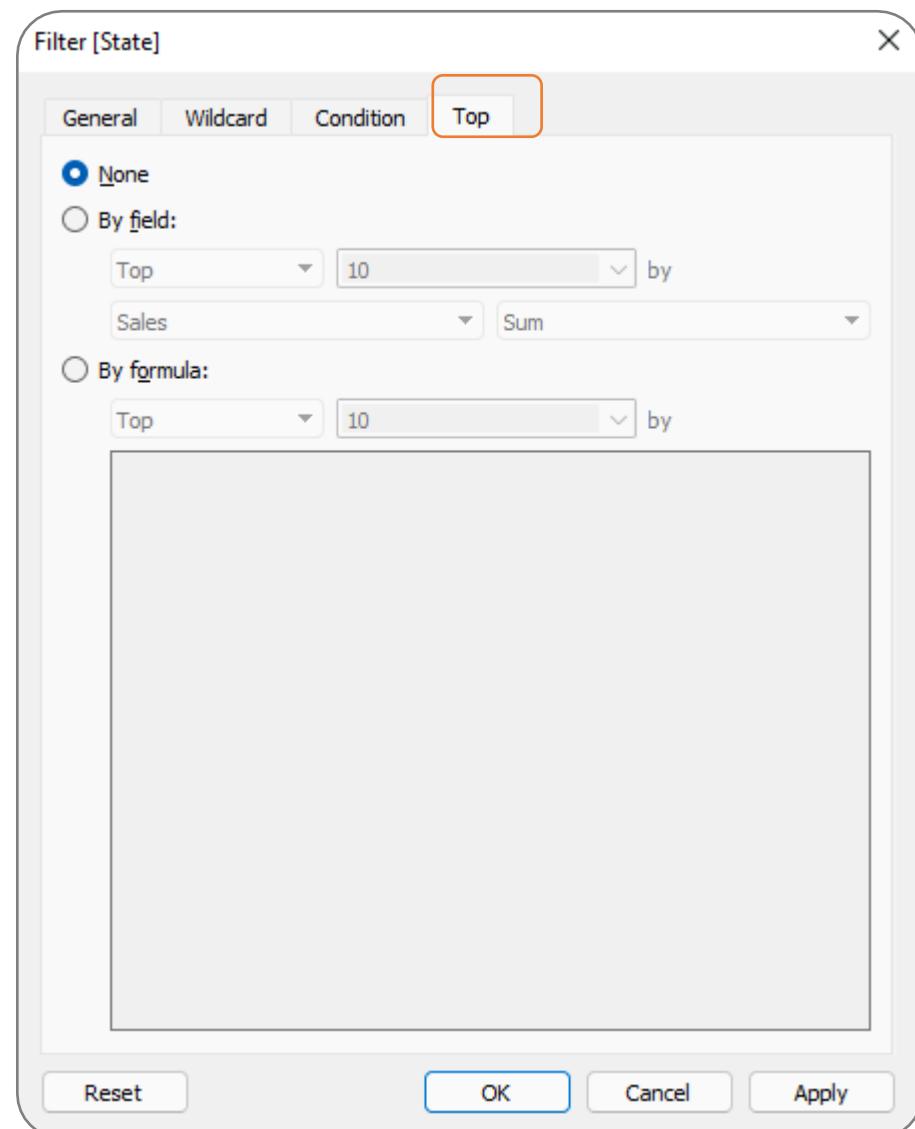


Step 1

Open a new visualization window
and drag **States** to **Rows** and **Sales** to
Columns

Parameters with Filters

The steps to create Top N filter are:

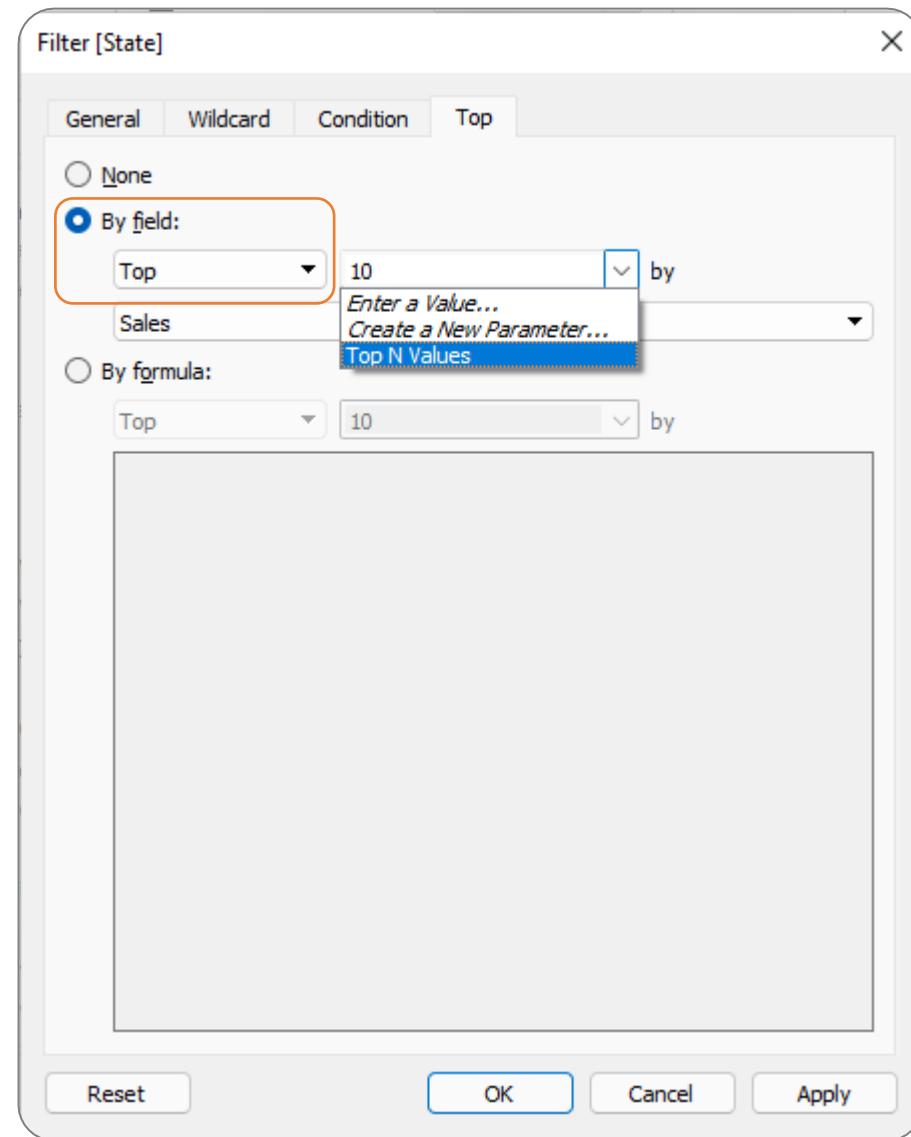


Step 2

Drag **State** to **Filter** and select **Top**

Parameters with Filters

The steps to create Top N filter are:

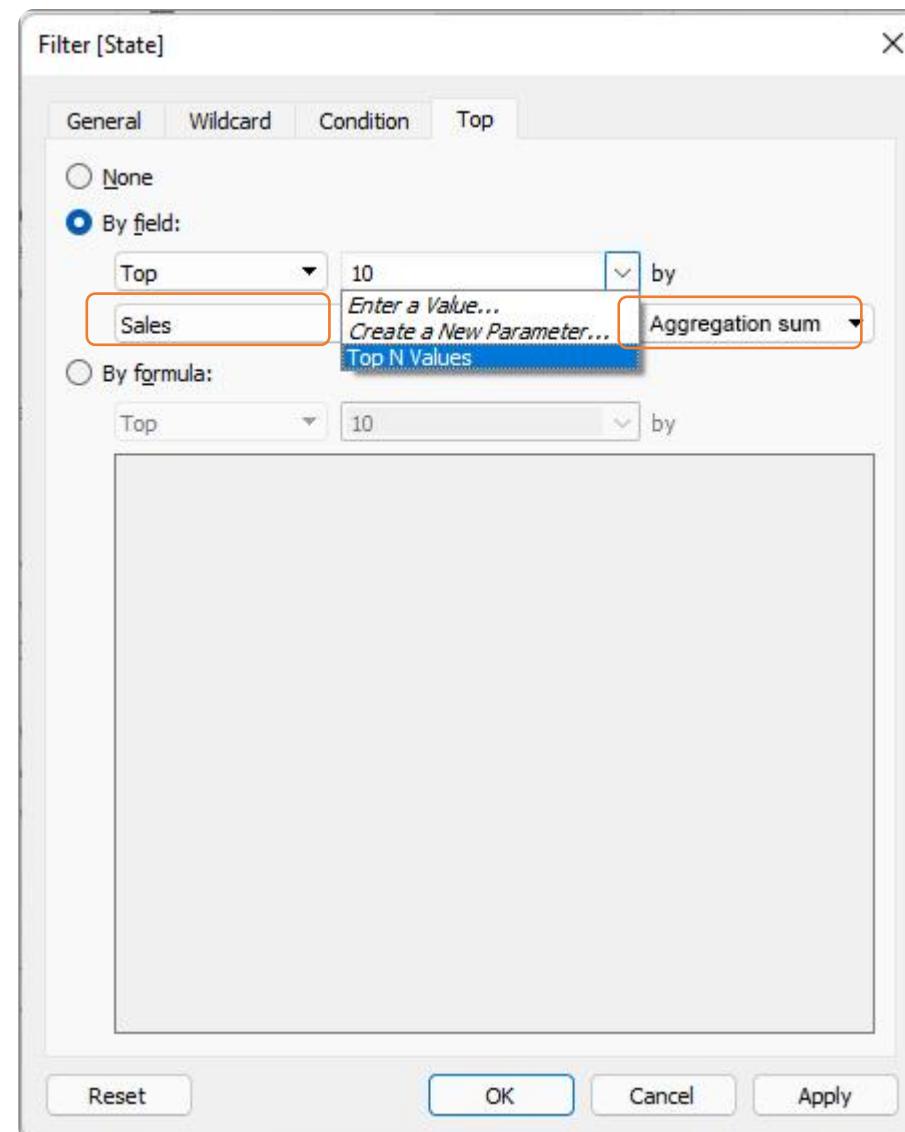


Step 3

Select **By Field** and then select **Top**

Parameters with Filters

The steps to create Top N filter are:

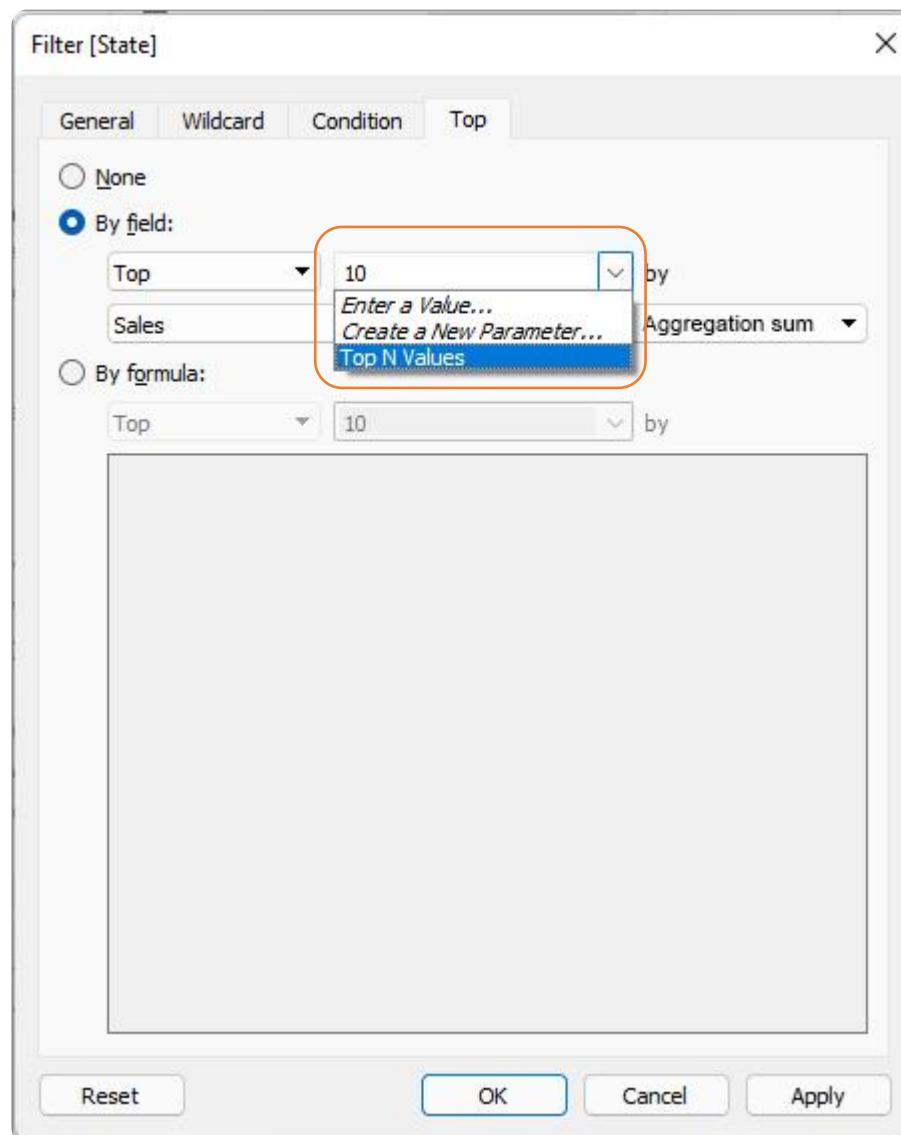


Step 4

Select **Sales**, then **Aggregation sum**,
and click **OK**

Parameters with Filters

The steps to create Top N filter are:

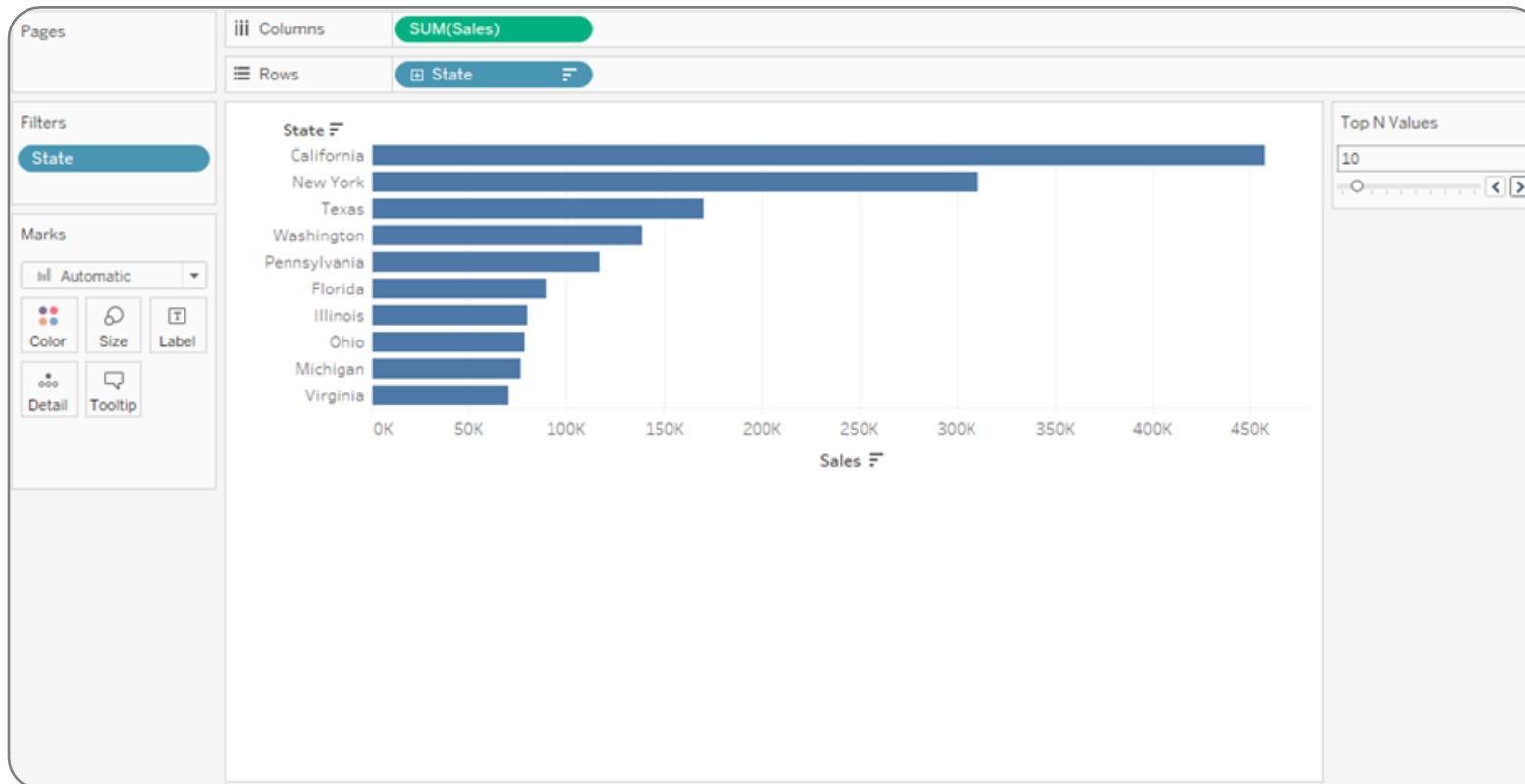


Step 5

Under values, choose the parameter
Top N Values

Parameters with Filters

The steps to create Top N filter are:



Step 6

Change the parameter values in the **Parameter Control** and look at how the visualization changes

Parameters in Calculations

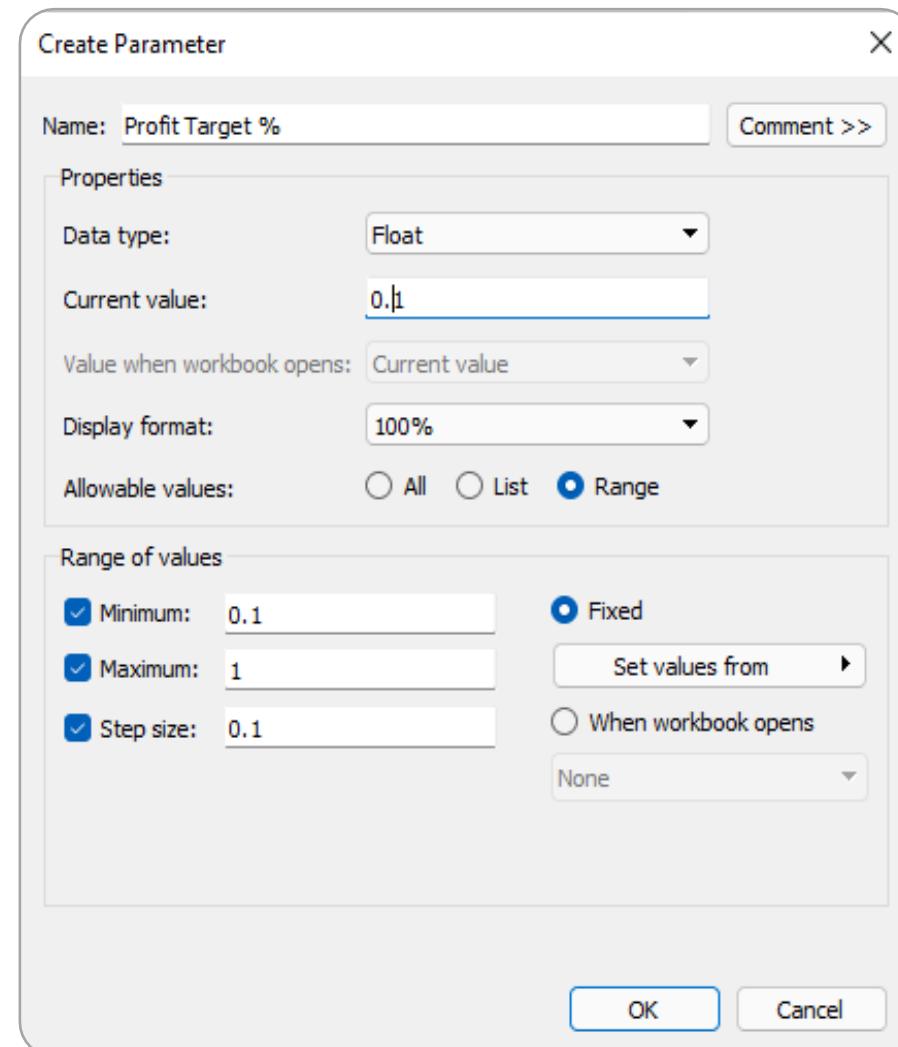
Parameters in Calculations

Parameters can be used in computed fields to make visualizations more interactive. As a result, the chart will become more dynamic.



Parameters in Calculations

Steps to extrapolate sales to reach profit targets:

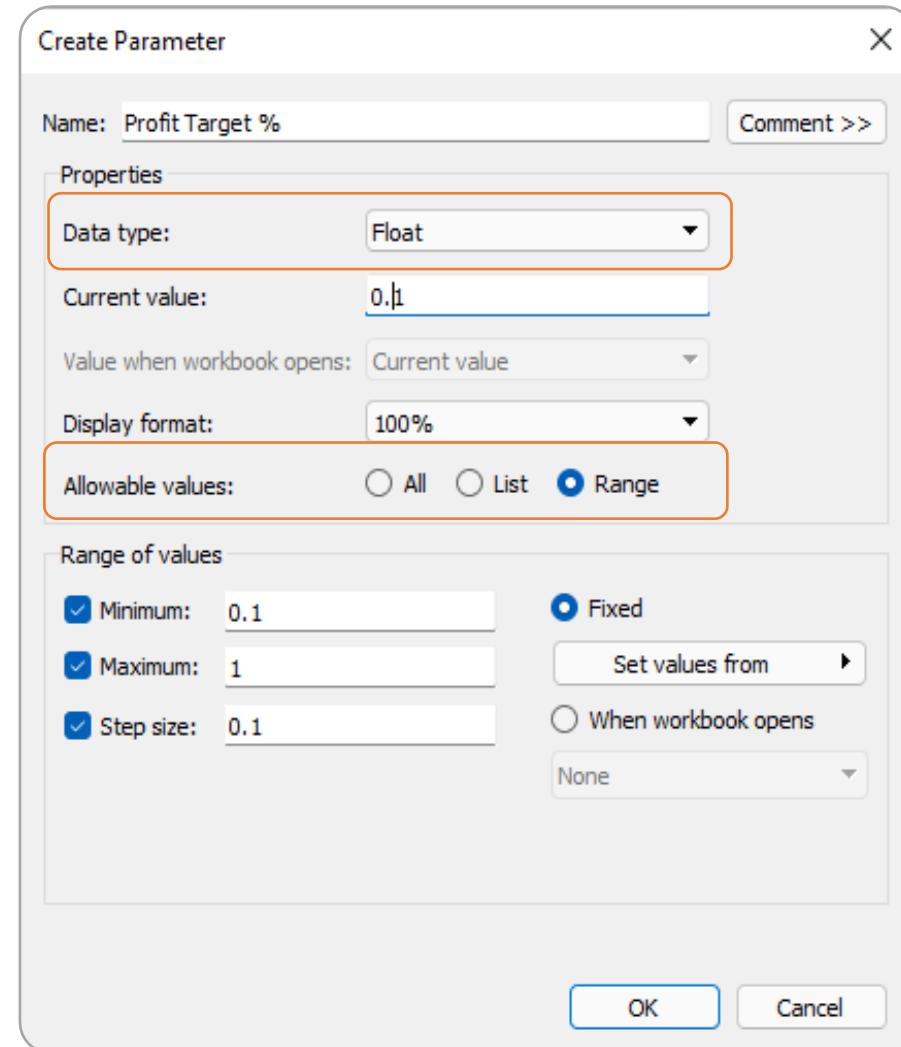


Step 01:

Create a Parameter for **Profit Target %** to select the increased targeted profit.

Parameters in Calculations

Steps to extrapolate sales to reach profit targets:



Step 02:

Select Data type as **Float** and Allowable values as **Range**

Parameters in Calculations

Steps to extrapolate sales to reach profit targets:



Step 03:

Create a calculated field to calculate the **Expected Sales** to achieve the increment in profit, based on the value selected in the parameter

Parameters in Calculations

Steps to extrapolate sales to reach profit targets:

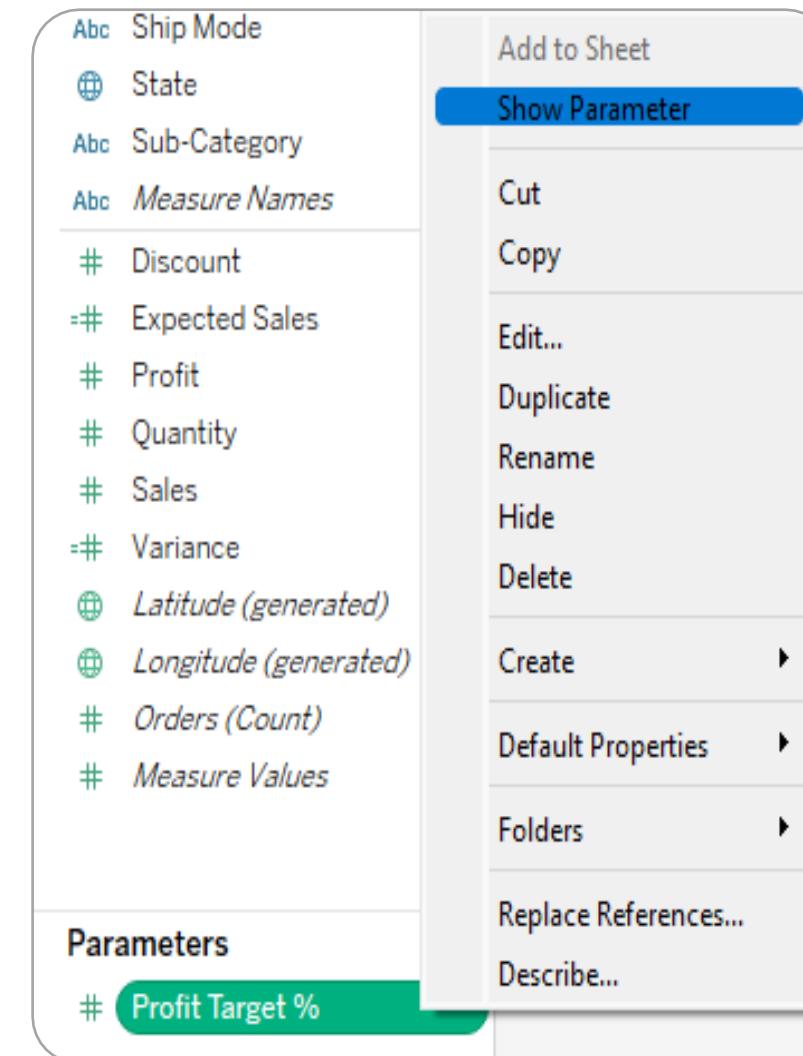


Step 04:

Create a calculated field **Variance** to calculate the variance between actual sales and expected sales and change the default property to display in %

Parameters in Calculations

Steps to extrapolate sales to reach profit targets:



Step 05:

Right-click on a parameter and **Show Parameter** control

Parameters in Calculations

Steps to extrapolate sales to reach profit targets:

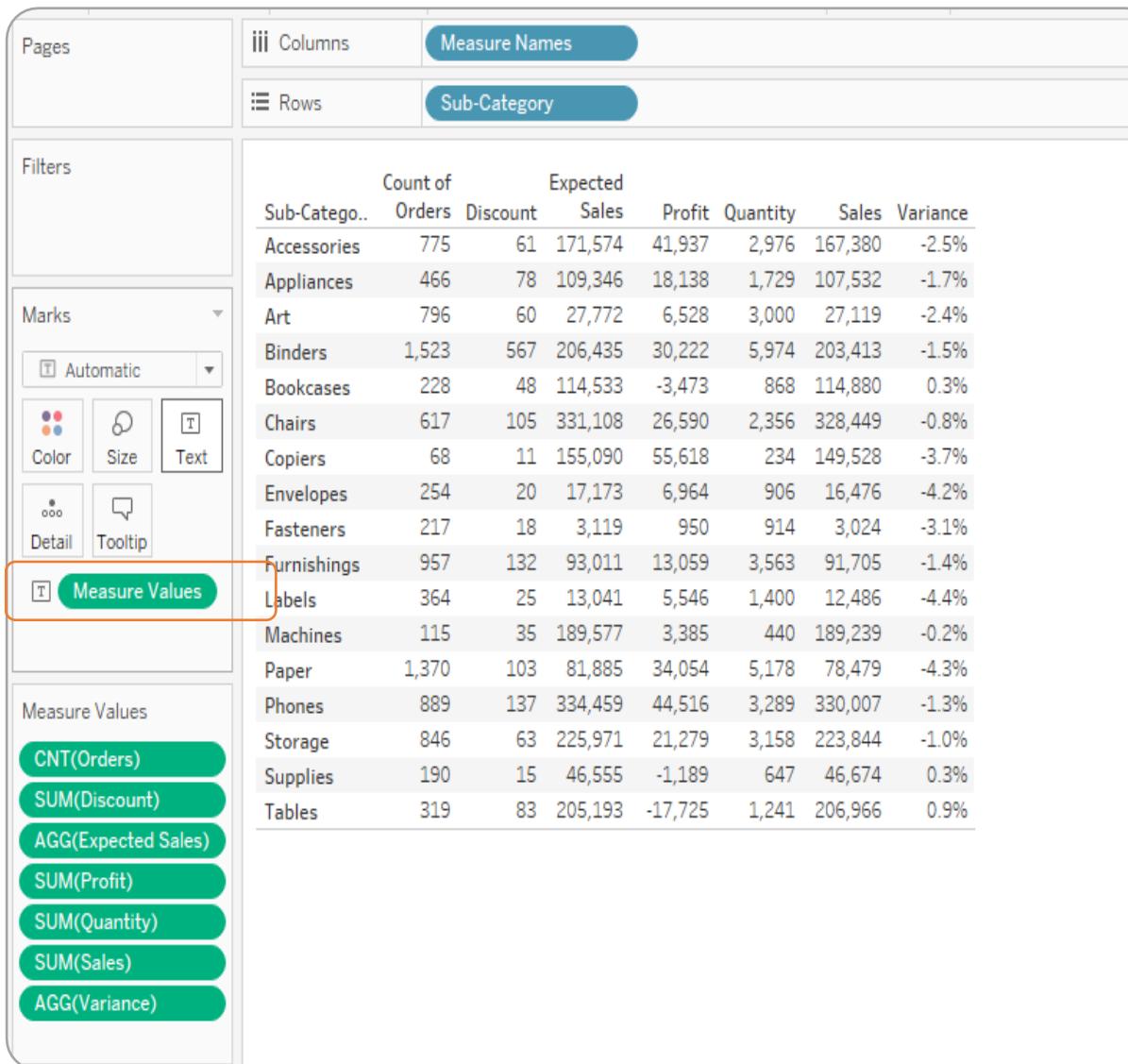
The screenshot shows the Tableau Data Source interface. On the left, there are sections for 'Pages' and 'Filters'. The main area is titled 'No Meas' and contains a list of categories: Accessories, Appliances, Art, Binders, Bookcases, Chairs, Copiers, Envelopes, Fasteners, Furnishings, Labels, Machines, Paper, Phones, Storage, Supplies, and Tables. Each category has a value 'Abc' next to it. On the right, there are two buttons: 'Columns' and 'Measure Names' (highlighted with an orange border), and 'Rows' and 'Sub-Category' (highlighted with a blue border). Below these buttons is a 'Marks' section with options: Automatic, Color, Size, Text, Detail, and Tooltip.

Step 06:

Drag **Sub-Category** to **Rows** and
Measure Names to **Columns**

Parameters in Calculations

Steps to extrapolate sales to reach profit targets:

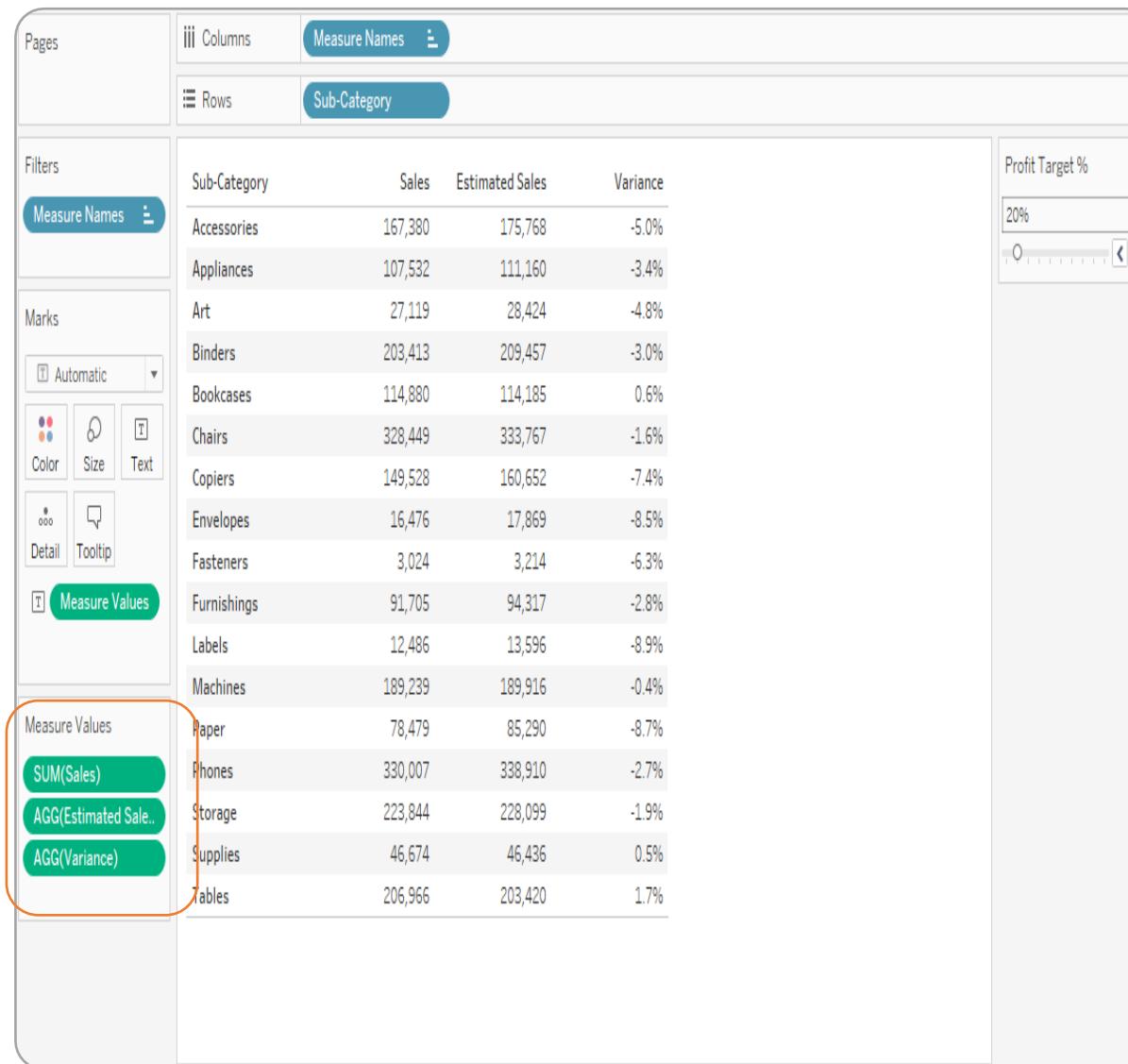


Step 07:

Drag Measure Values to Text

Parameters in Calculations

Steps to extrapolate sales to reach profit targets:

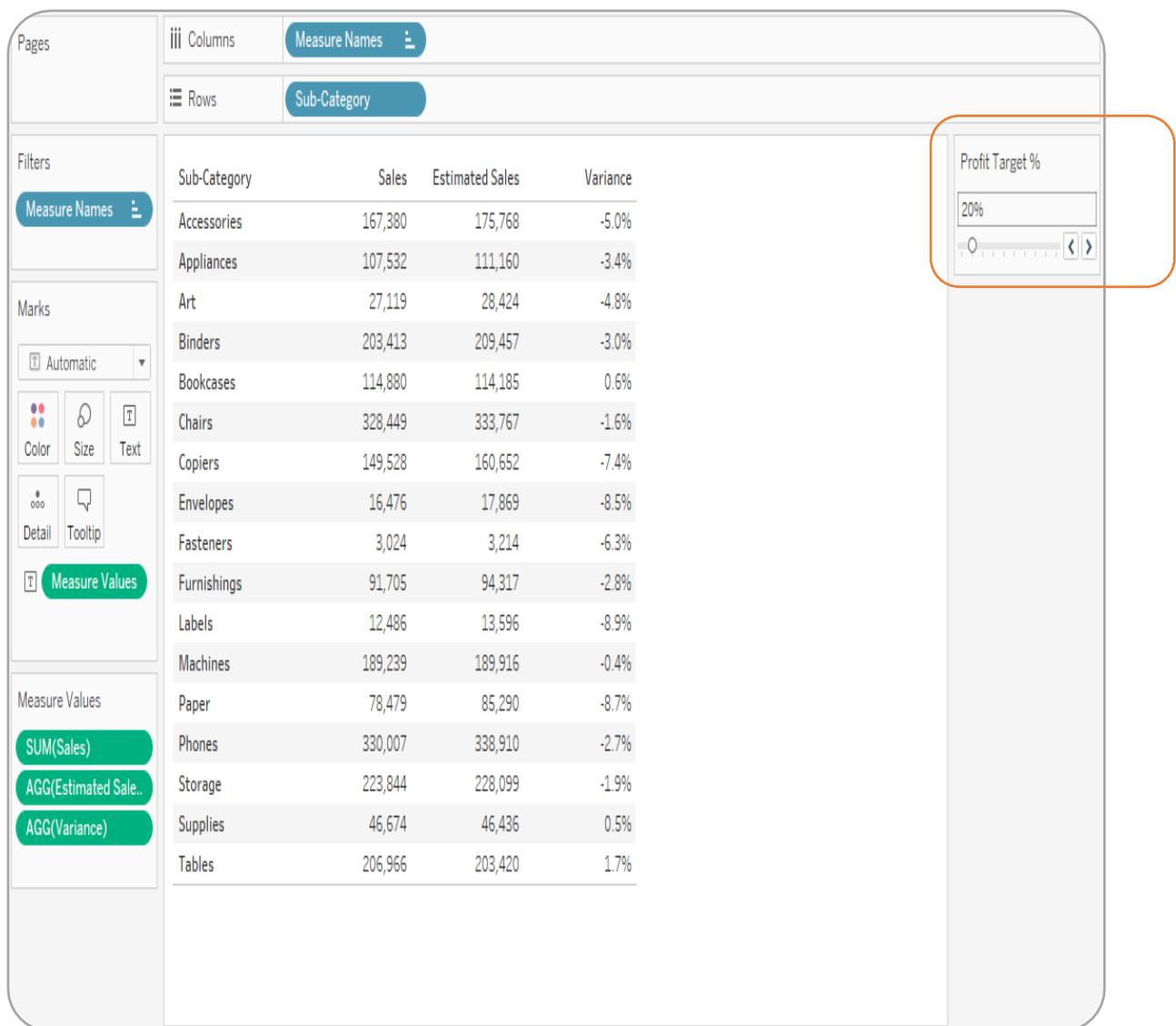


Step 08:

Keep **Sales**, **Expected Sales**, and
Variance % in Measure Values shelf
and remove the rest

Parameters in Calculations

Steps to extrapolate sales to reach profit targets:



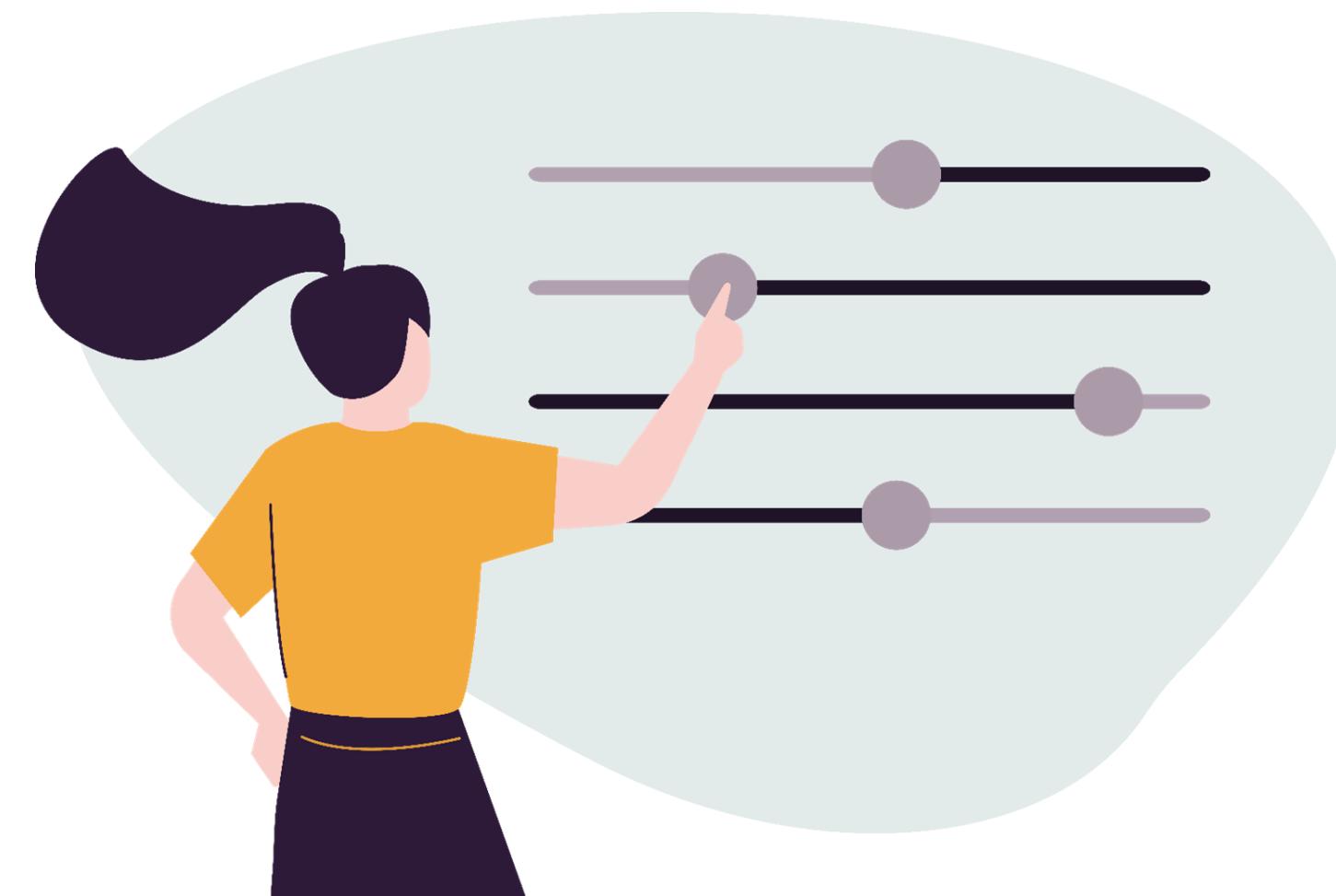
Step 09:

Change the parameter to showcase the increase in Profit % which will alter the Expected Sales and Variance % values.

Column Selection Parameters

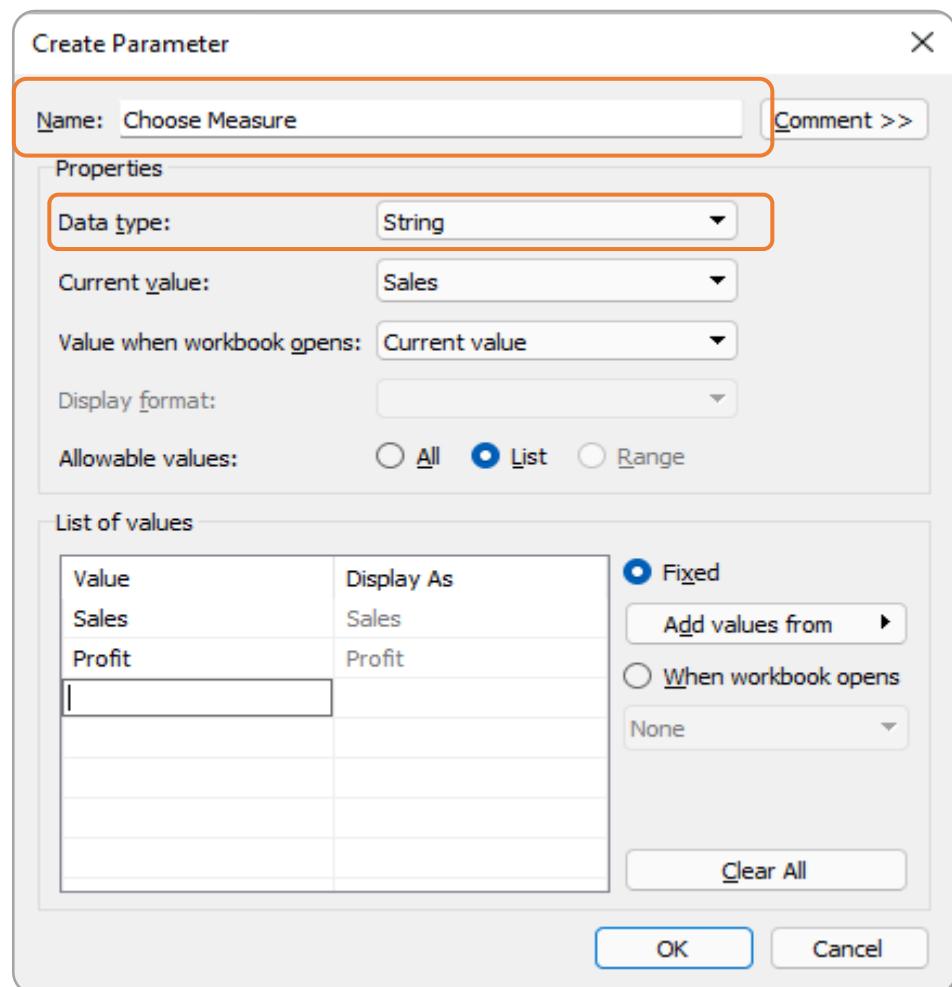
Column Selection Parameters

Different dimensions or measures can be chosen by using parameters and tying it to the visualization using another calculated field.



Column Selection Parameters

Steps to create column selection parameter:

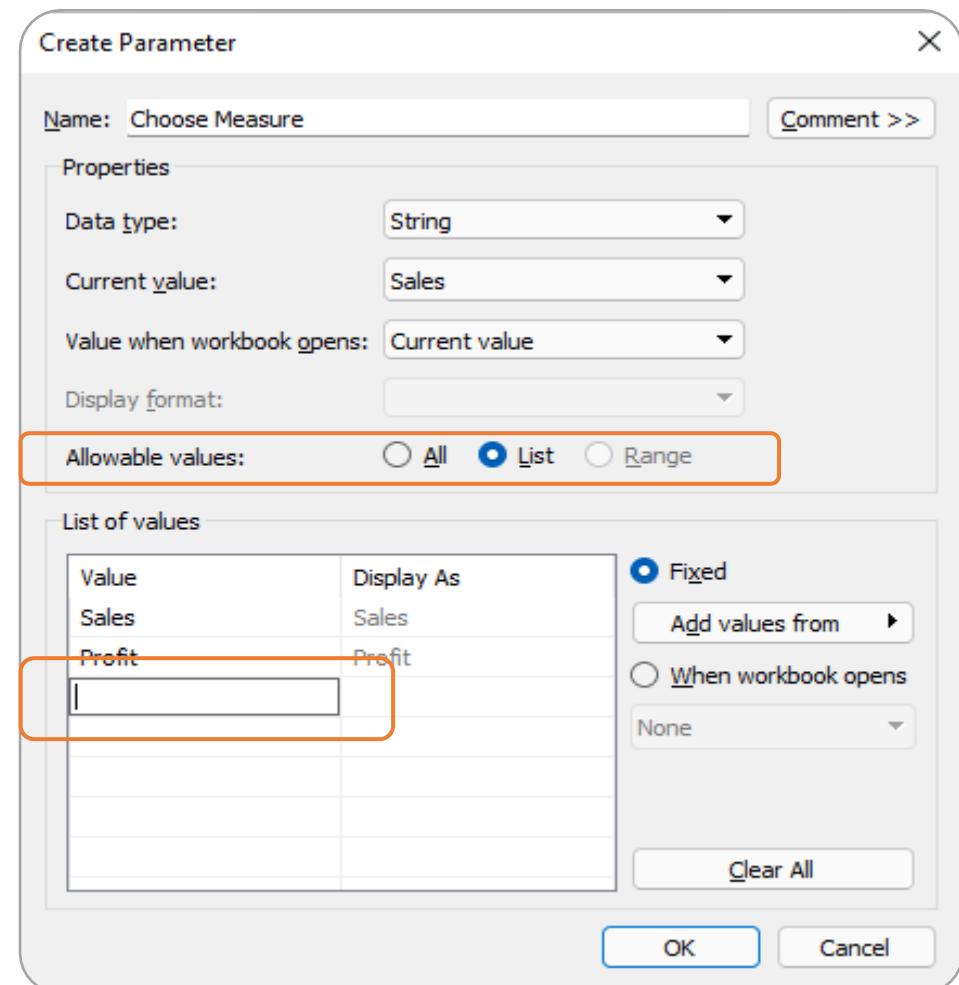


Step 1

Create parameter **Choose Measure** and **Data type as String**

Column Selection Parameters

Steps to create column selection parameter:

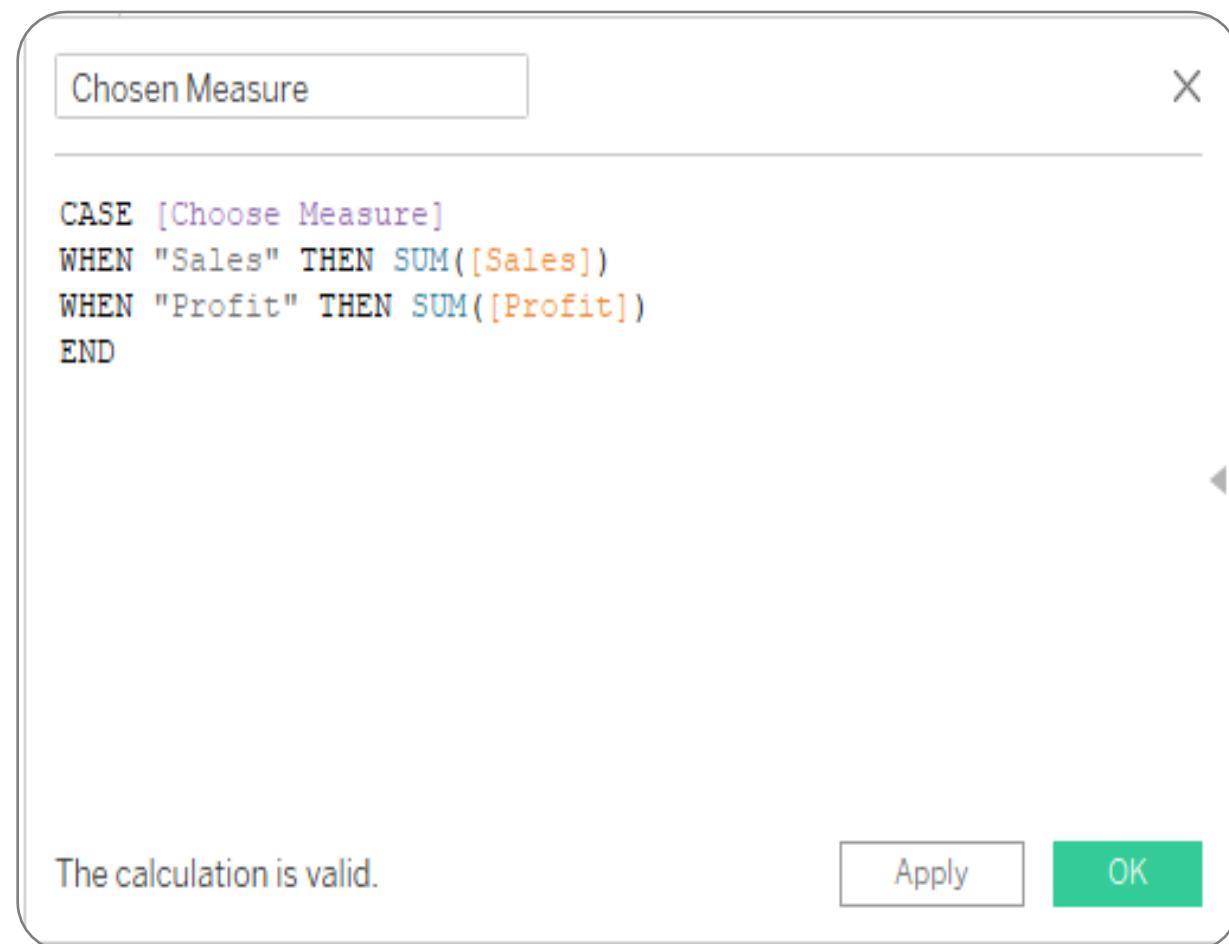


Step 2

Select **Allowable values** as **List** and
type it under **Value**

Column Selection Parameters

Steps to create column selection parameter:

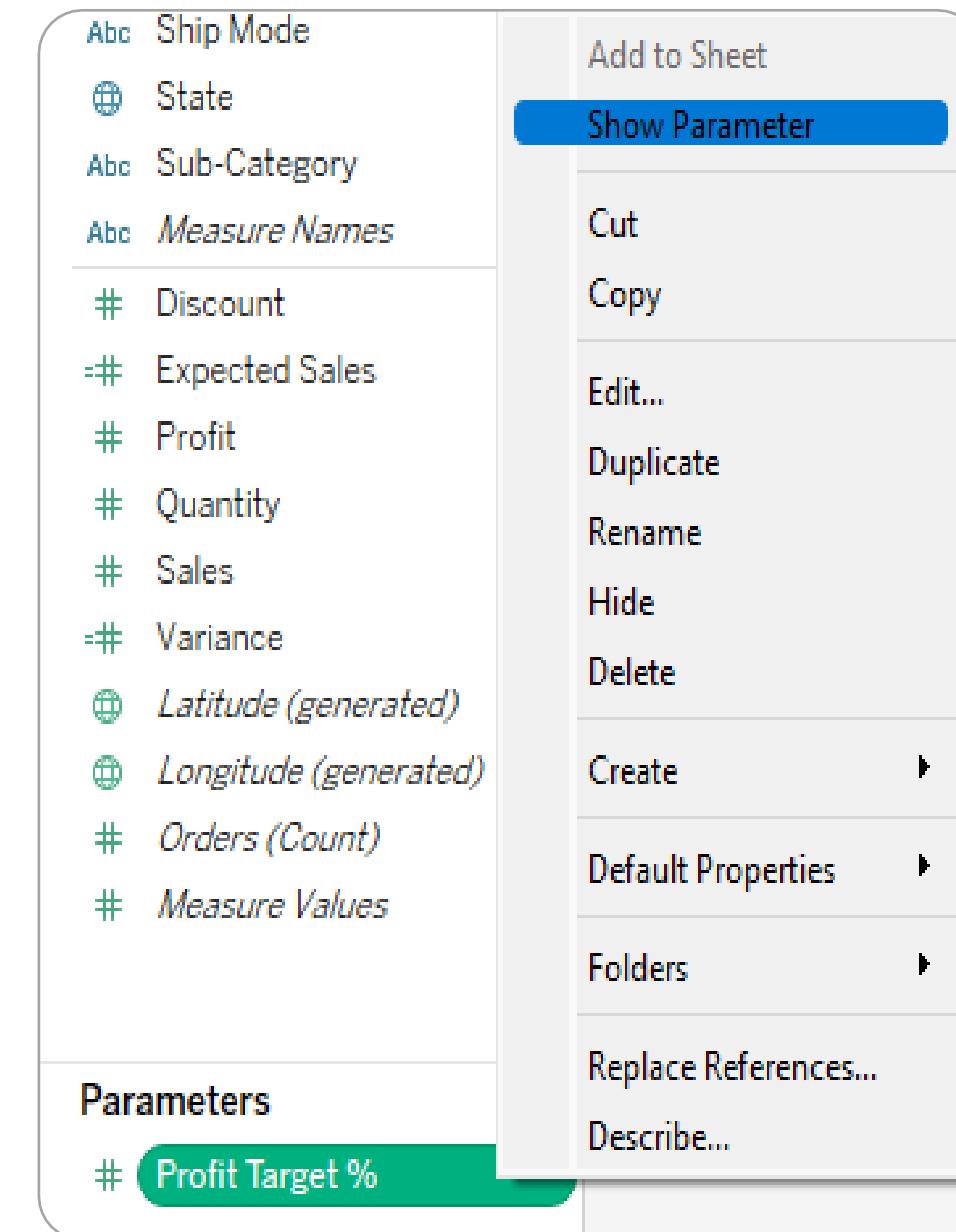


Step 3

Create a calculated field for **Chosen Measure** with the formula given in the image

Column Selection Parameters

Steps to create column selection parameter:

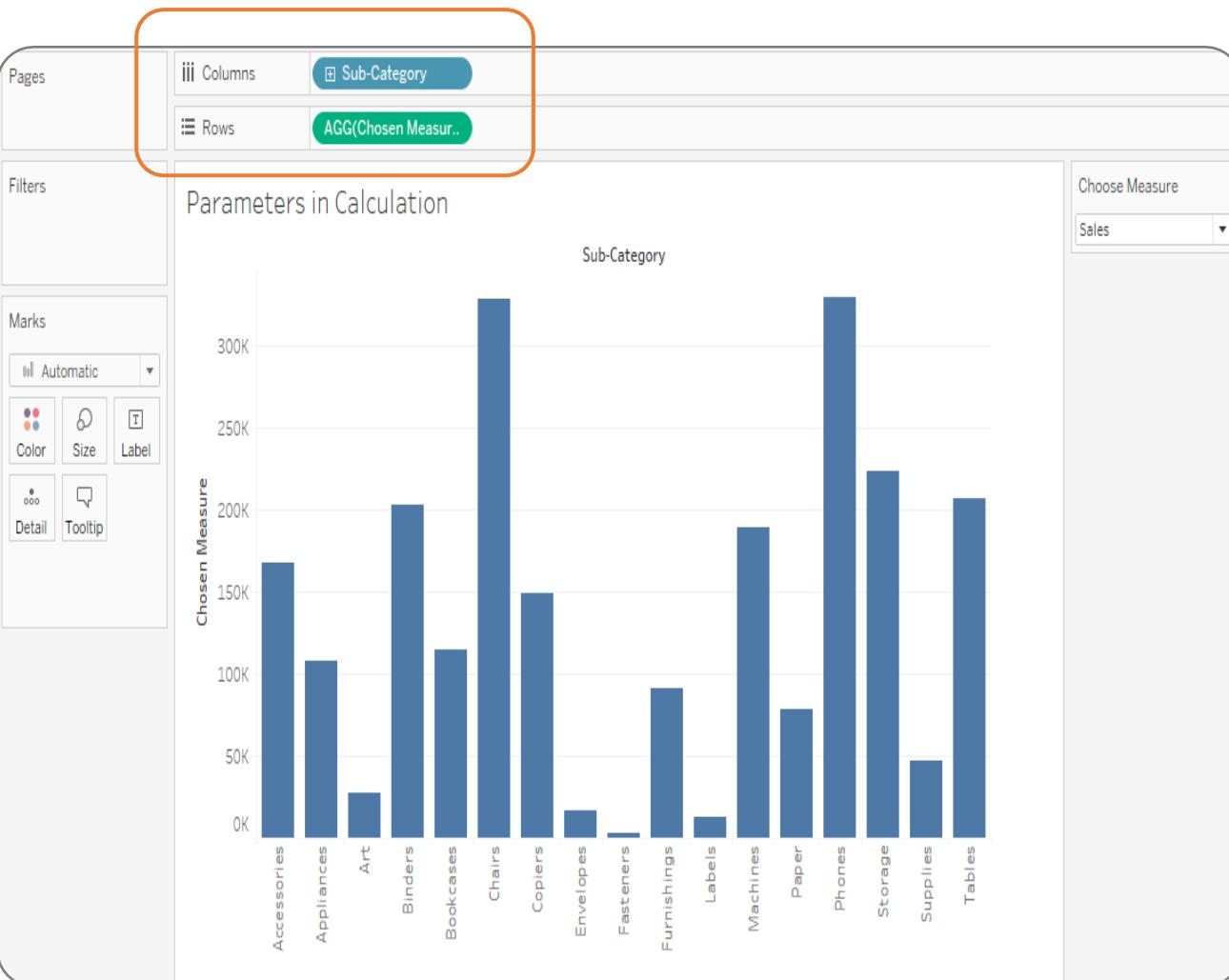


Step 4

Right-click on a parameter and **Show Parameter** control

Column Selection Parameters

Steps to create column selection parameter:

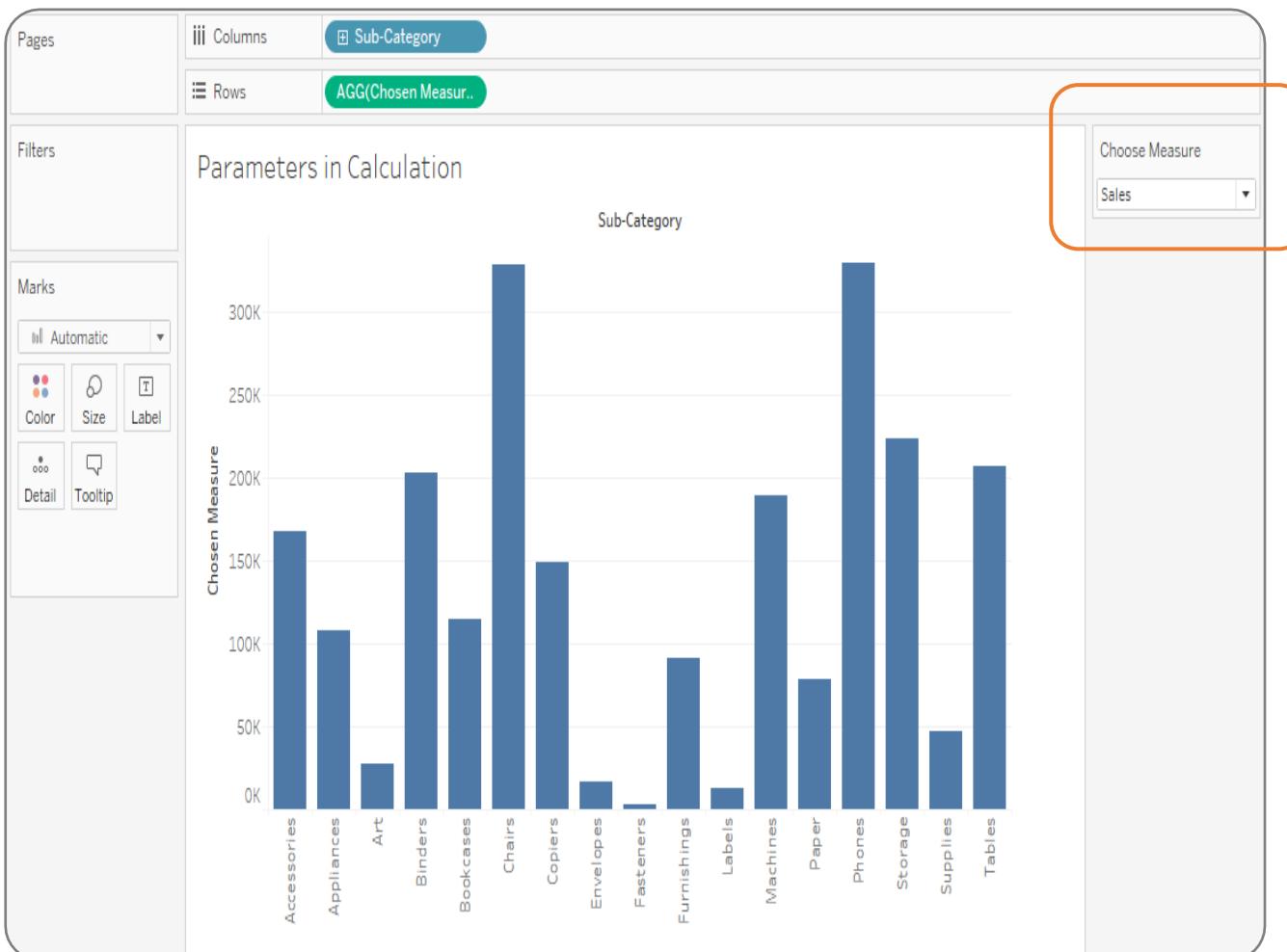


Step 5

Drag **Sub-Category** to **Columns** and
Chosen Measure to **Rows**

Column Selection Parameters

Steps to create column selection parameter:



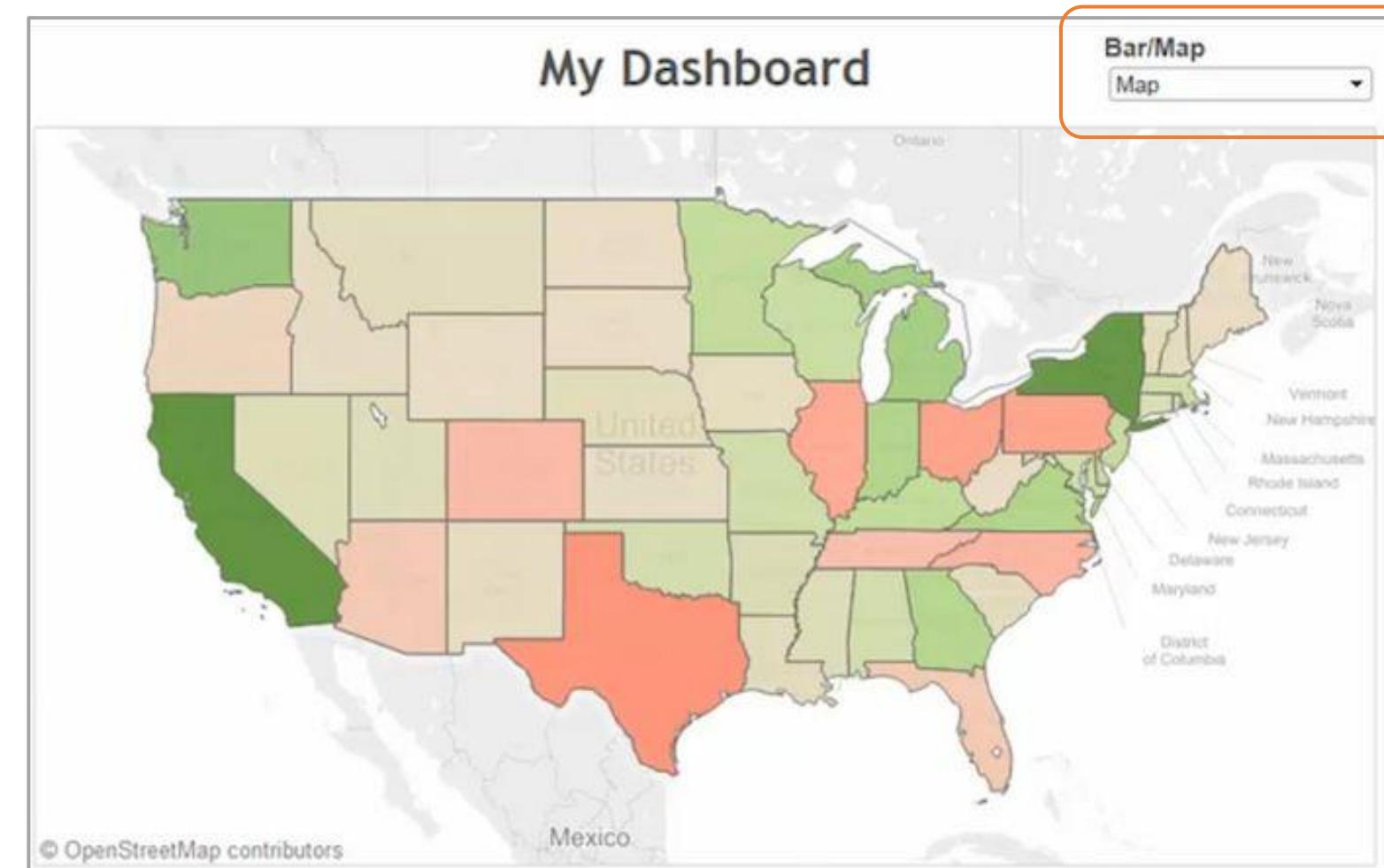
Step 6

Change parameter control from Sales to Profit and Profit to Sales to visualize the same chart displaying two measures based on the selection

Chart Selection Parameter

Chart Selection Parameter

Create a drop-down menu using a combination of a parameter and a calculated field.



The drop-down menu lets users to select an individual view that automatically expands to fill a dashboard.

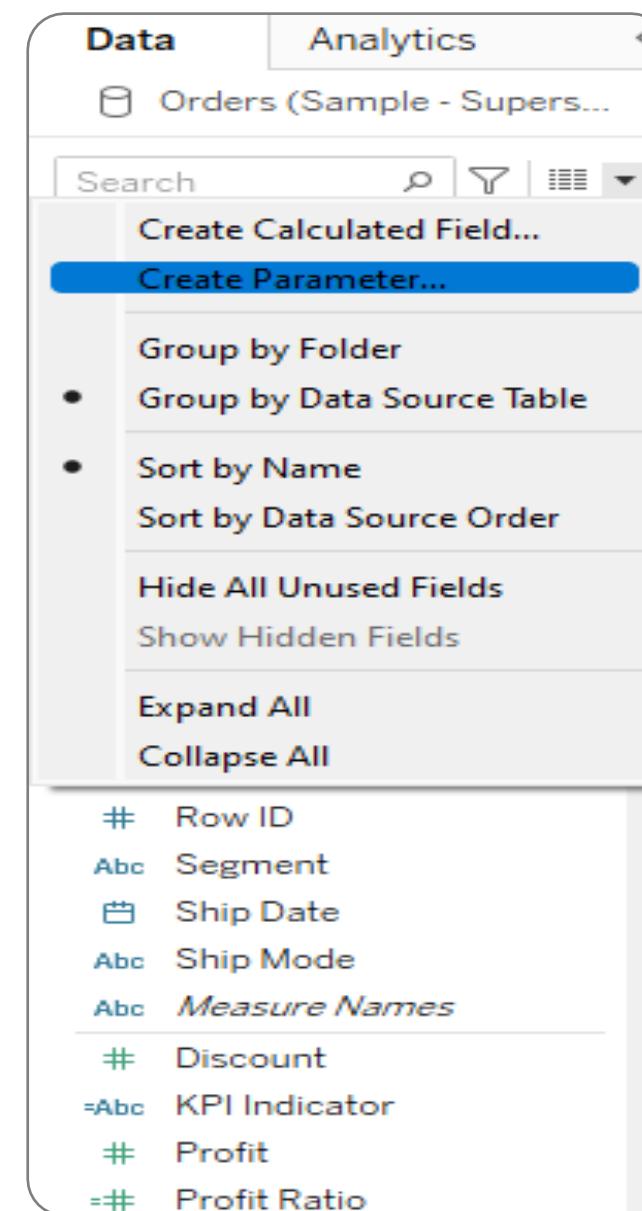
Chart Selection Parameter

Let's learn how to create a chart selection parameter as shown below:



Chart Selection Parameter

Steps to create a chart selection parameter:

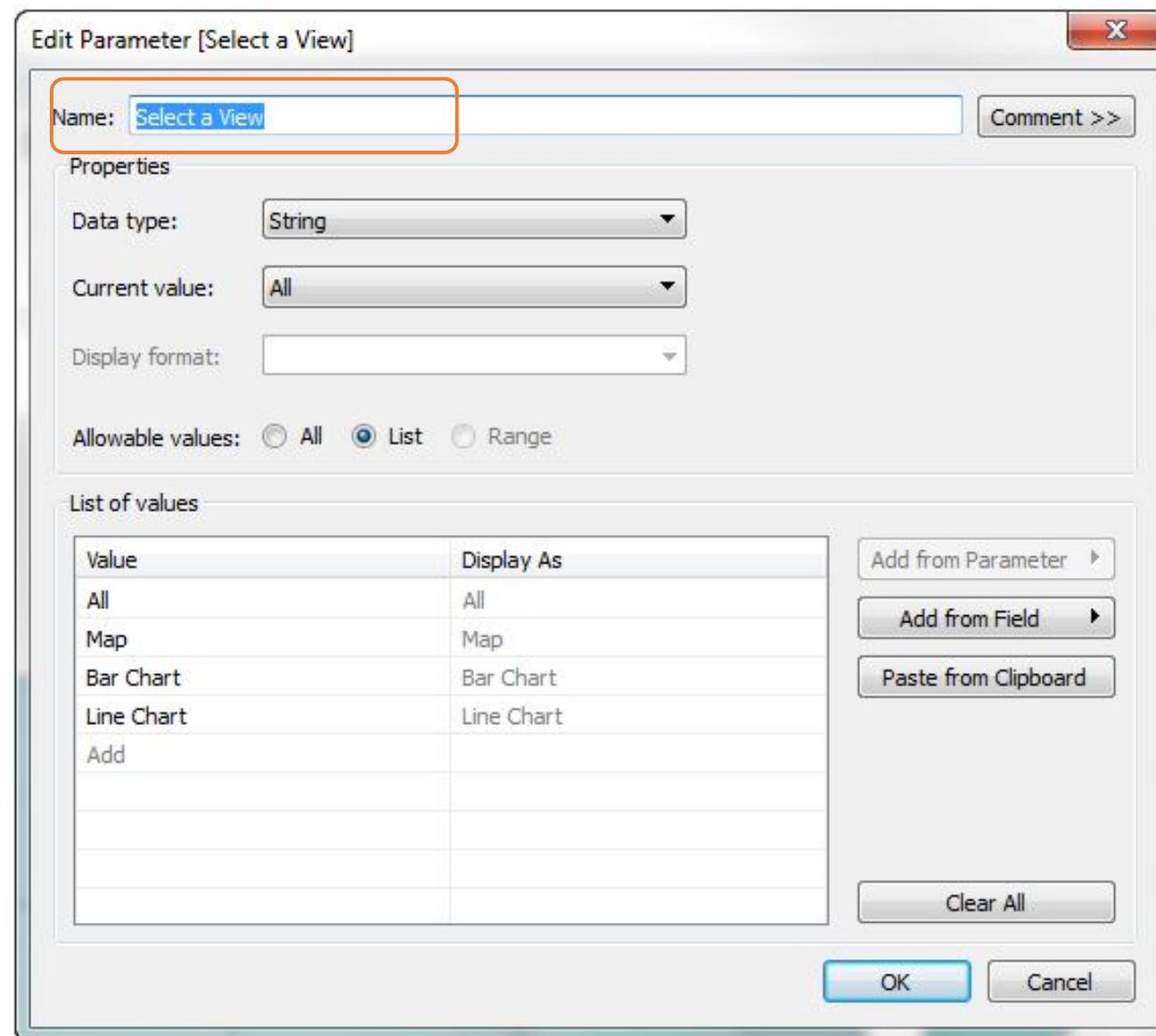


Step 1

Right-click on the **Data** pane and select
Create Parameter

Chart Selection Parameter

Steps to create a chart selection parameter:

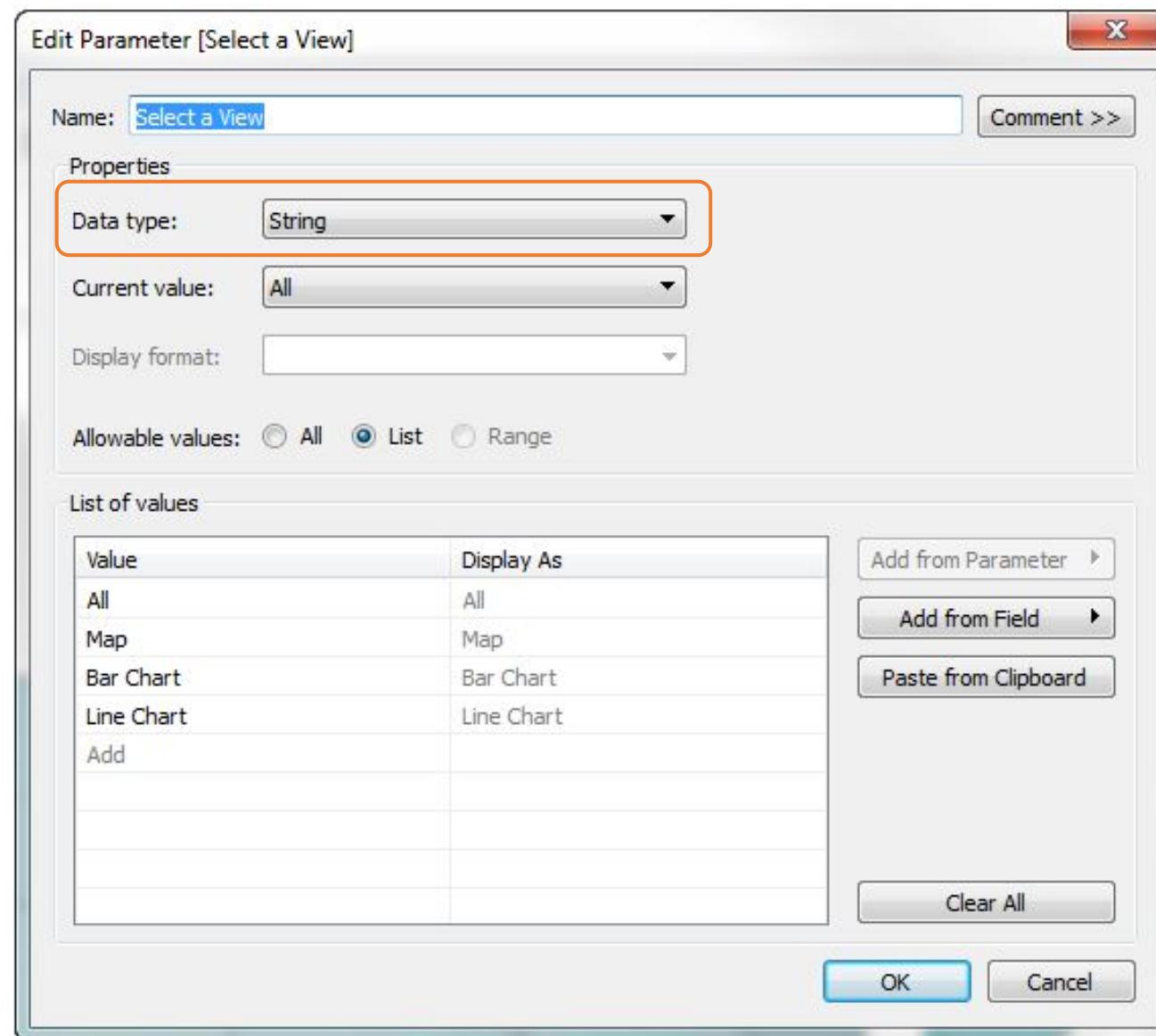


Step 2

Enter a **Name** for the parameter

Chart Selection Parameter

Steps to create a chart selection parameter:

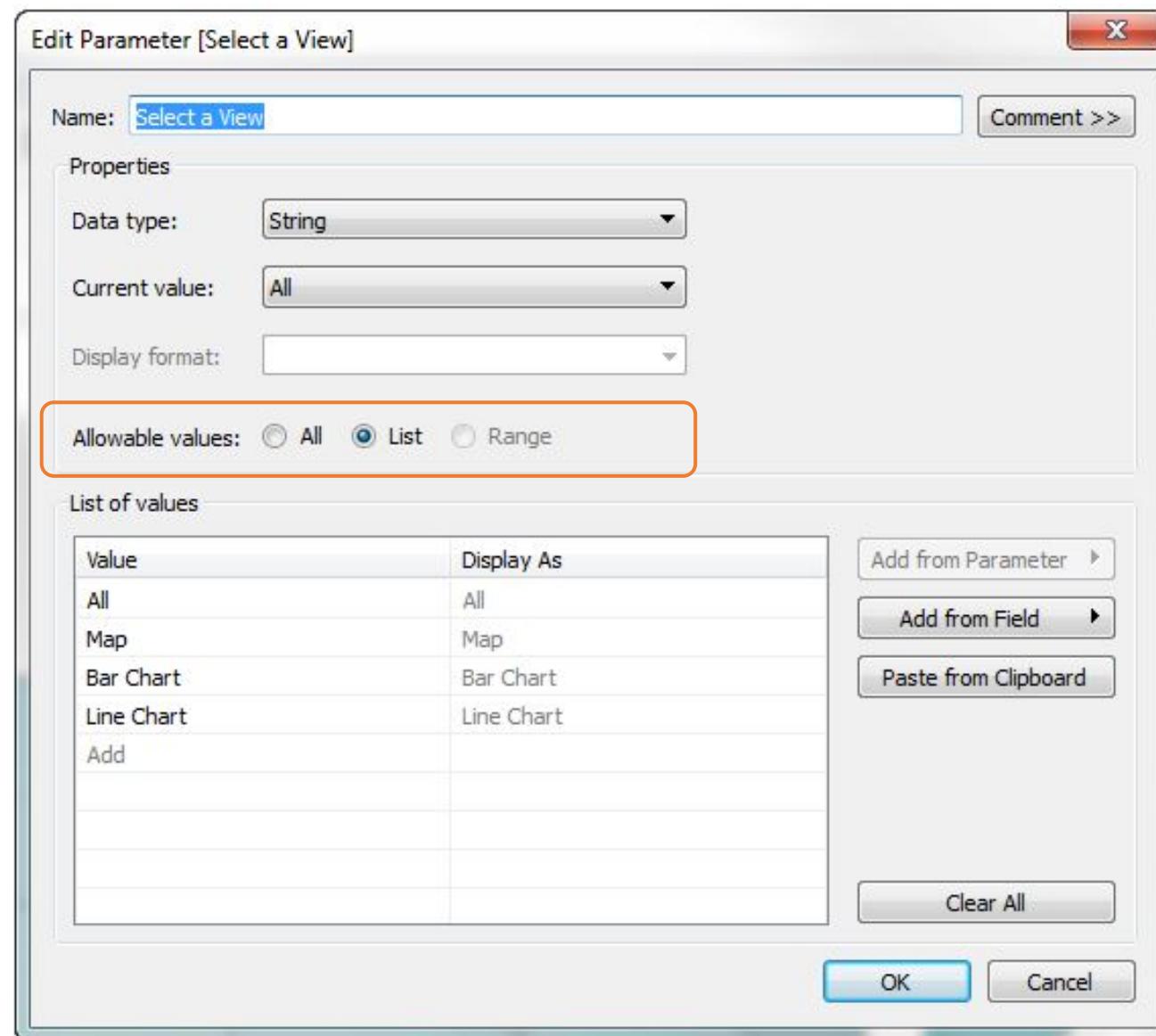


Step 3

Select the Data type as **String**

Chart Selection Parameter

Steps to create a chart selection parameter:

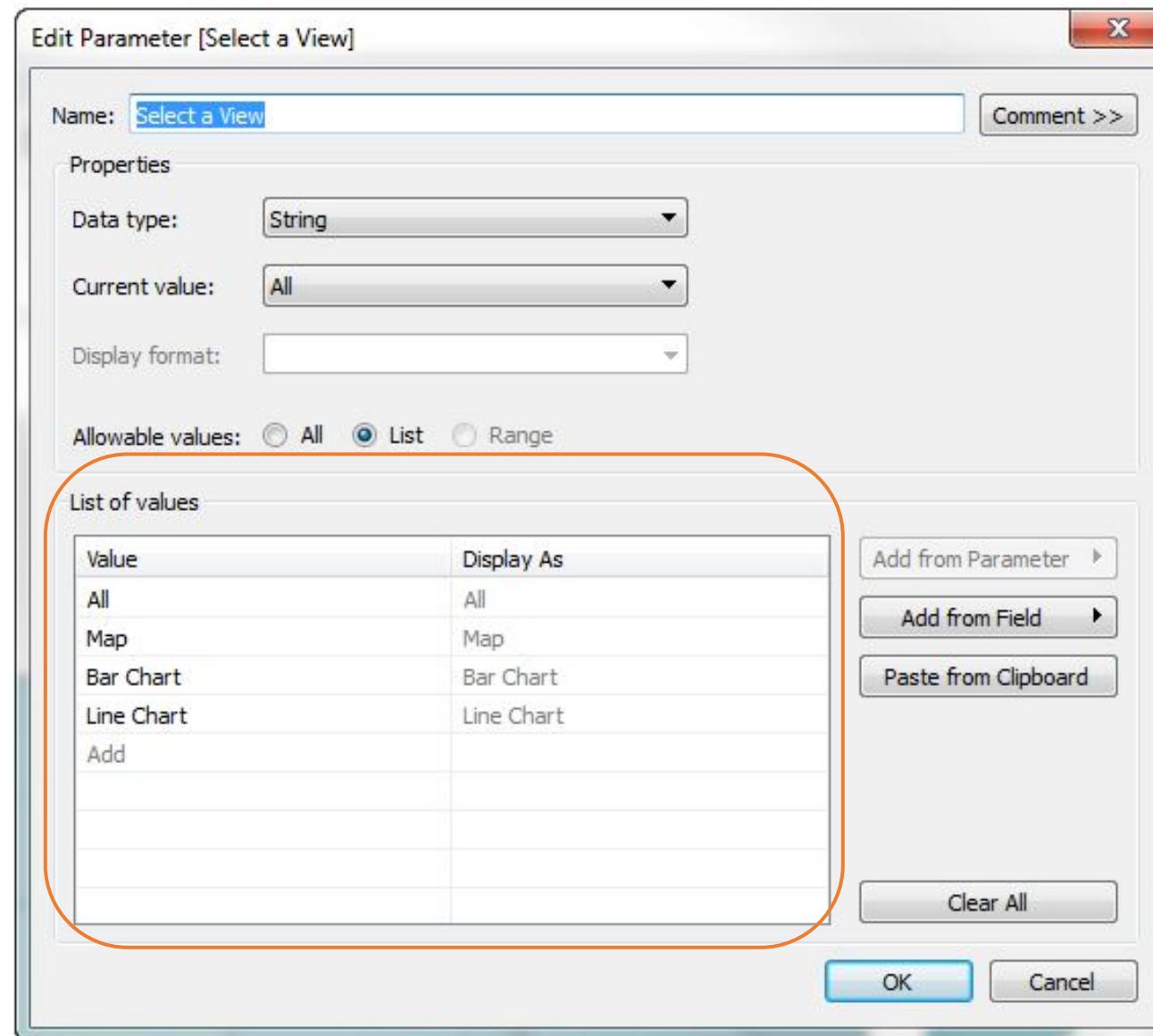


Step 4

Select **Allowable values** as **List**

Chart Selection Parameter

Steps to create a chart selection parameter:

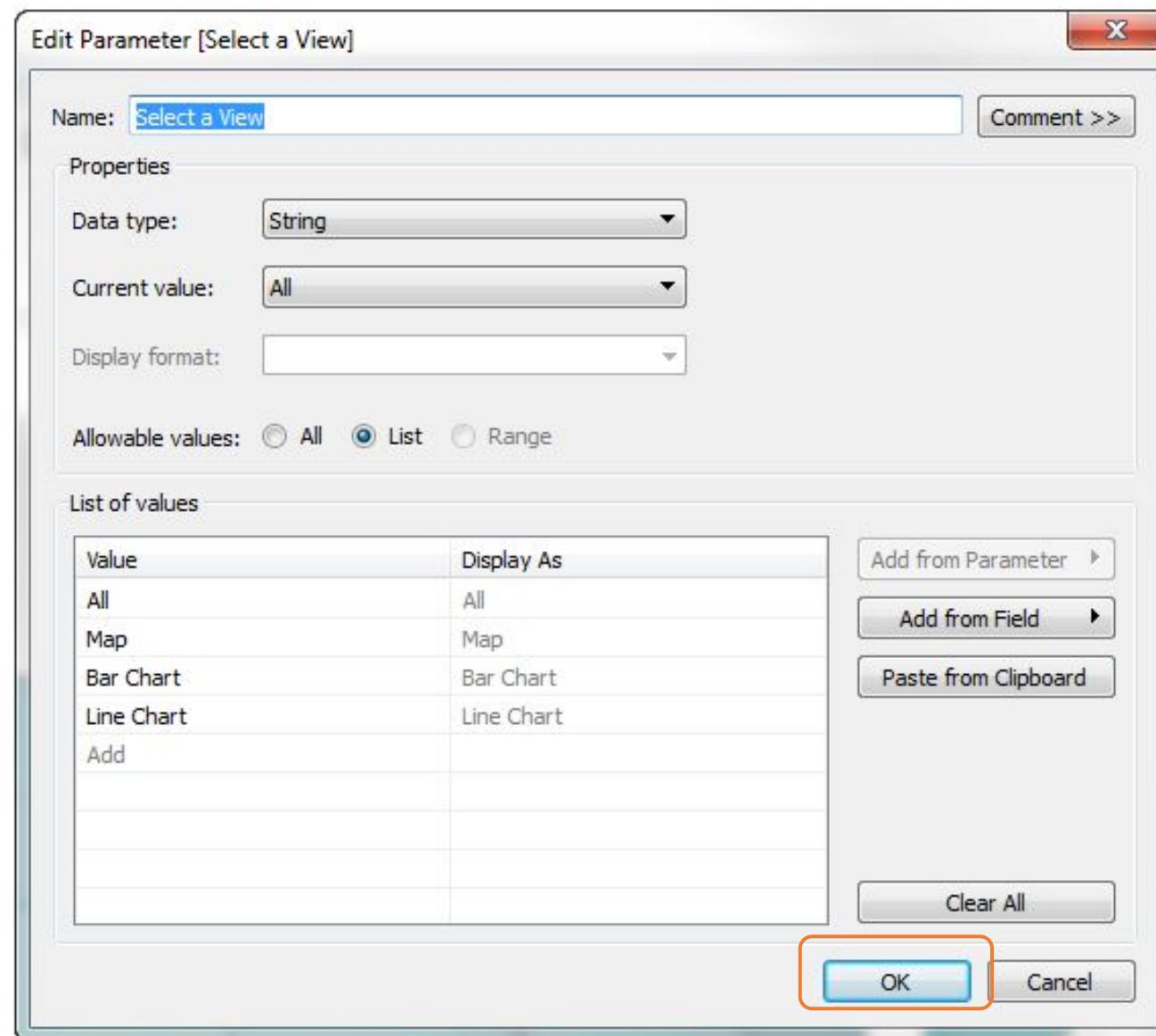


Step 5

Under **List of values**, type **All** for the first value, and then add values with the name of each view in the dashboard

Chart Selection Parameter

Steps to create a chart selection parameter:

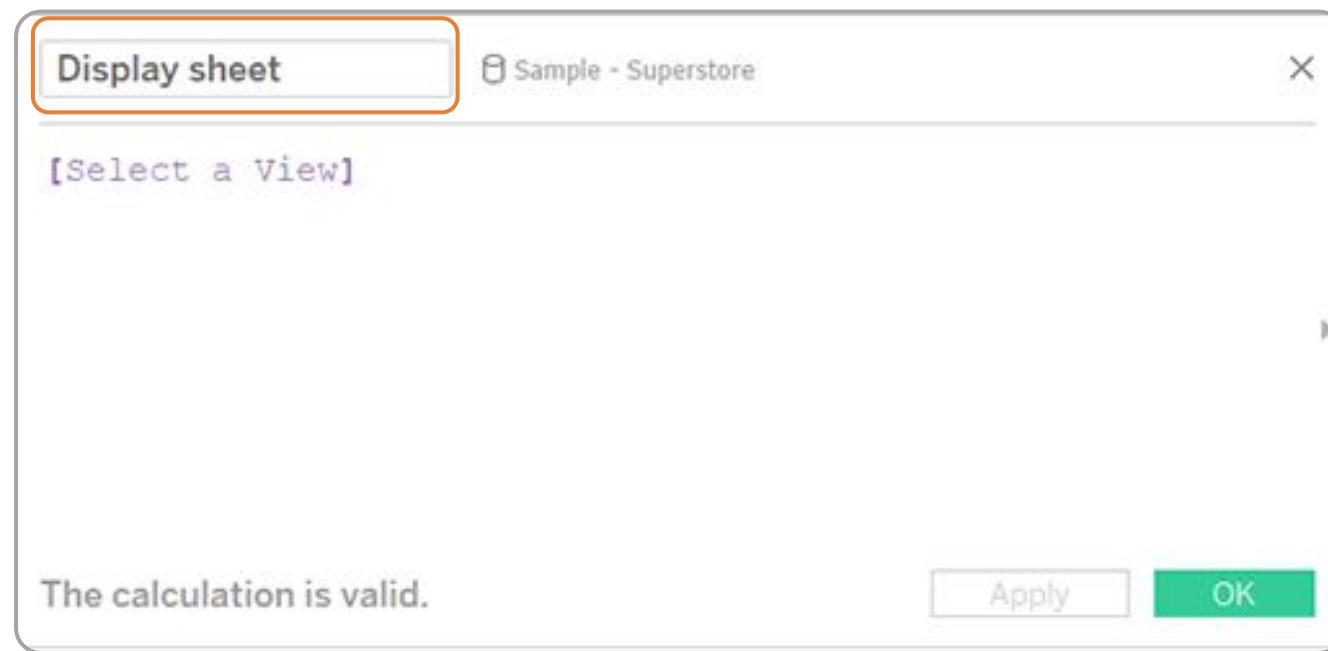


Step 6

Click OK

Chart Selection Parameter

Steps to create a chart selection parameter:



Step 7

Right-click on **Data** pane, then select **Create Calculated Field** and name the calculation as shown

Chart Selection Parameter

Steps to create a chart selection parameter:

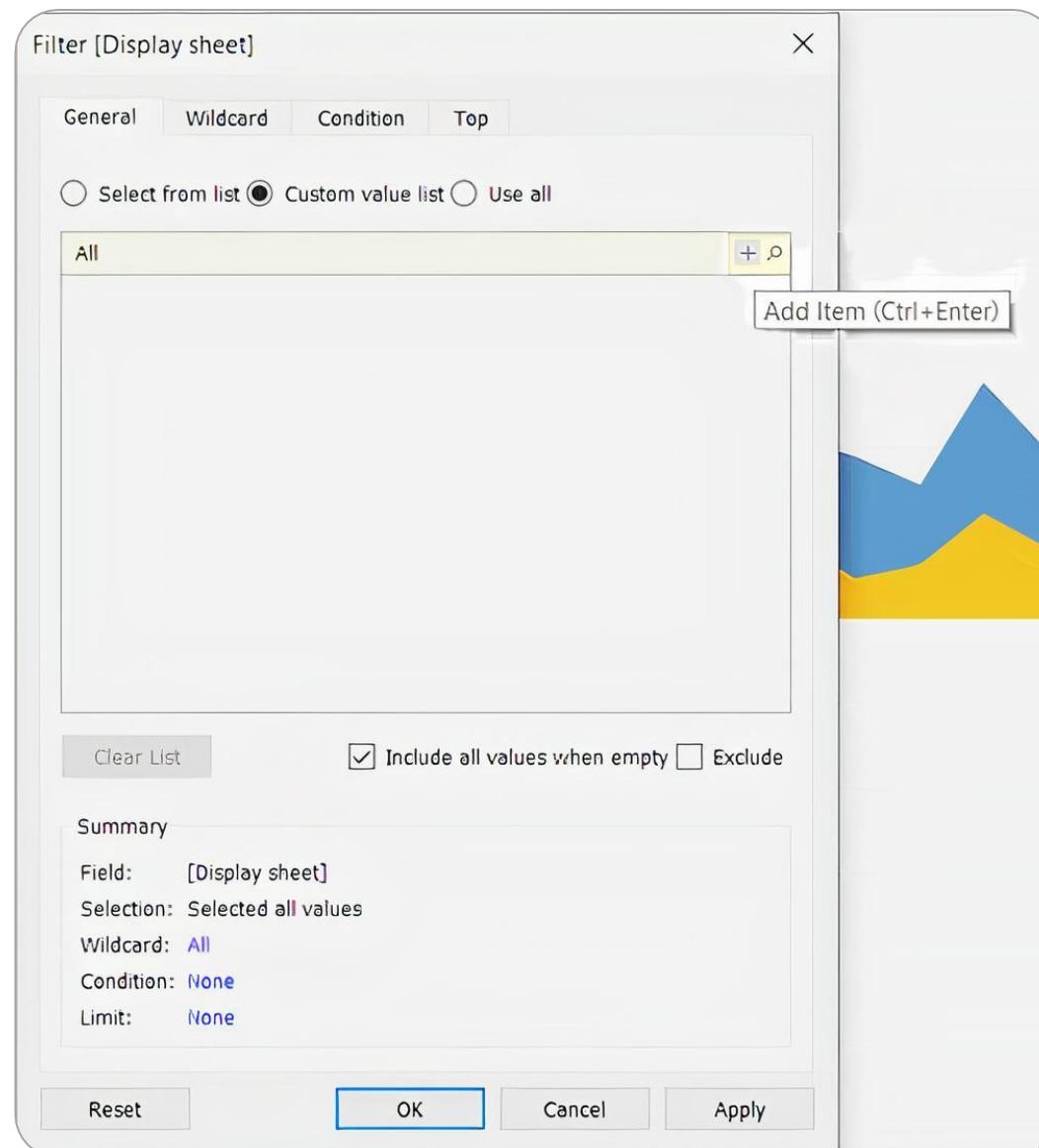


Step 08

In the formula text box, enter the name of the parameter **Select a View** and click **OK**

Chart Selection Parameter

Steps to create a chart selection parameter:

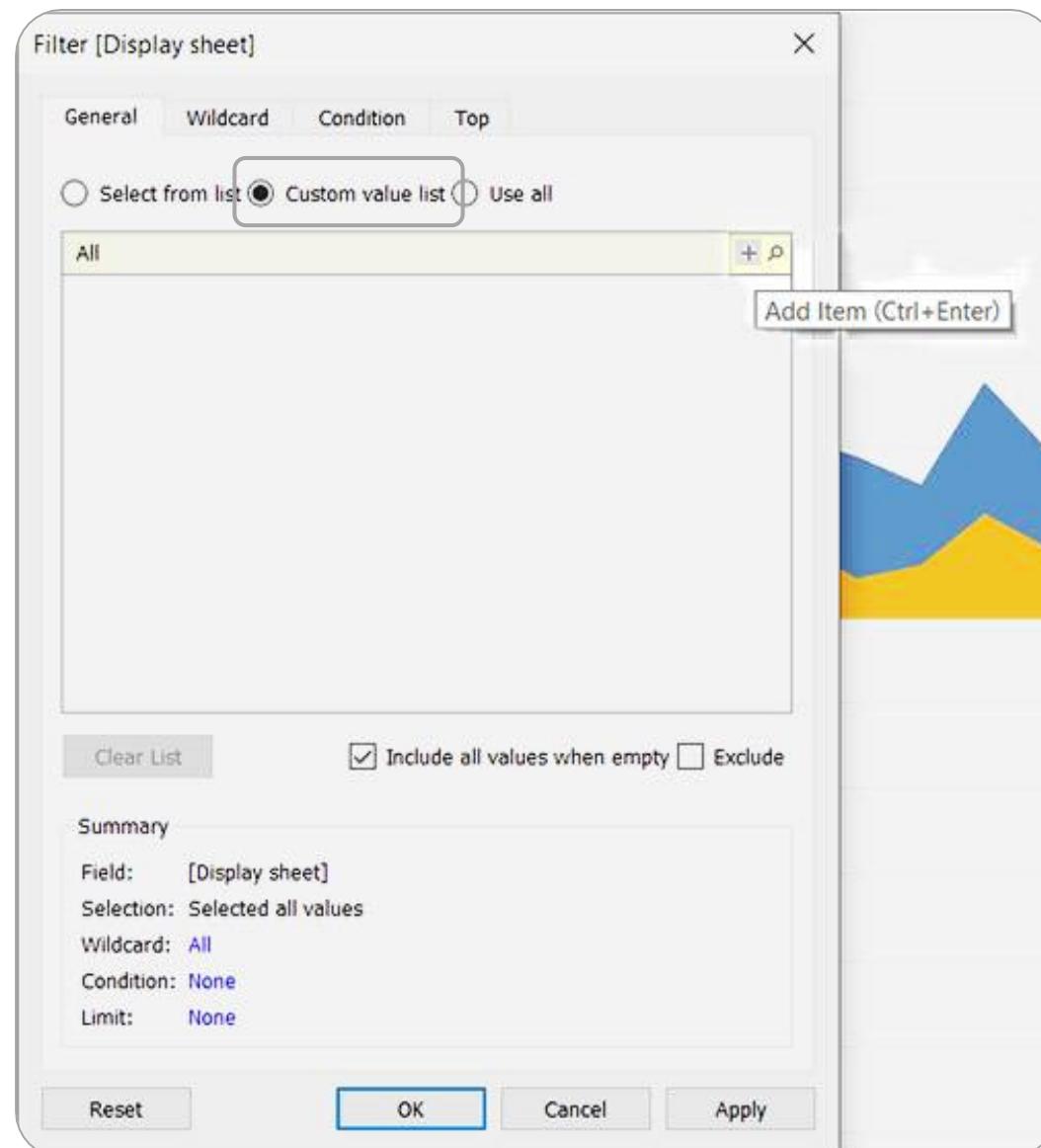


Step 09

Open a sheet that is to be added in the dashboard, and drag the new calculation to the **Filters** shelf

Chart Selection Parameter

Steps to create a chart selection parameter:

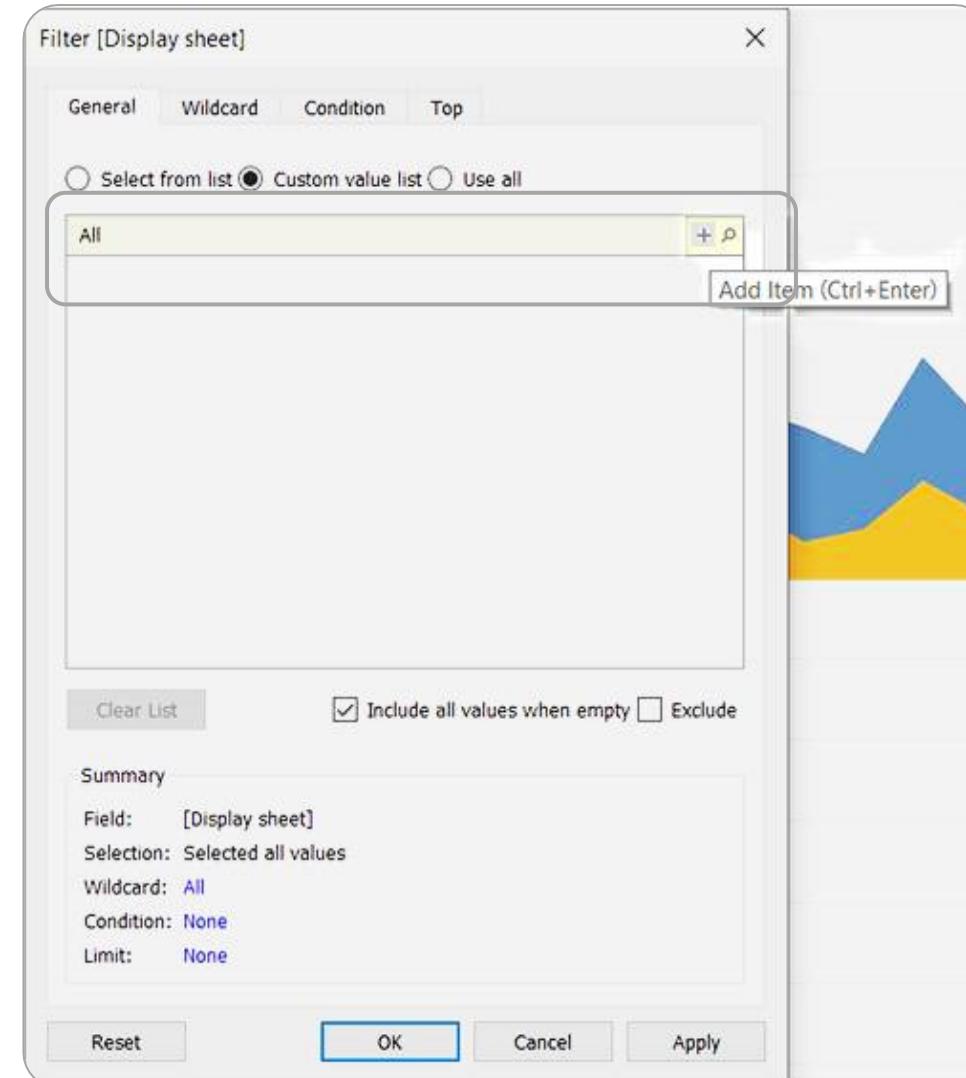


Step 10

Now, in the filter dialog box,
select **Custom Value List**.

Chart Selection Parameter

Steps to create a chart selection parameter:



Step 11

- Type **All** in the text box and click the **Add Item** button
- Type the current view's name (like *Map*) in the text box and click the **Add Item** button

Repeat steps 09-11 for every sheet which is to be added to the dashboard.

Chart Selection Parameter

Steps to create a chart selection parameter:

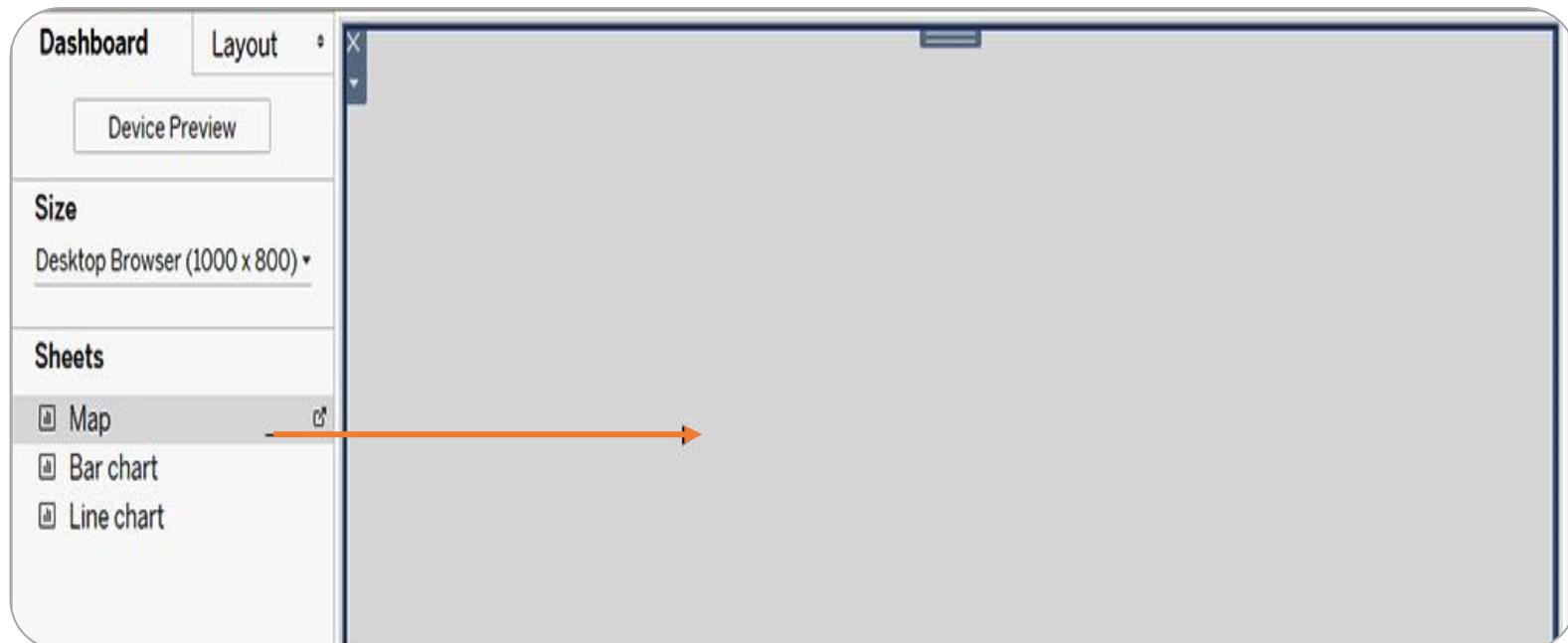


Step 12

- Select **Dashboard** and then **New Dashboard**
- From the Objects section at the lower left, drag a **Vertical** or **Horizontal** layout container to the dashboard

Chart Selection Parameter

Steps to create a chart selection parameter:

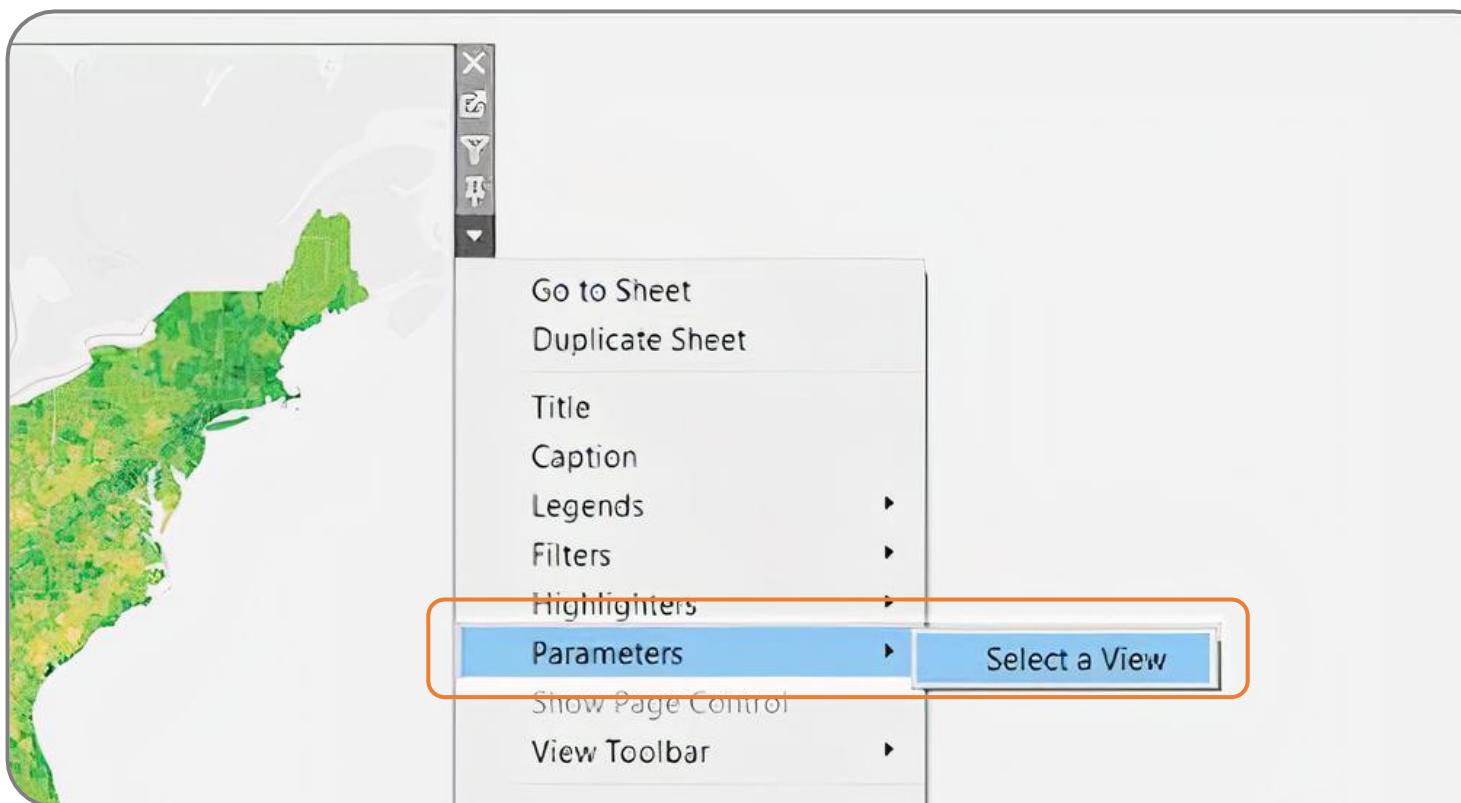


Step 13

Now, drag each sheet to the layout container identified by the dark blue outline

Chart Selection Parameter

Steps to create a chart selection parameter:



Step 14

To display the sheet selector, choose **Parameters** and then **Select a View** from the drop-down menu at the top of a view

Chart Selection Parameter

The final output will look like this.



Assisted Practice: Parameters



Duration: 20 minutes

Problem statement:

A leading retail chain wants to analyze its performance in terms of sales, profit, and profit ratio. For this, the manager needs to view these various measures at different levels, such as Sub-Category, Region, and Customer Name. In addition to this, the manager should be able to select various measures dynamically.

Assisted Practice Guidelines



Steps to follow:

- Step 1: Create a parameter to dynamically change Dimensions in a view
- Step 2: Create a parameter to dynamically change Measures in a view
- Step 3: Create the calculated fields using these parameters
- Step 4: Create a view using these calculated fields

ASSISTED PRACTICE

Assisted Practice: Using Custom Dates



Duration: 20 minutes

Problem statement:

A sales manager must submit a monthly sales report to her director. She needs to show the monthly trend in sales across various products. With the help of this analysis, the manager and her director want to reform their sales strategy for the next year. Create a highlight table with category, sales, and a custom order date showing data at the month level.

Assisted Practice Guidelines



Steps to follow:

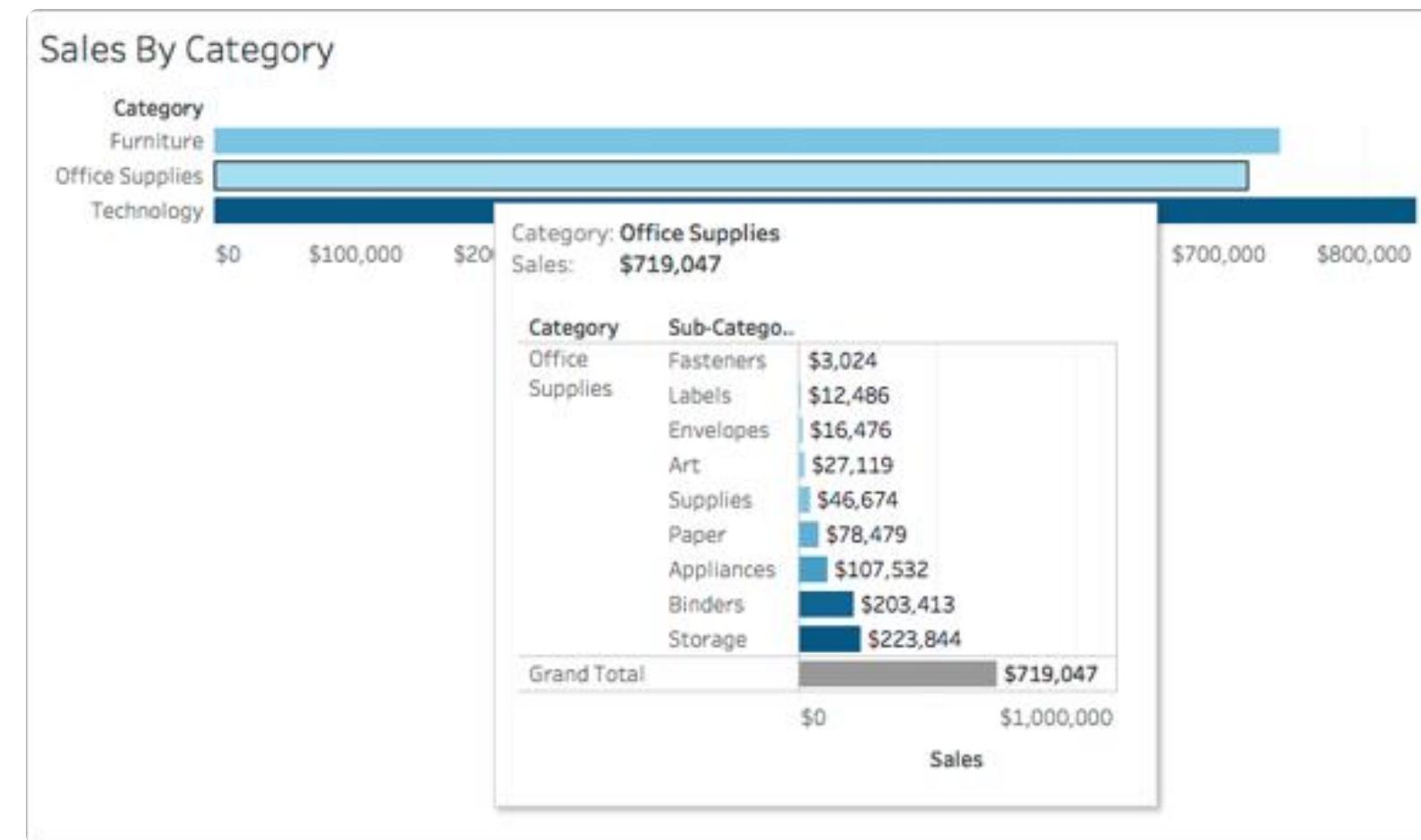
- Step 1: Create a custom date on Order Date at Month/Year level
- Step 2: Create a Highlight table with Order Date (Month/Year), Category, and Sales
- Step 3: Add Profit Ratio to the tooltip
- Step 4: Sort months by profit ratio in descending order

ASSISTED PRACTICE

Toolips

Toolips

A tooltip is displayed when you rest the pointer over one or more marks in the view.



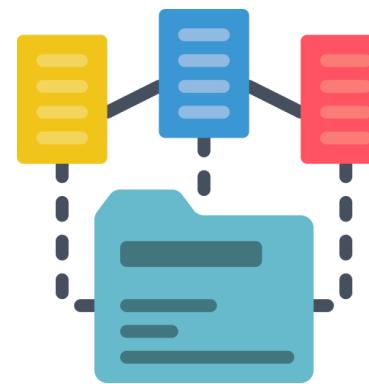
https://help.tableau.com/current/pro/desktop/en-us/viz_in_tooltip.htm

Tooltips

A list of options appears at the top of the tooltip, including filtering data, creating a group, sorting the selection, and displaying the underlying data.



Filtering data



Sorting the selection



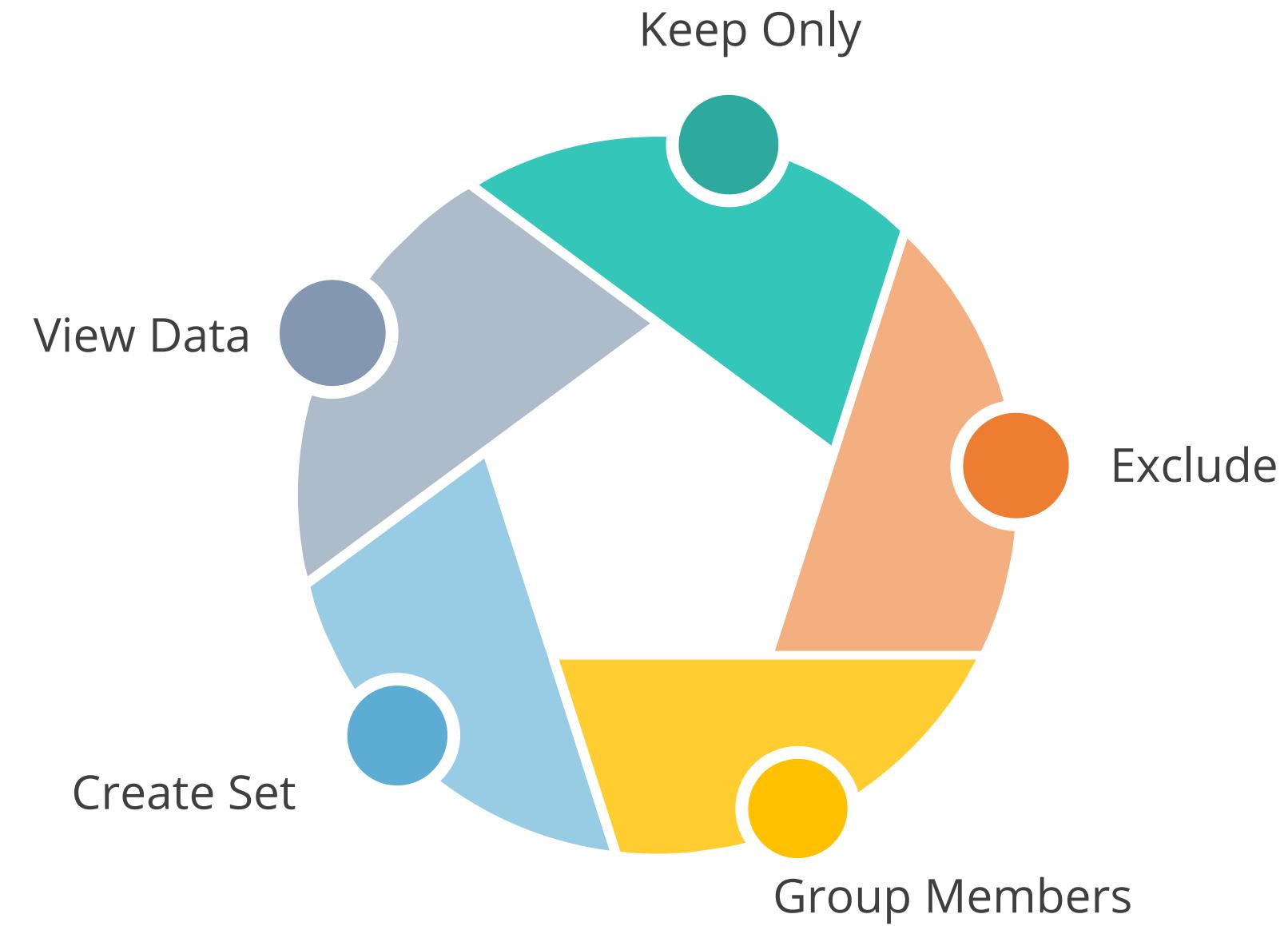
Creating group



Displaying data

Tooltips

The tooltip commands are:



Toolips

The following steps can be used to disable tooltip commands:

Select tooltip under worksheet or **click tooltip** on the marks card

Clear the **Include command buttons check box** in the Edit Tooltip dialog box



Tooltip Visualizations

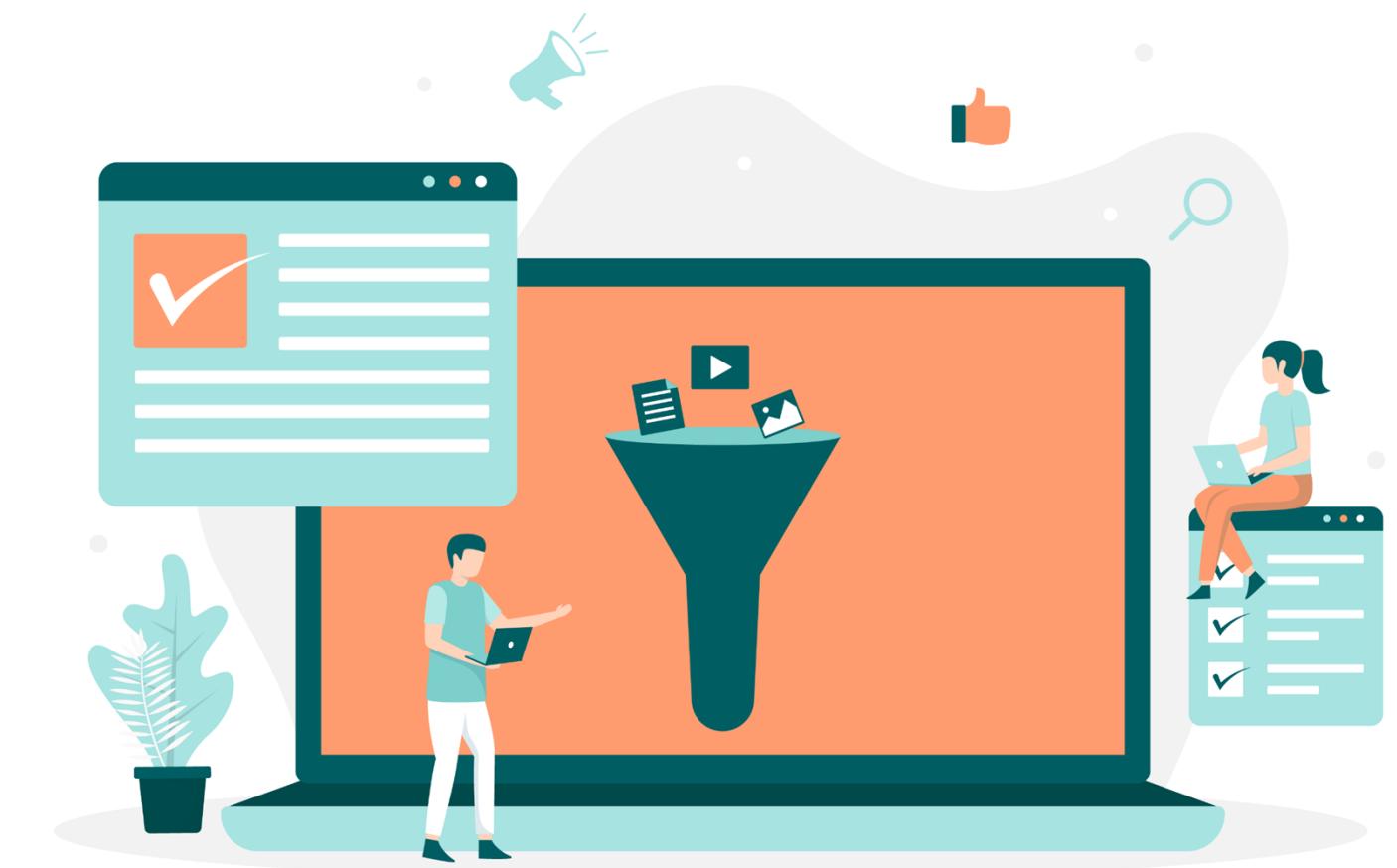
Tooltip Visualizations

Tooltip visualization is a new way to represent a visualization in the tooltip to complement the main visualization.



Tooltip Visualizations

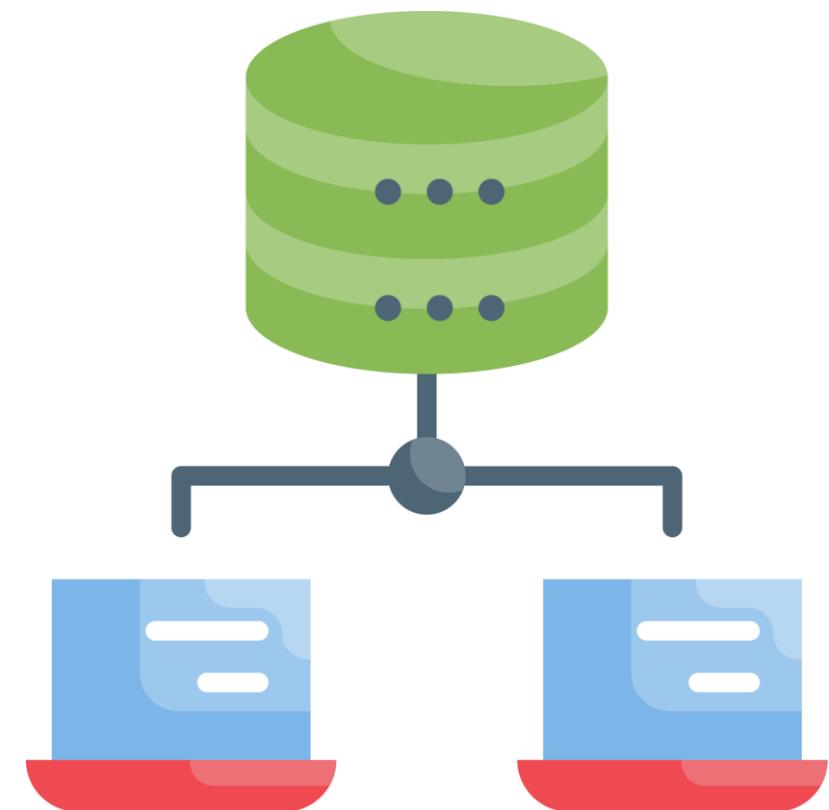
The selection on the chart will act as a filter to visualization in the tooltip.



Tooltip Visualizations

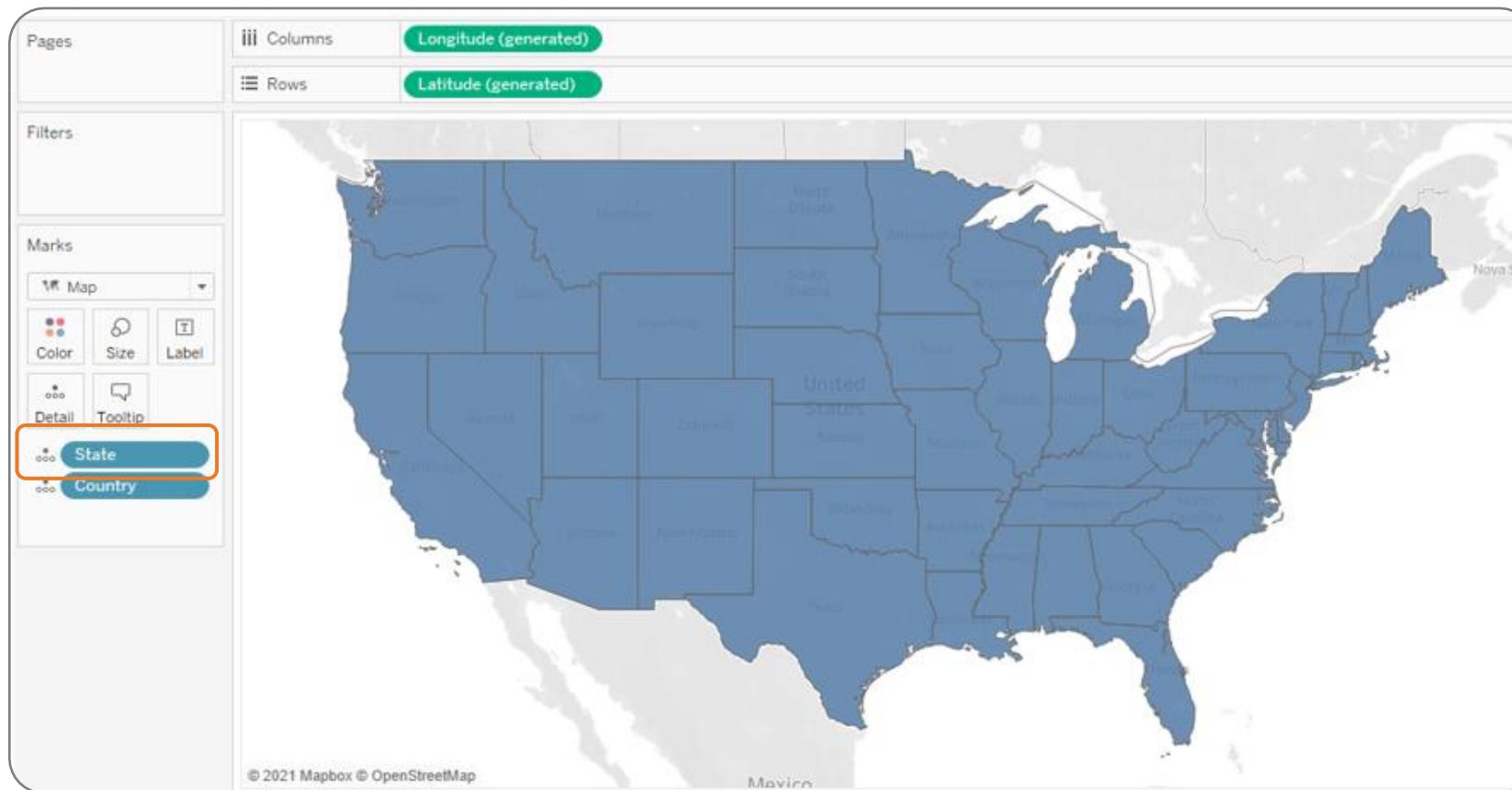
Steps to create a tooltip visualization are as follows:

Use sample superstore dataset



Tooltip Visualizations

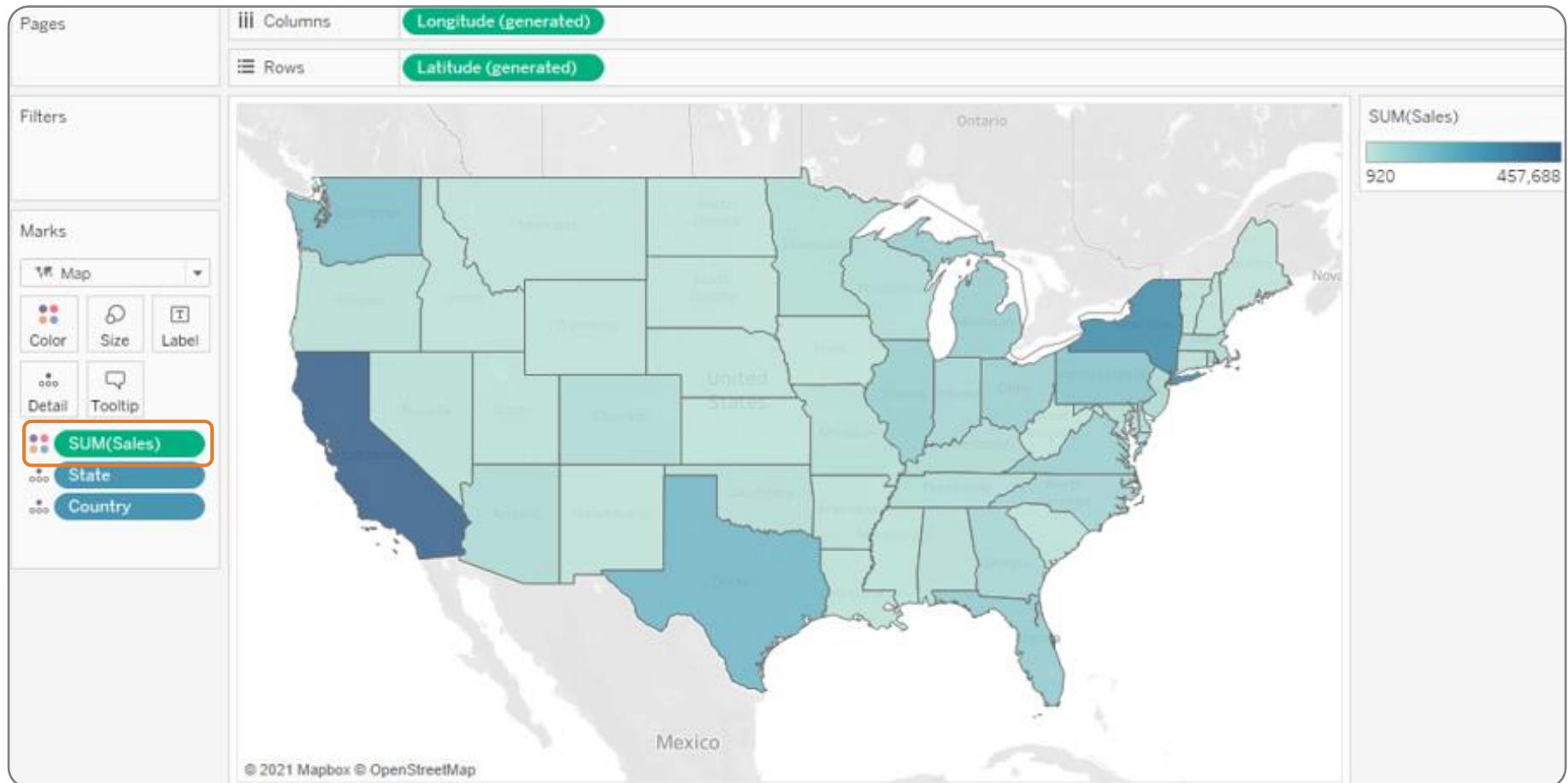
Create a geographical map



Step 1

Select **Marks** type as map and
drag state to **Detail**

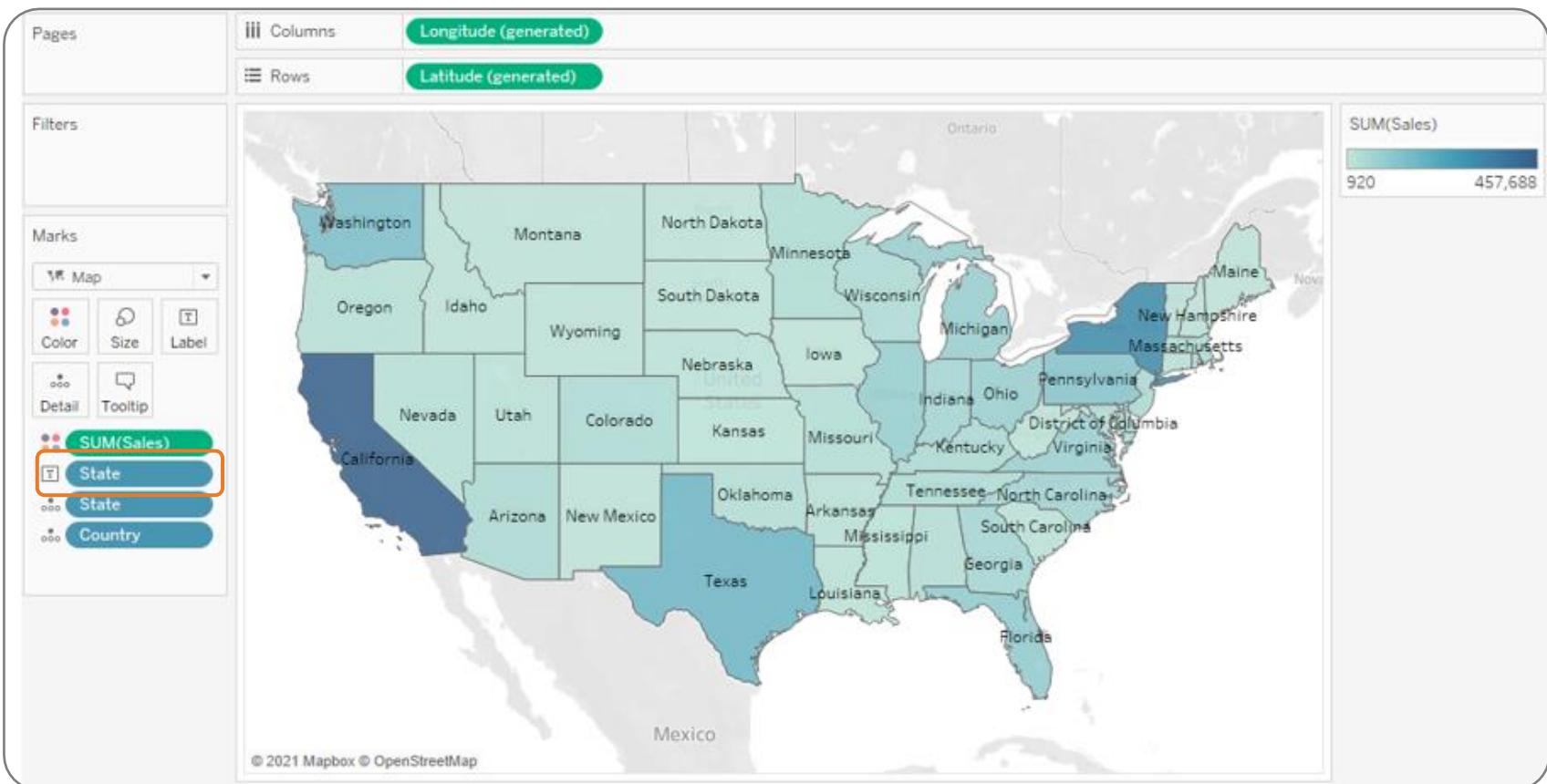
Tooltip Visualizations



Step 2

Drag SUM(Sales) to **Color**

Tooltip Visualizations

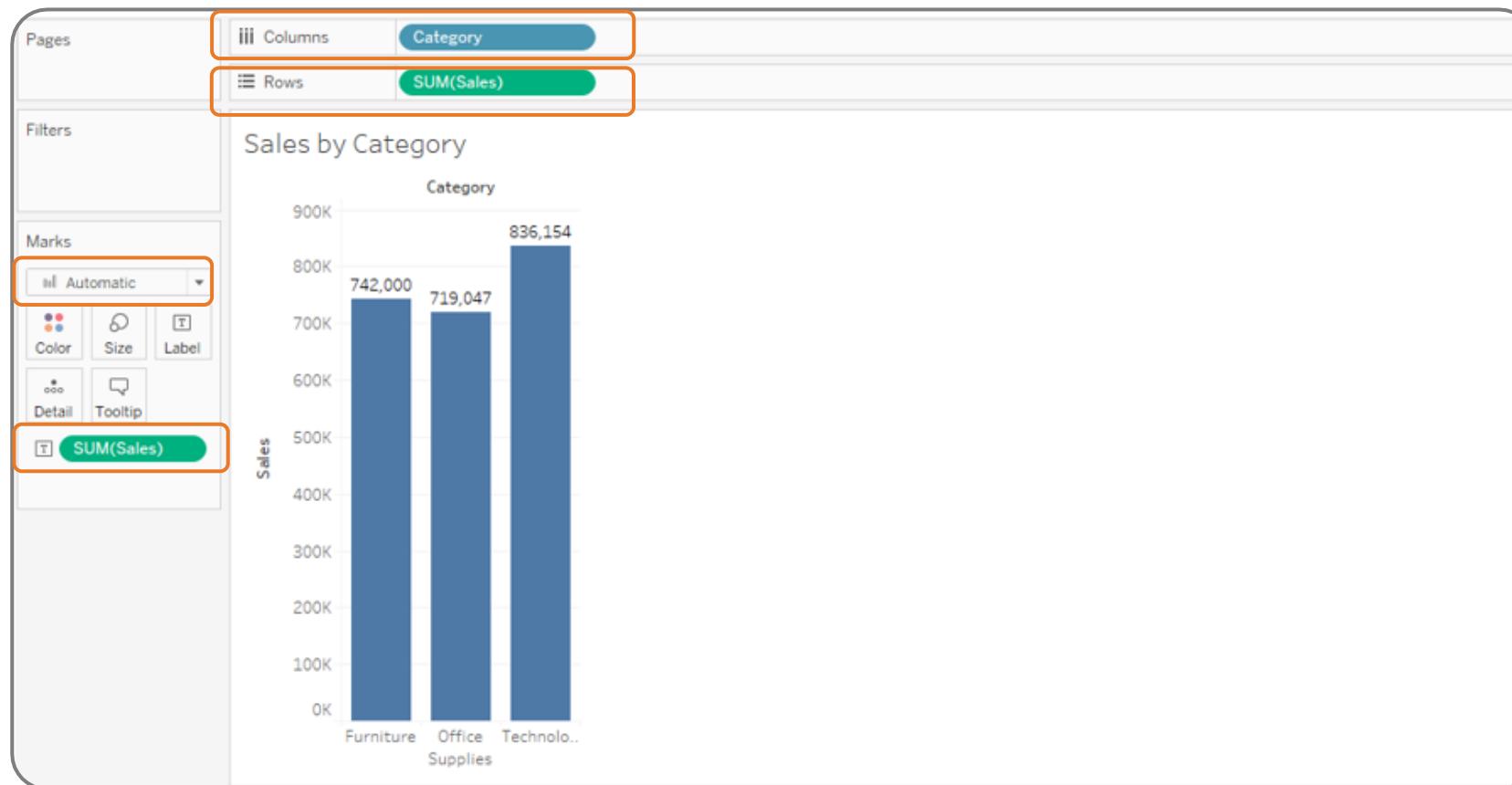


Step 3

Add state to **Label**

Tooltip Visualizations

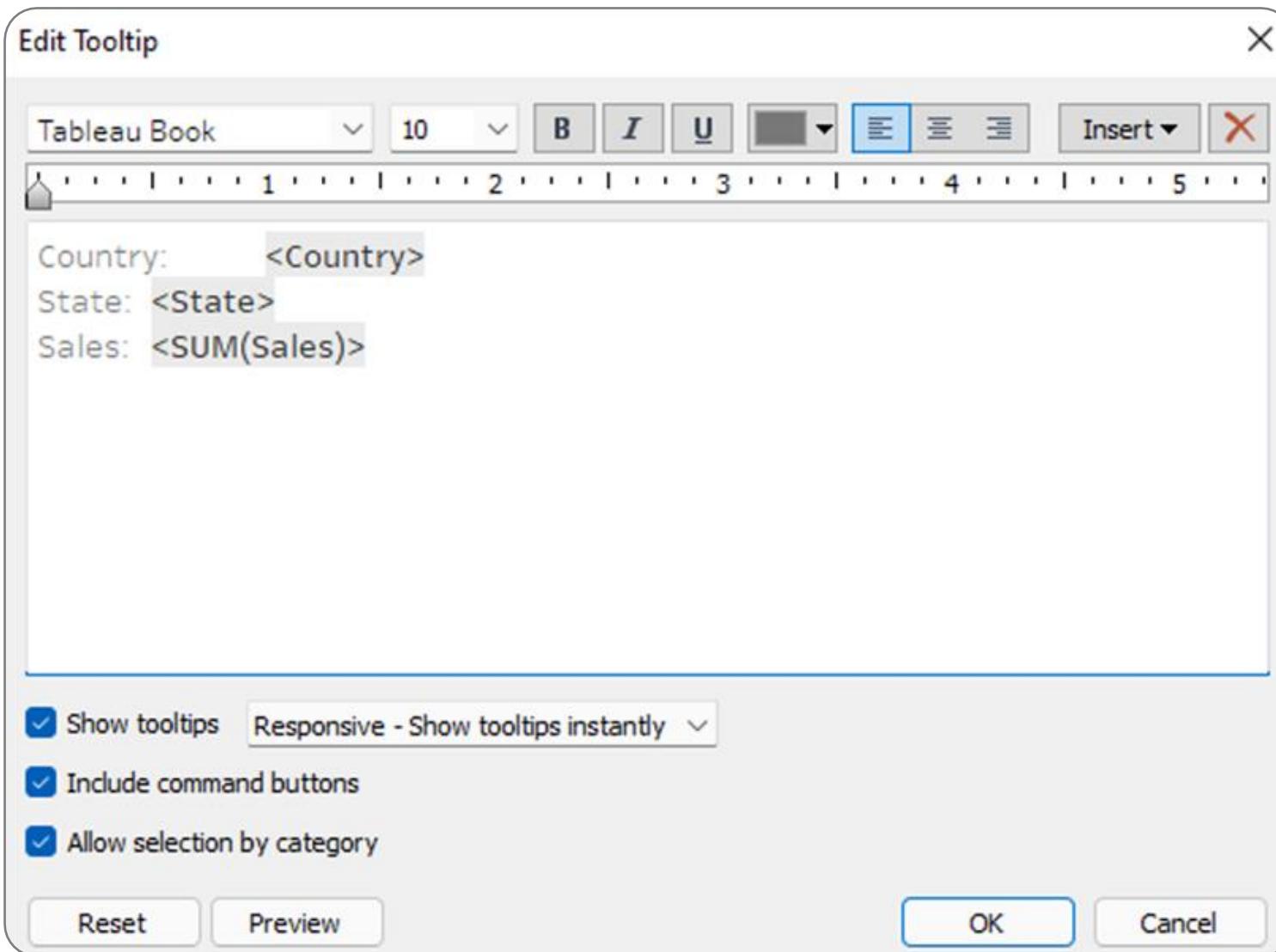
Create a bar chart in another sheet



Step 4

- Select **Marks** type as bar
- Drag category to **Columns**
- Drag sum(sales) to **Rows** and **Label**

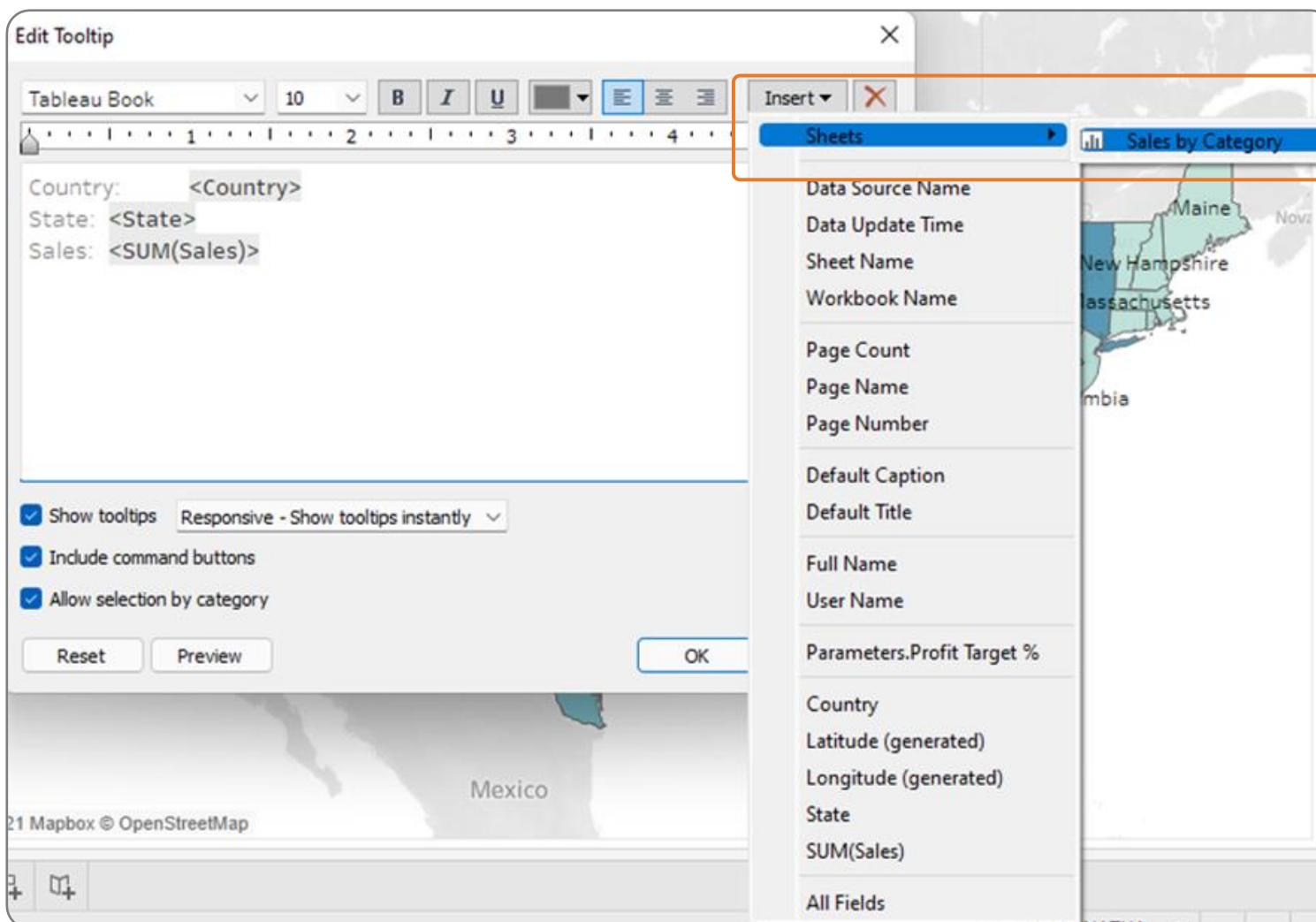
Tooltip Visualizations



Step 5

Go to geographical map sheet and select tooltip to open edit tooltip window

Tooltip Visualizations

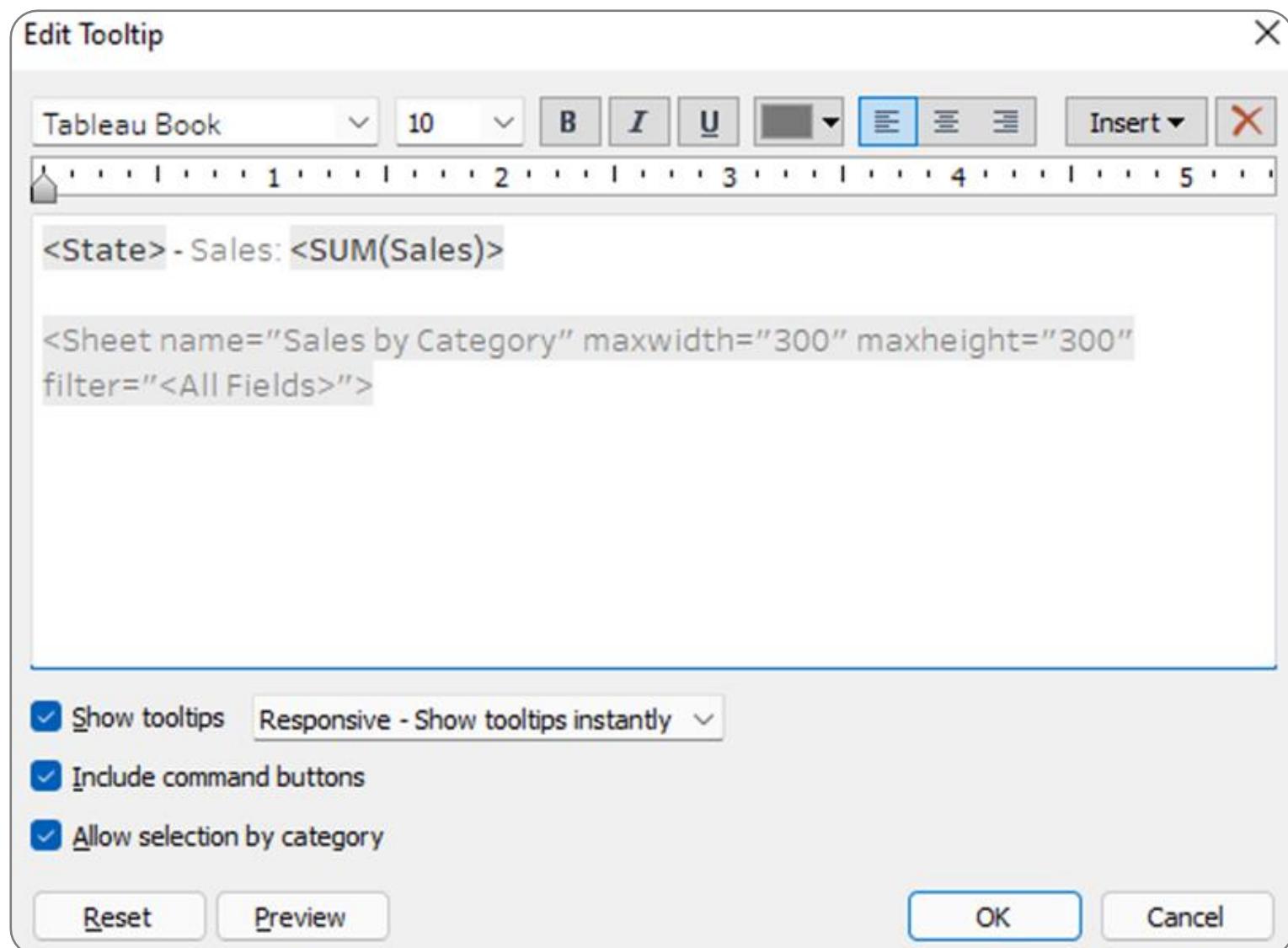


Step 6

- Click on **Insert**
- Select **Sheets**
- Click on **Sales by Category**

Tooltip Visualizations

Alter tooltip as given below:

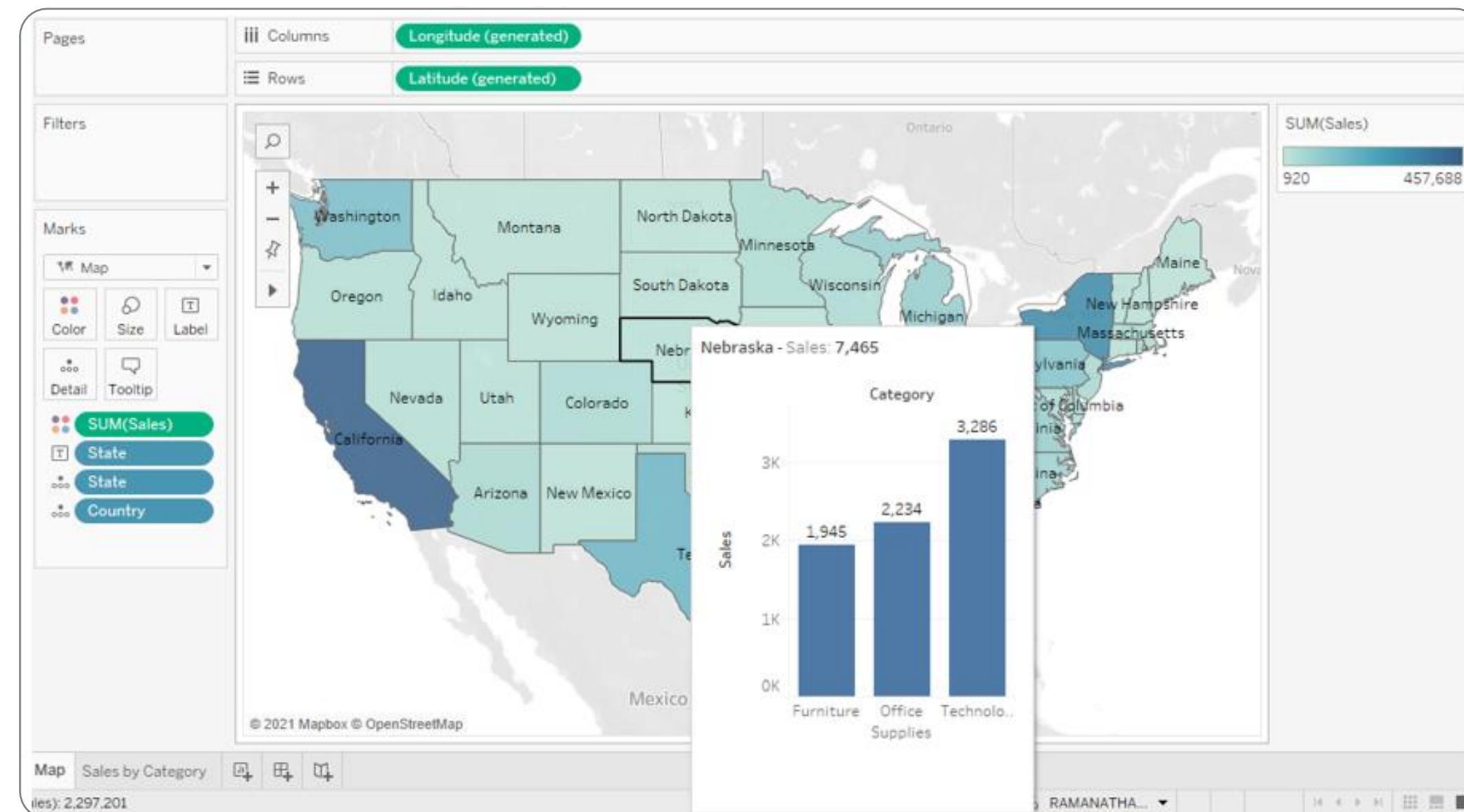


Step 7

Click **OK**

Tooltip Visualizations

Hover the mouse pointer over any state in the geographical map to view the tooltip visualization



Assisted Practice: Using Title, Caption, and Tooltip



Duration: 20 minutes

Problem statement:

The production manager of a retail company previously analyzed the performance of various subcategories. He is expected to present his analysis at the upcoming board meeting, and he needs to format and annotate the pre-created views to make them more presentable and readable.

ASSISTED PRACTICE

Assisted Practice Guidelines



Steps to follow:

- Step 1: Create a view, use the previously created sales by subcategory view
- Step 2: Enable caption
- Step 3: Format title and caption
- Step 4: Add profit ratio to tooltip and format it
- Step 5: Add color shading to the view

ASSISTED PRACTICE

Trend Lines

Trend Lines

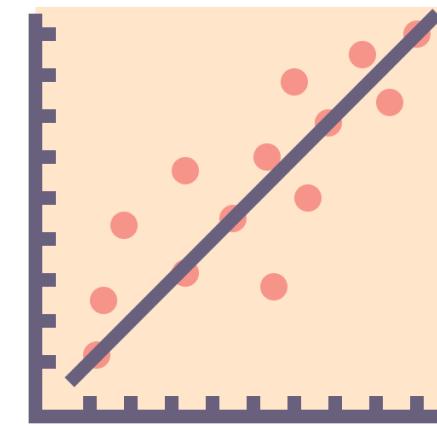
Trend lines are used to show how the data has changed over time.



Trend lines help in predicting the given data.

Trend Lines

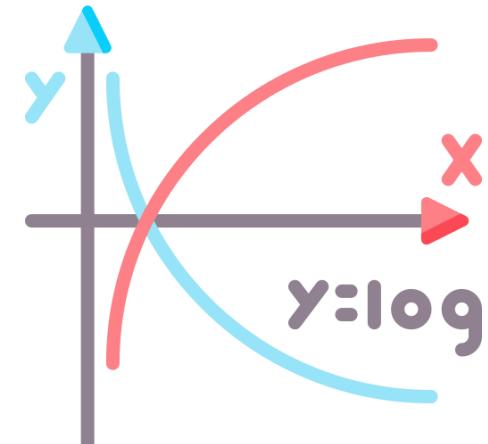
A trend line can be:



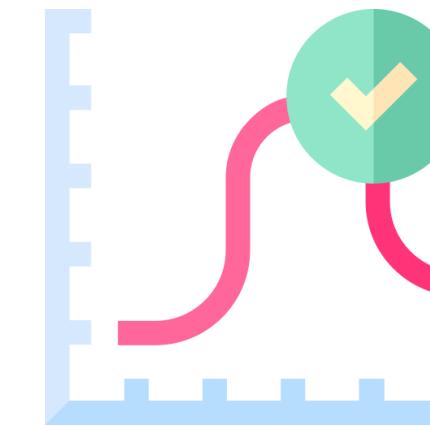
Linear



Exponential



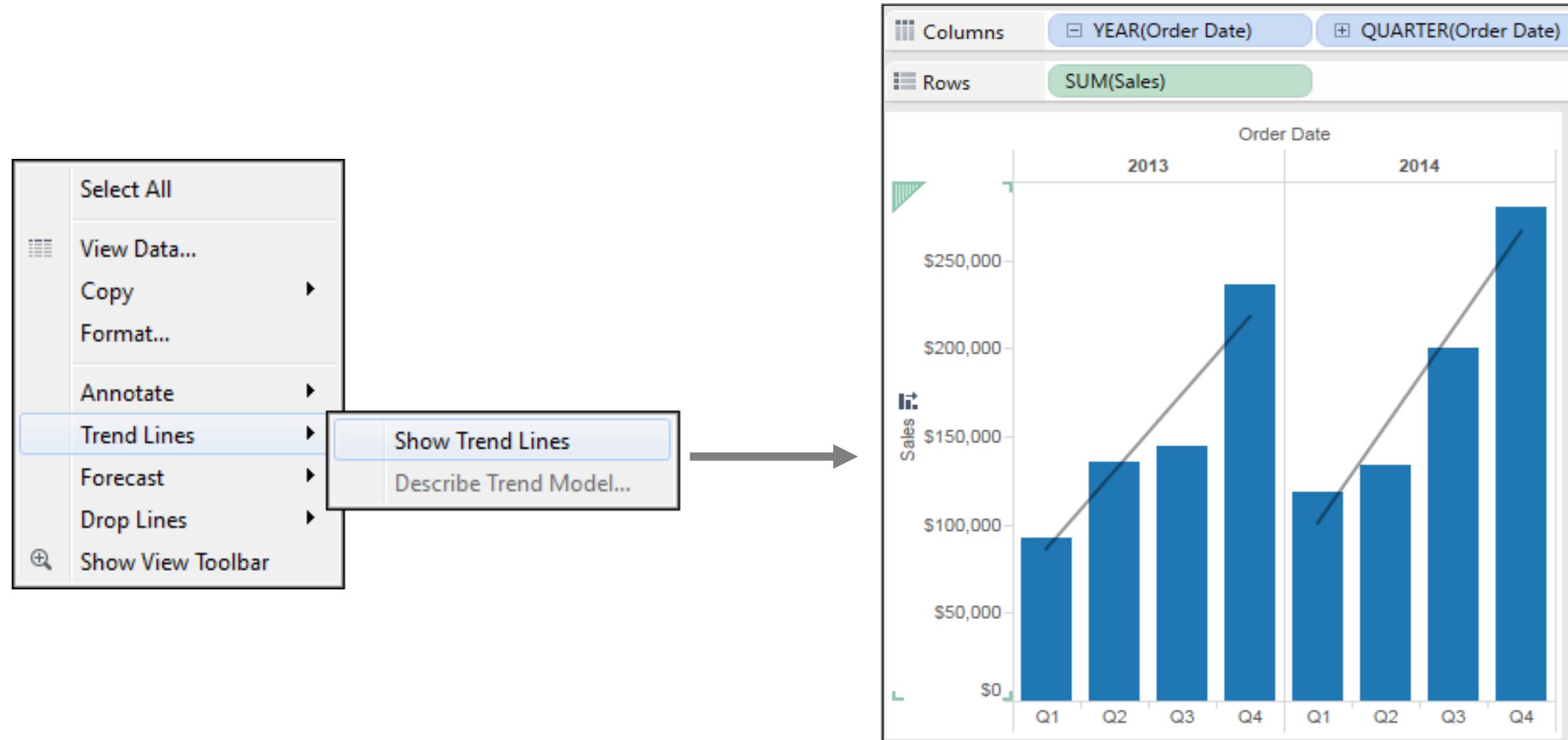
Logarithmic



Polynomial

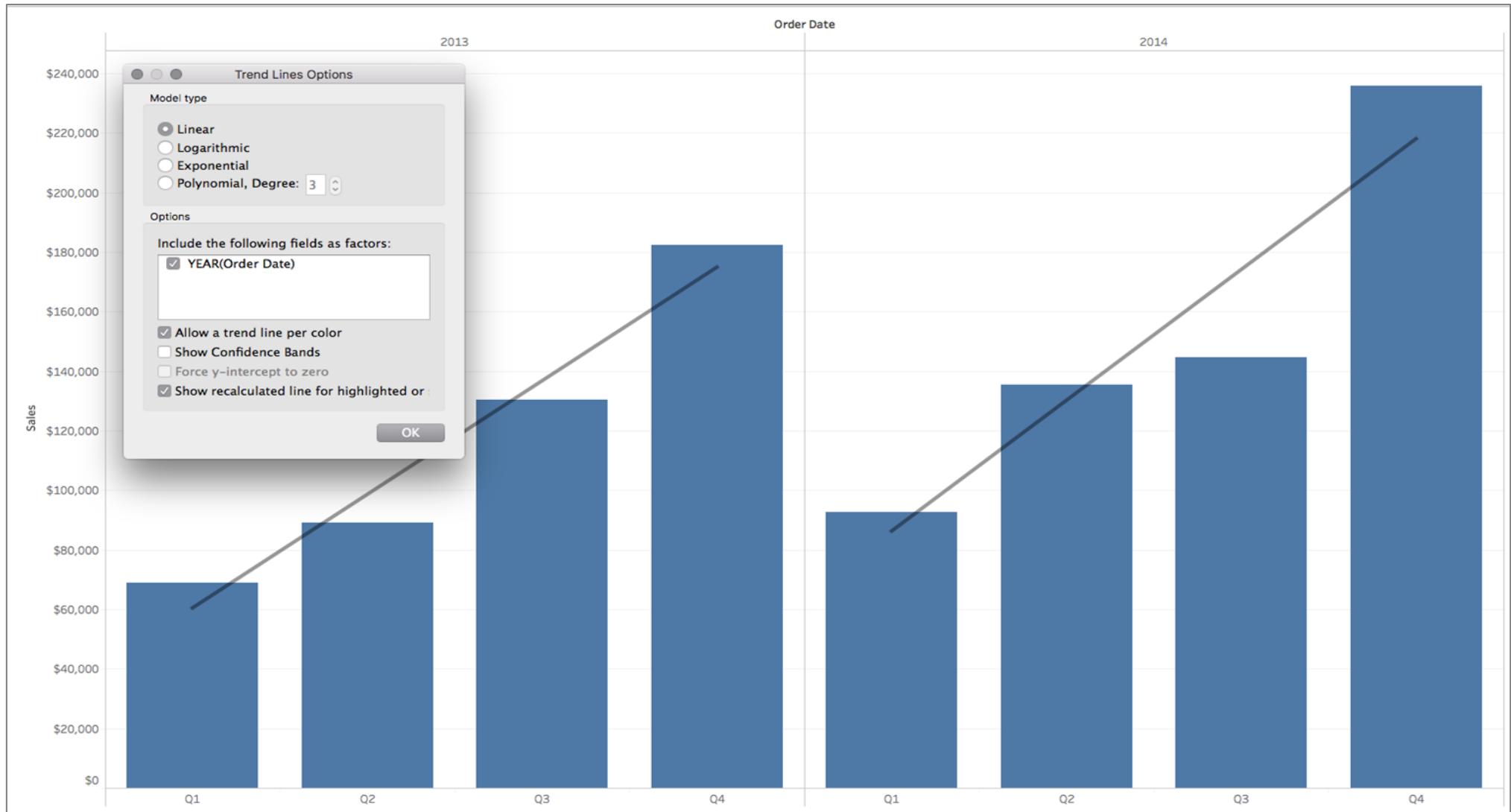
Trend Lines

Enable trend line by right clicking on the view



Trend Lines

Types of trend lines:

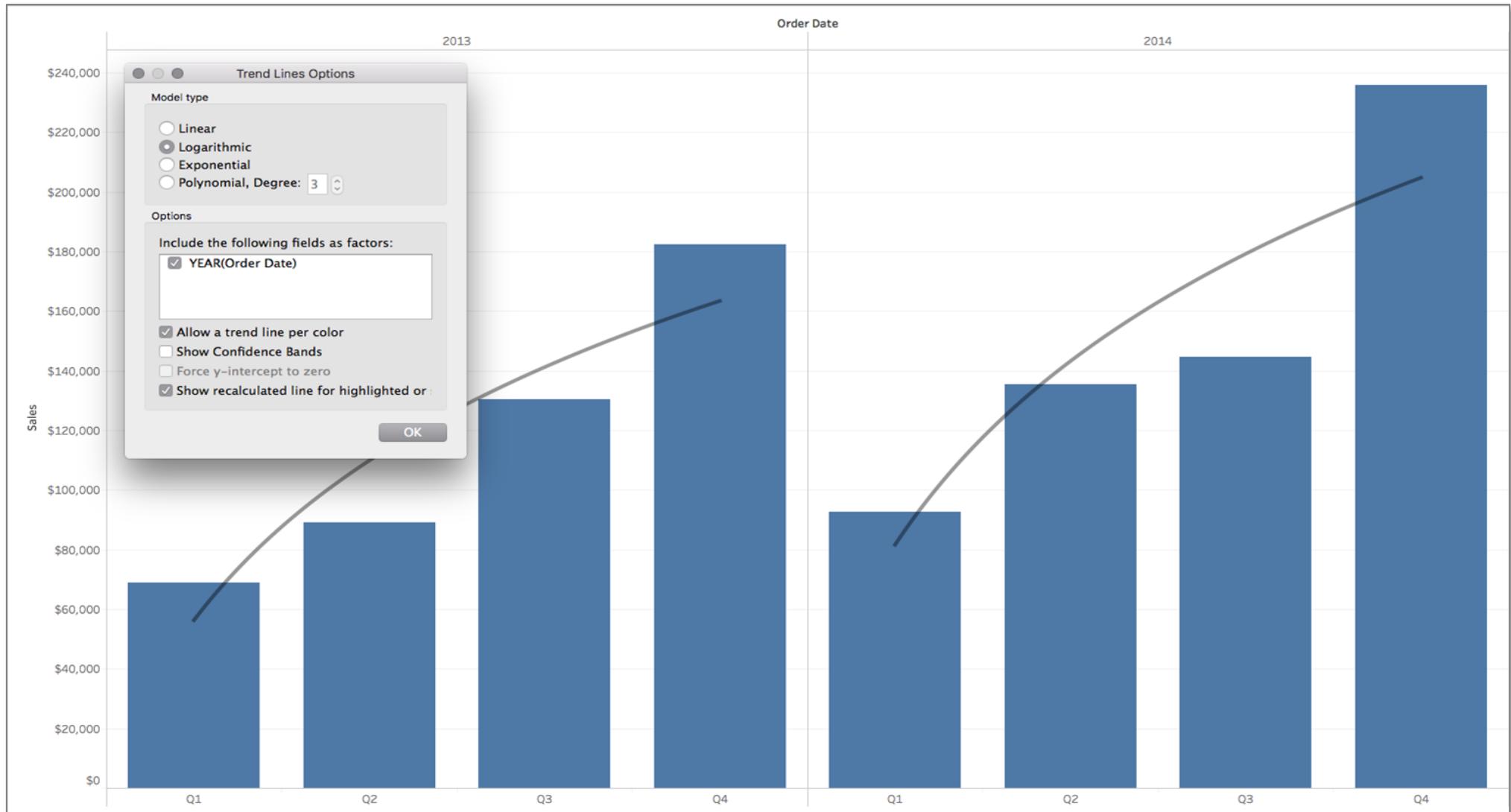


Linear Trend Line

Transformations are not performed on explanatory or response variables.

Trend Lines

Types of trend lines:

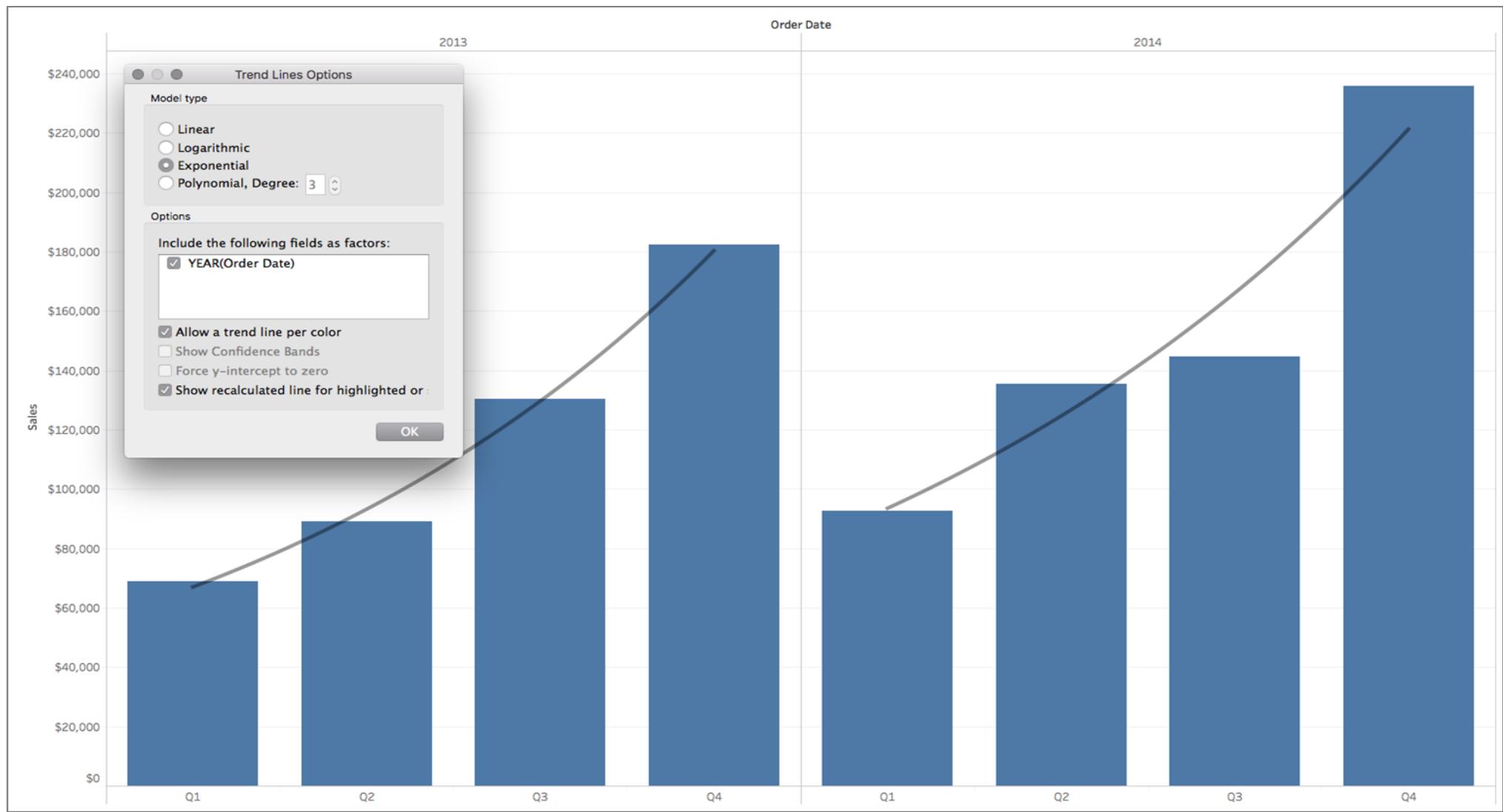


Logarithmic Trend Line

Transformation is performed on an explanatory variable prior to the assessment of the trend model.

Trend Lines

Types of trend lines:

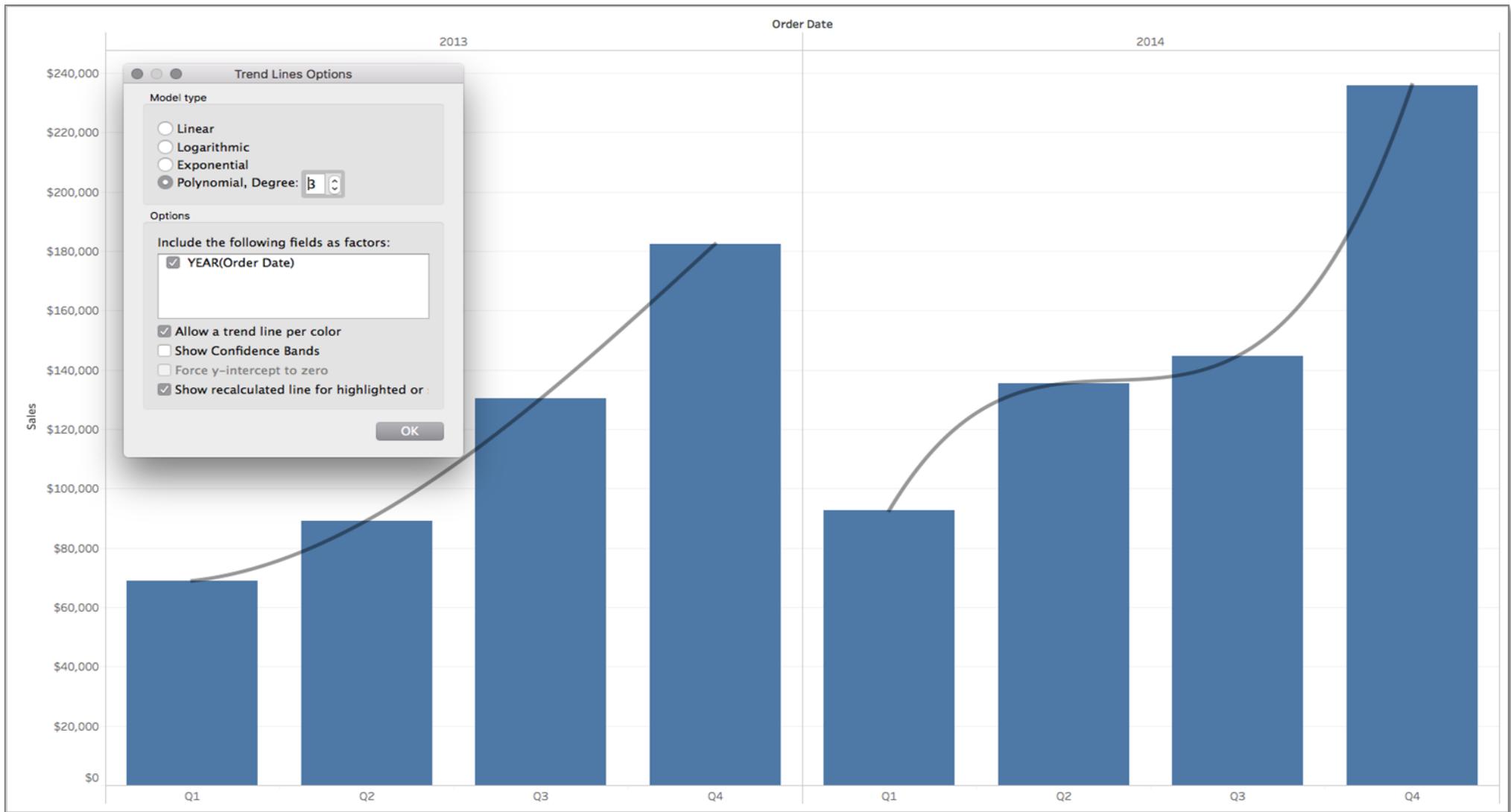


Exponential Trend Line

Transformation is executed on the response variable before the assessment of the trend model.

Trend Lines

Types of trend lines:



Polynomial Trend Line

It provides the transformation of a response variable to a polynomial series of a particular degree.

Trend Lines

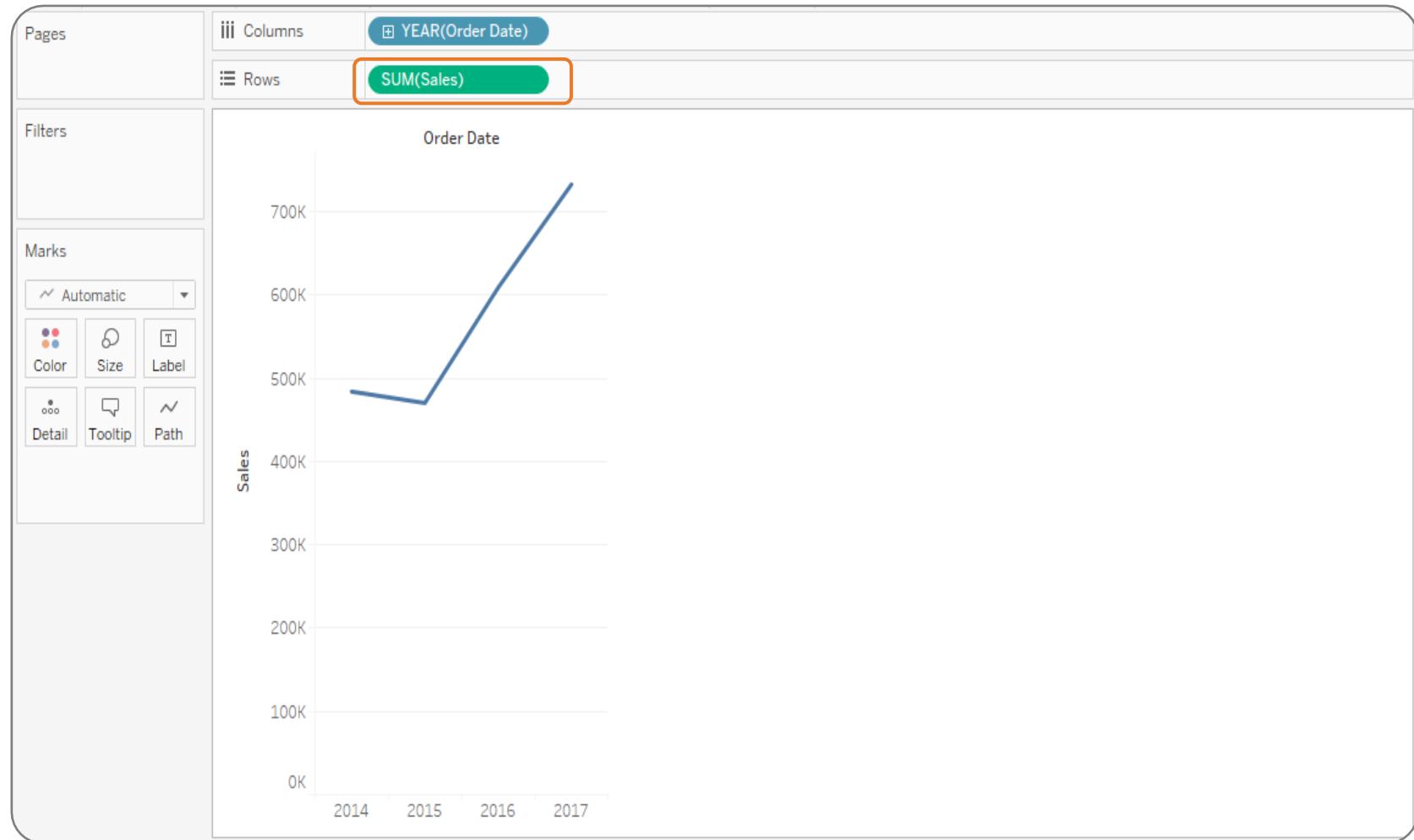
Steps to create a trend line for sales by each year:

The screenshot shows the Tableau Data Prep interface. On the left, there are three sections: 'Pages' (with a 'New Page' button), 'Columns' (with a 'New Column' button highlighted by an orange box), and 'Rows'. The 'Filters' section is empty. The 'Marks' section has a dropdown set to 'Automatic' and includes buttons for 'Color', 'Size', 'Text', 'Detail', and 'Tooltip'. In the center, a preview of a table is shown with a header 'Order Date' and four columns labeled 2014, 2015, 2016, and 2017. Each column contains the value 'Abc'.

Step 1

- Use sample superstore dataset
 - Drag **Order Date** to Columns

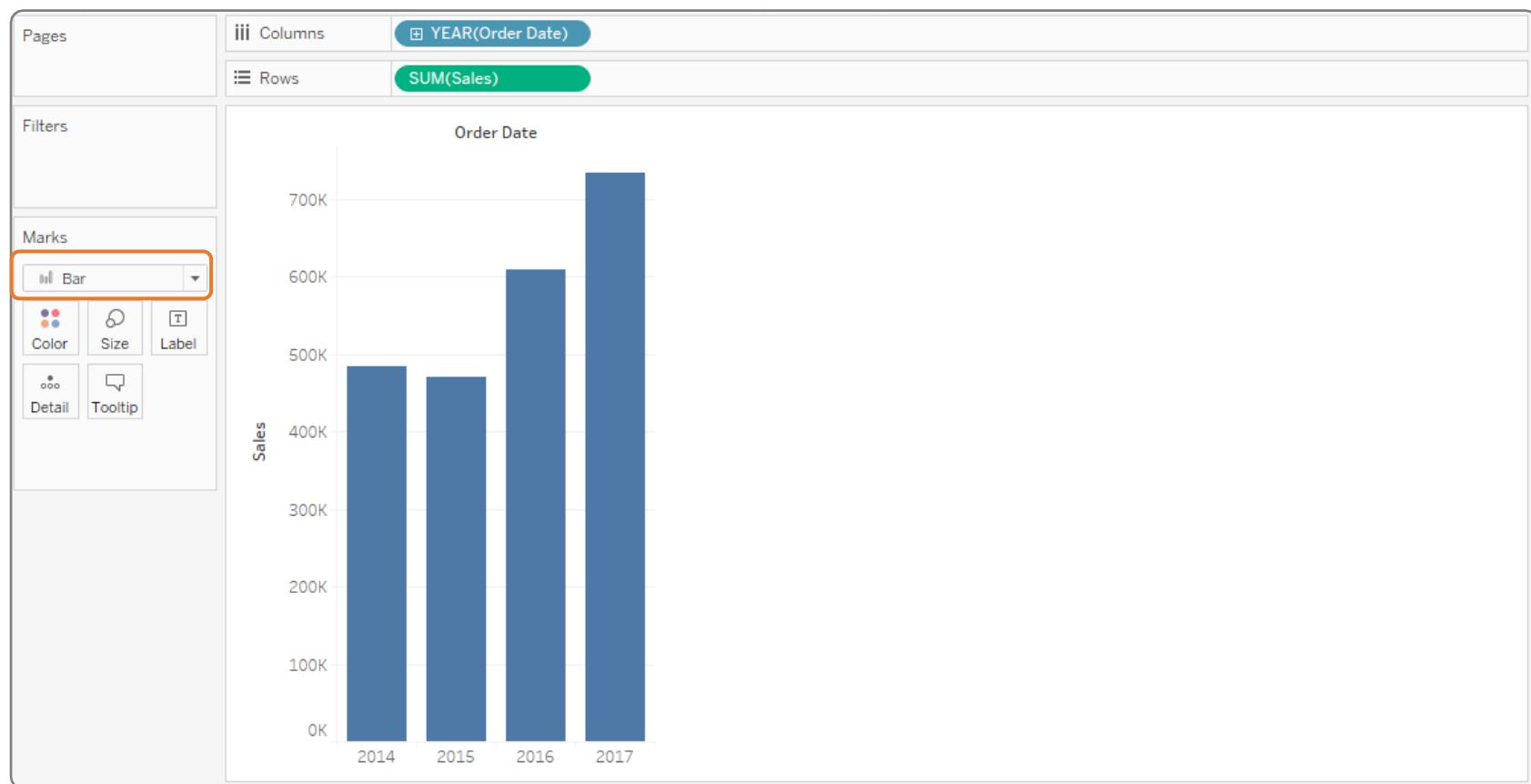
Trend Lines



Step 2

Drag **Sales** to Rows

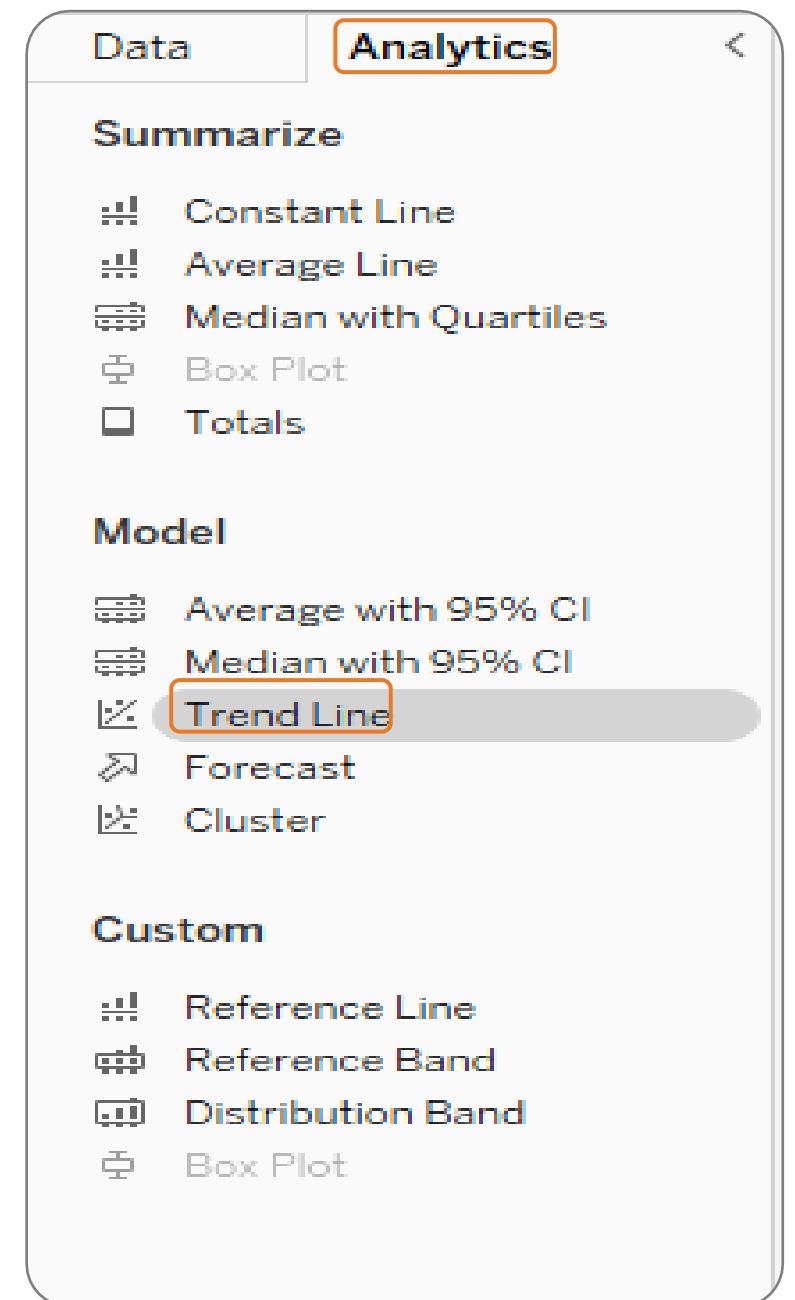
Trend Lines



Step 3

Change the type of mark to **Bar**. It is optional and only for the sake of visualizing the trend line separately

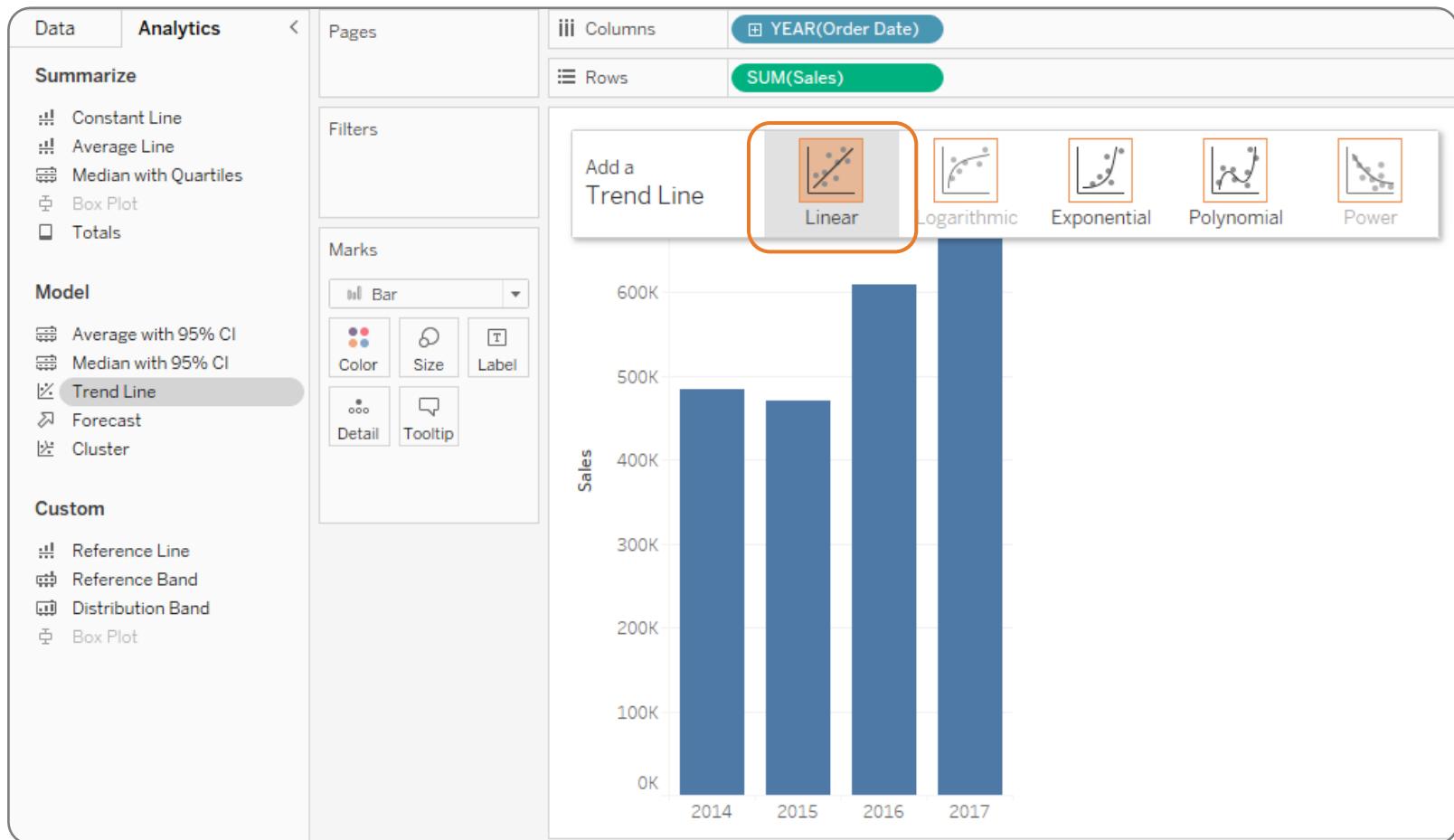
Trend Lines



Step 4

Go to Analytics Pane and select
Trend Line

Trend Lines

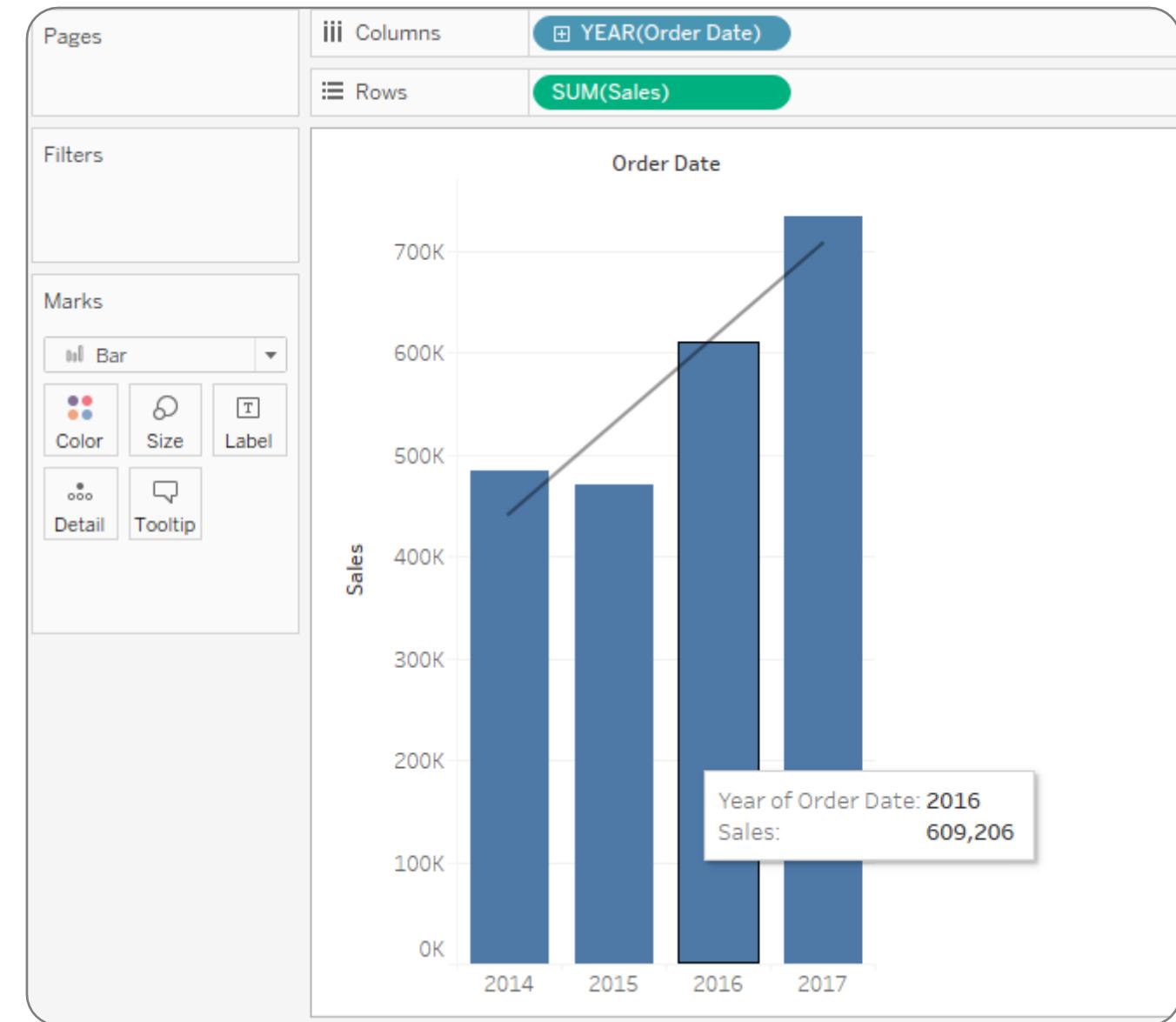


Step 5

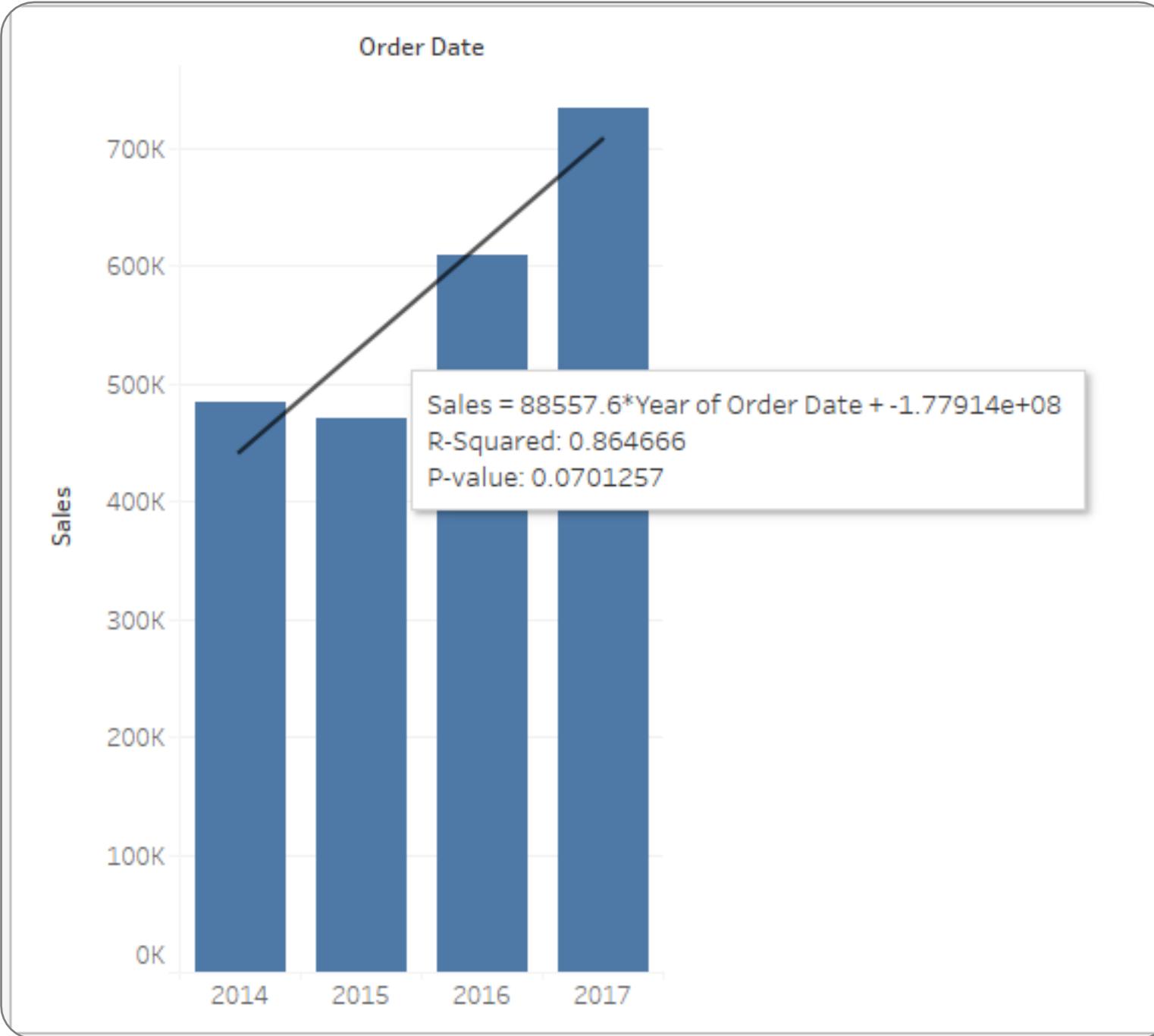
Drag **Linear** Trend Line to visualization

Trend Lines

This creates a linear trend line



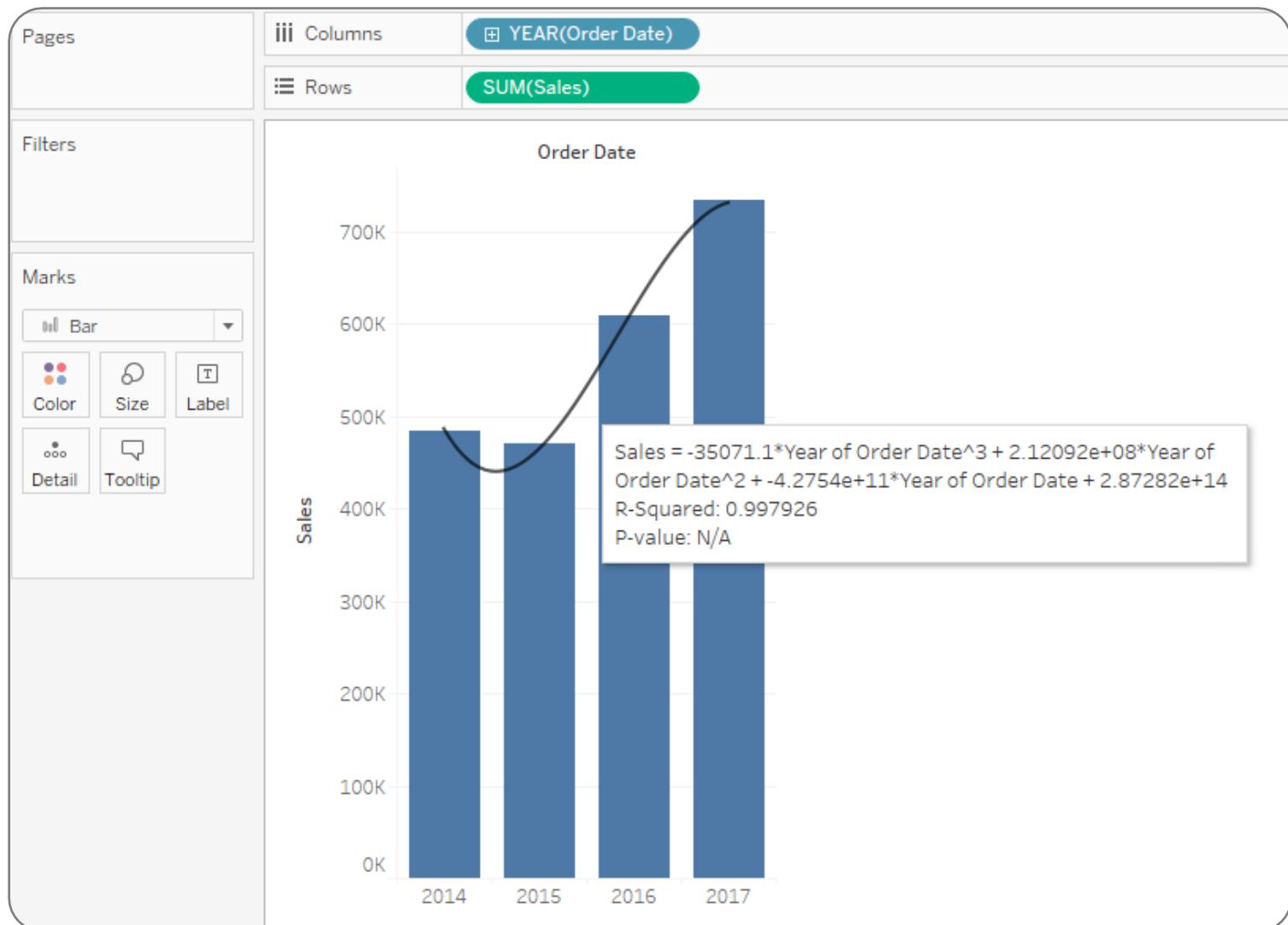
Trend Lines



Step 6

Hover the mouse pointer on the trend line to look at the tooltip for trend mode, R-Squared, and P-value

Trend Lines



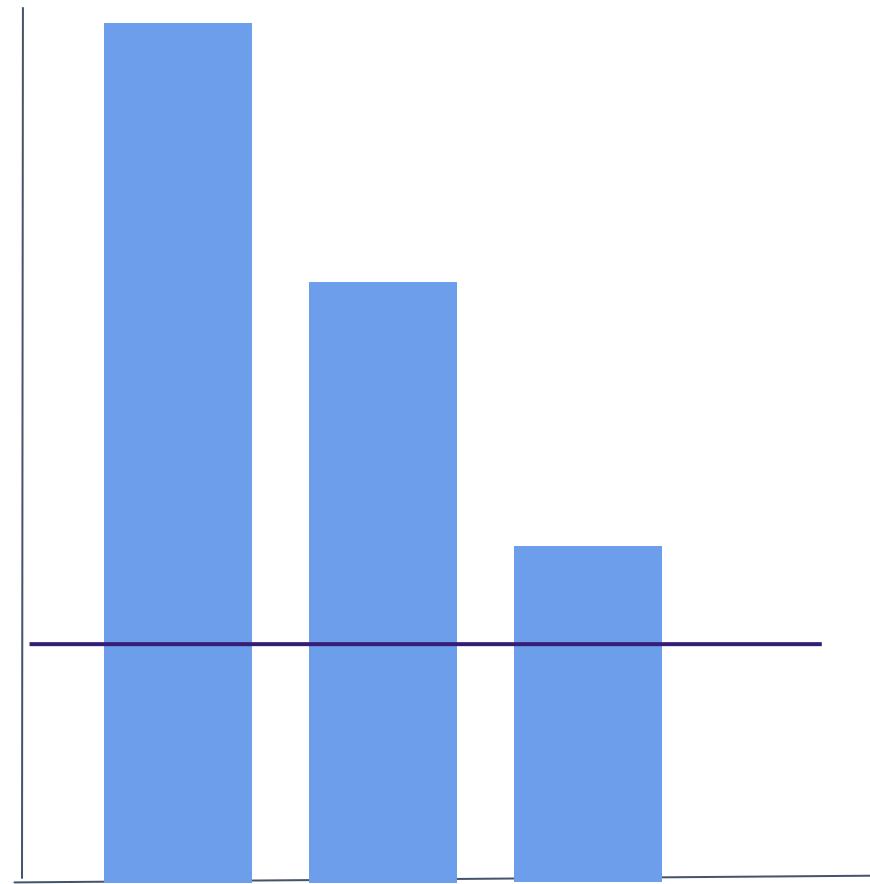
Step 7

Remove and add the type of trend line to polynomial for this scenario

Reference Lines

Reference Lines

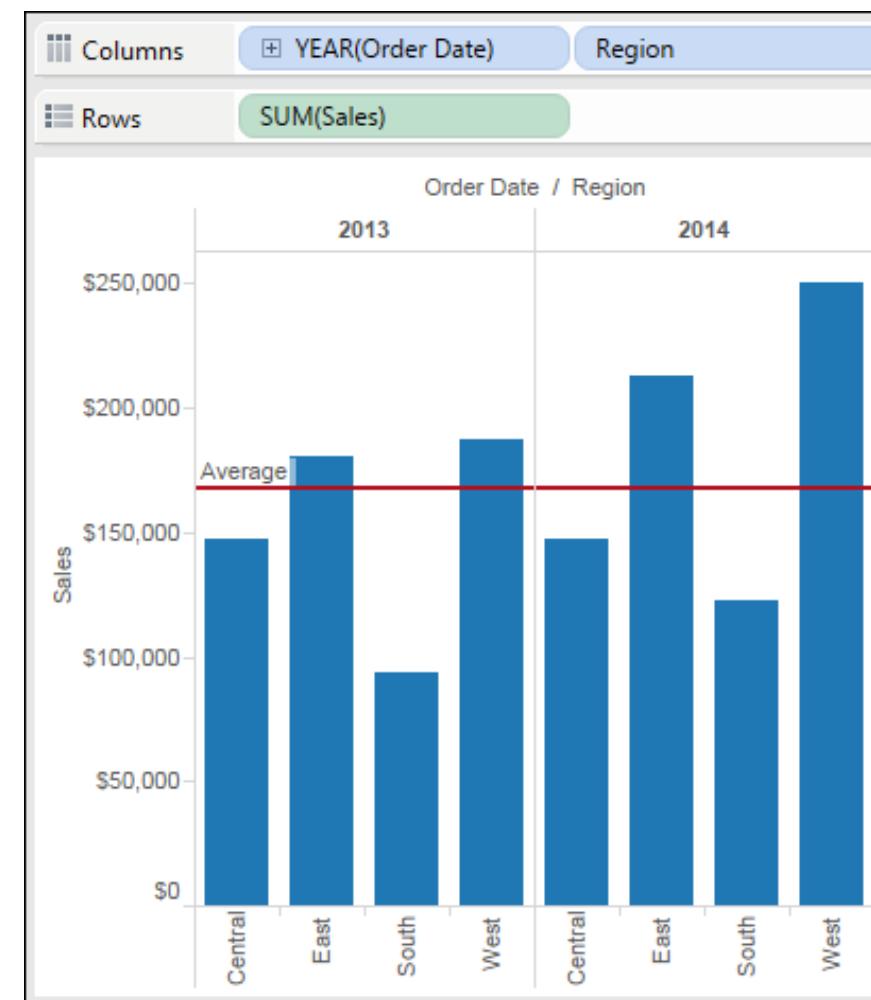
Reference lines indicate a particular value on a continuous axis in the view.



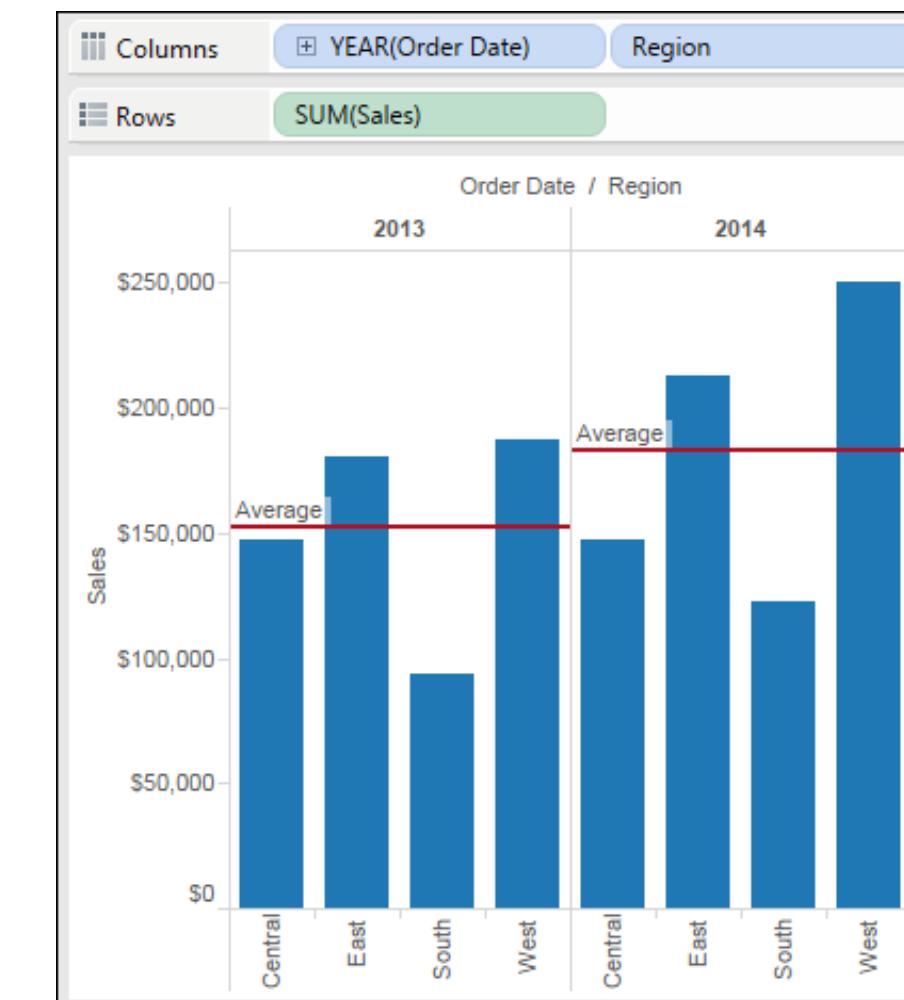
It can be based on a constant or computed value on the axis.

Reference Lines

Users can use the following examples to determine whether the bars in a view are above or below average:



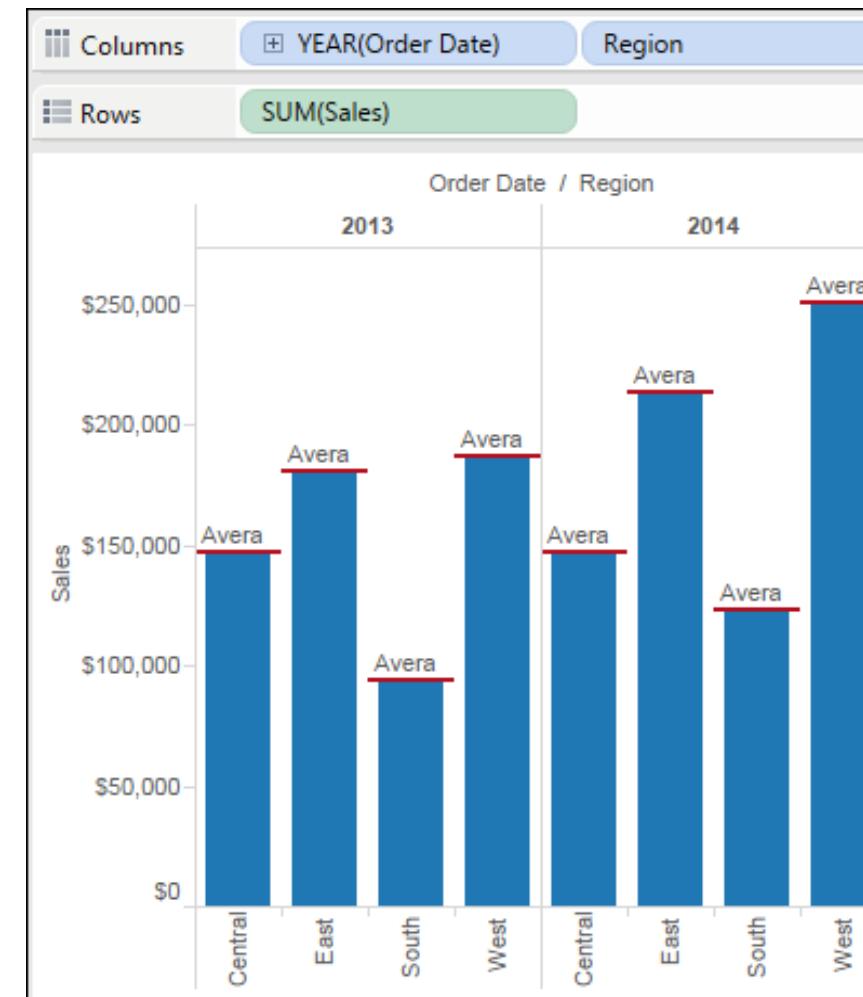
Entire table



Per pane

Reference Lines

Users can use the following examples to determine whether the bars in a view are above or below average:



Per cell

Reference Lines

A reference line can be added by selecting the following aggregations:

01

Average

03

Maximum

02

Constant

04

Median

Reference Lines

A reference line can be added by selecting the following aggregations:

05

Minimum

06

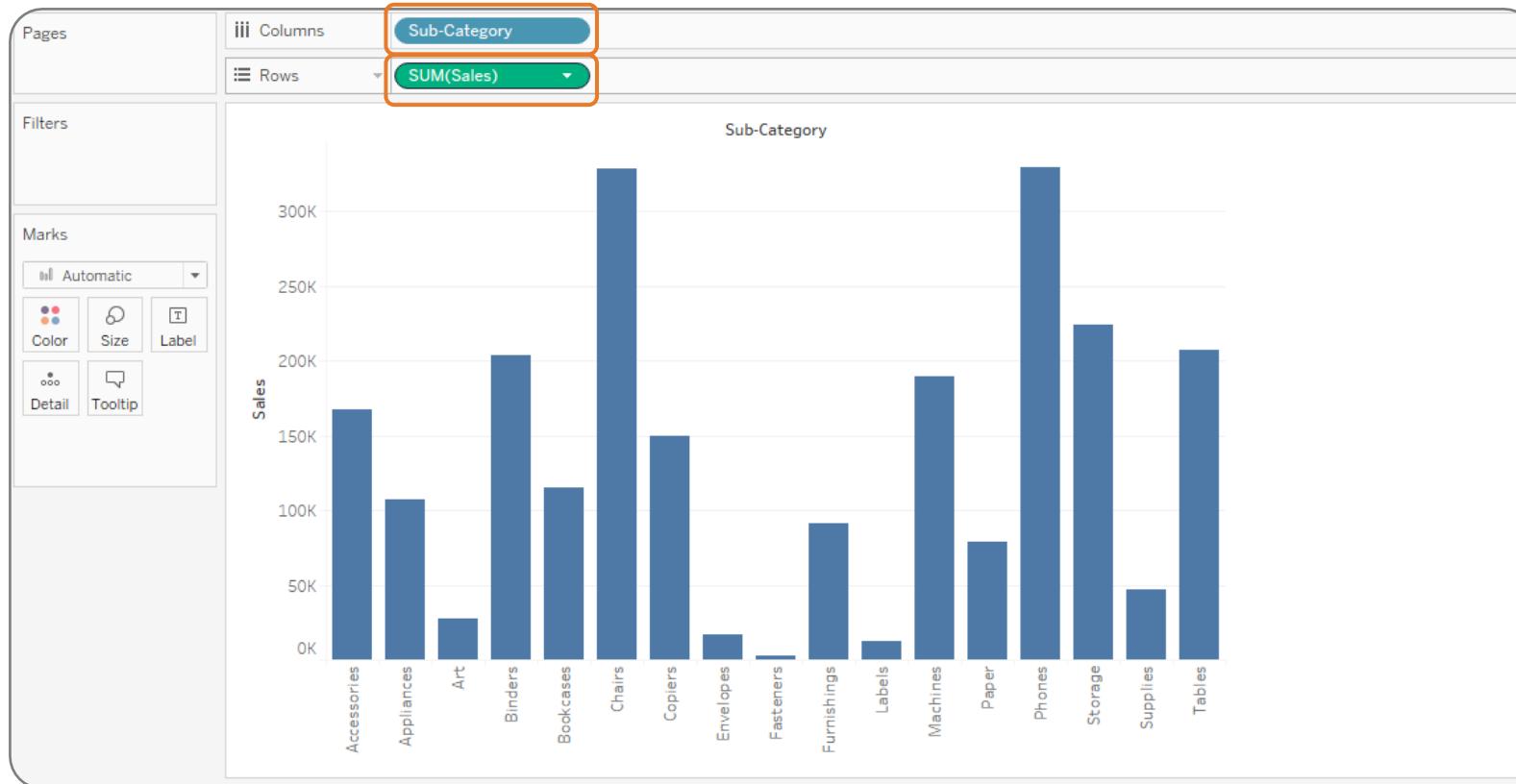
Sum

07

Total

Reference Lines

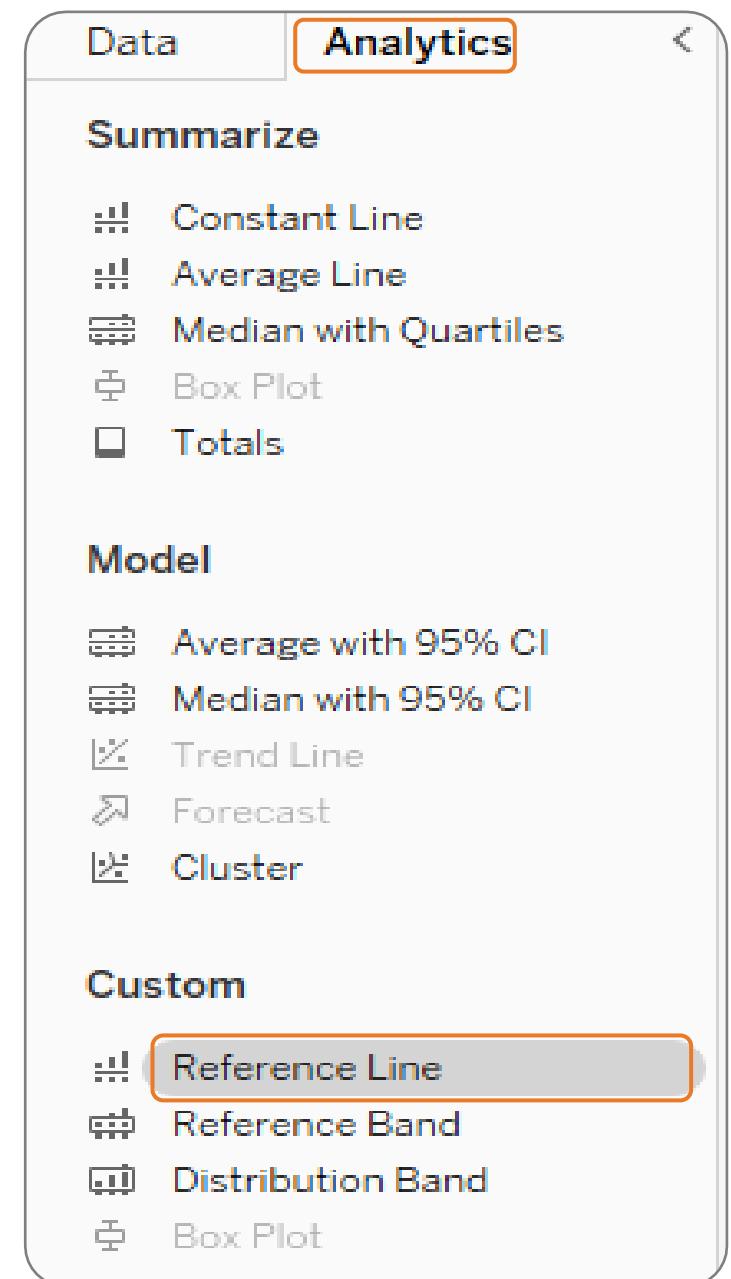
Steps to create a reference line for the sales on Sub-category:



Step 1

Create a bar chart with **Sub-Category** in Columns and **Sales** in Rows

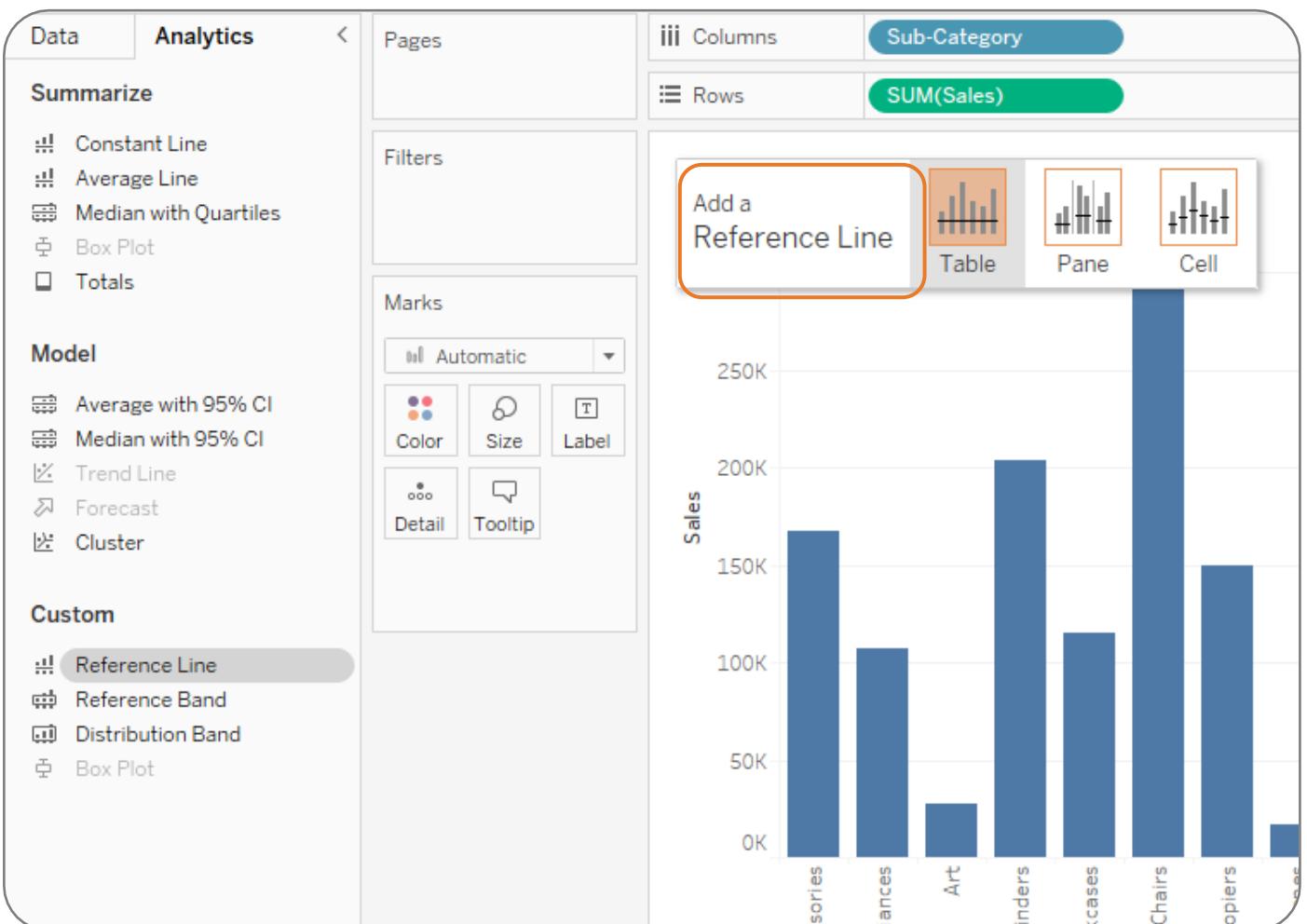
Reference Lines



Step 2

Navigate to Analytics pane and select
Reference Line

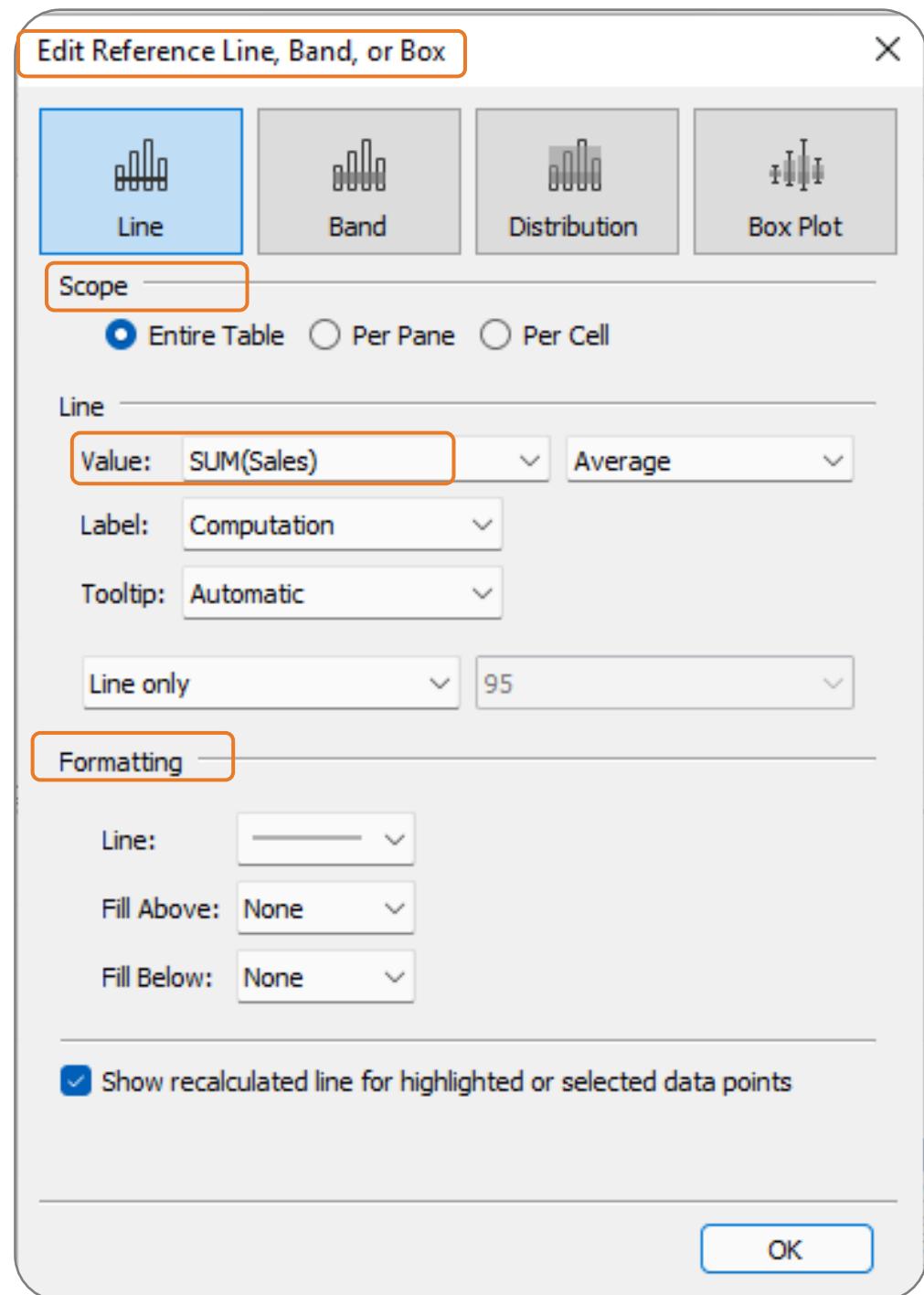
Reference Lines



Step 3

Drag **Reference Line** to the visualization under **Table** scope

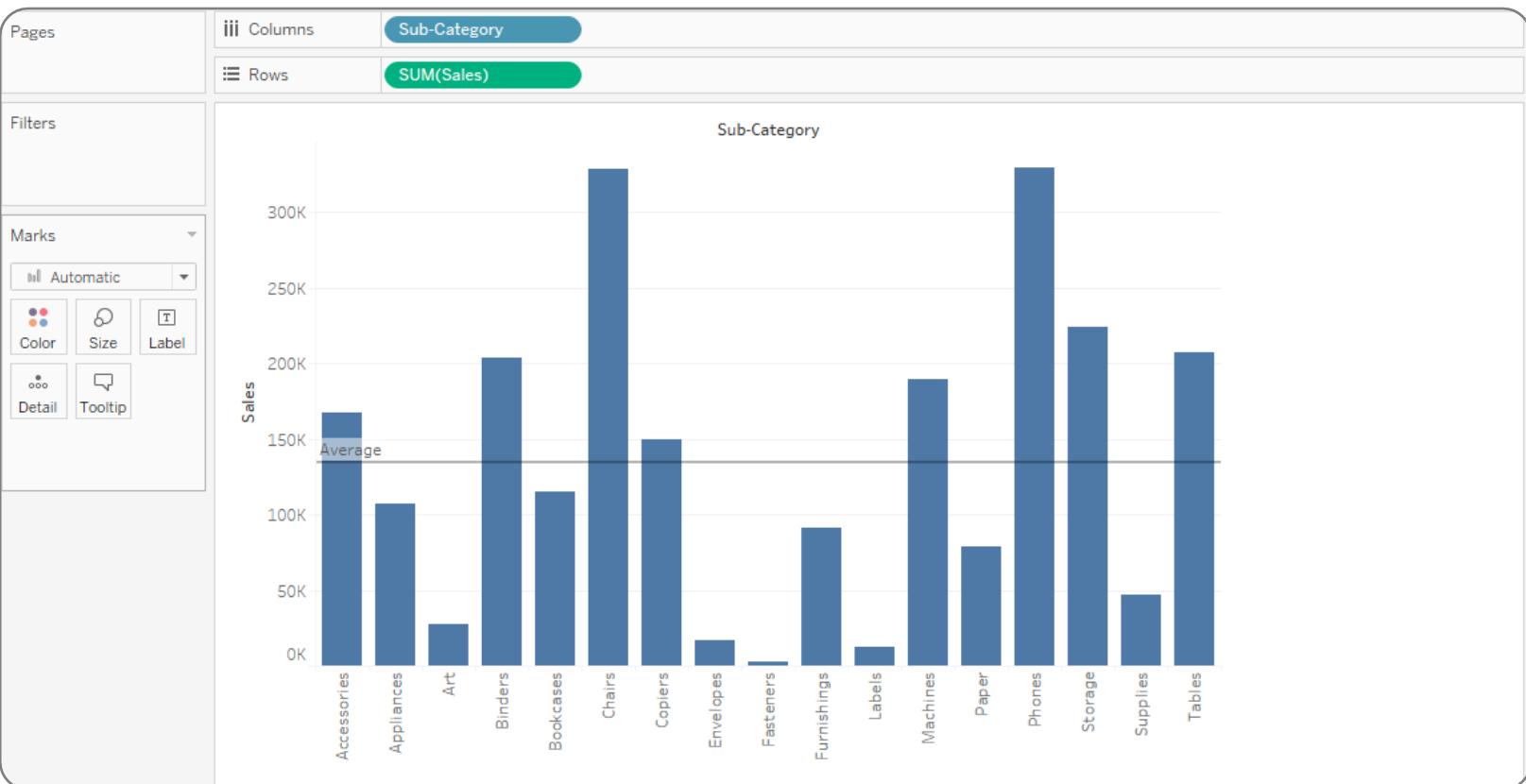
Reference Lines



Step 4

This opens the **Edit Reference Line** window. Scope, value, and the format of the reference line can be edited here. Then click **OK**

Reference Lines



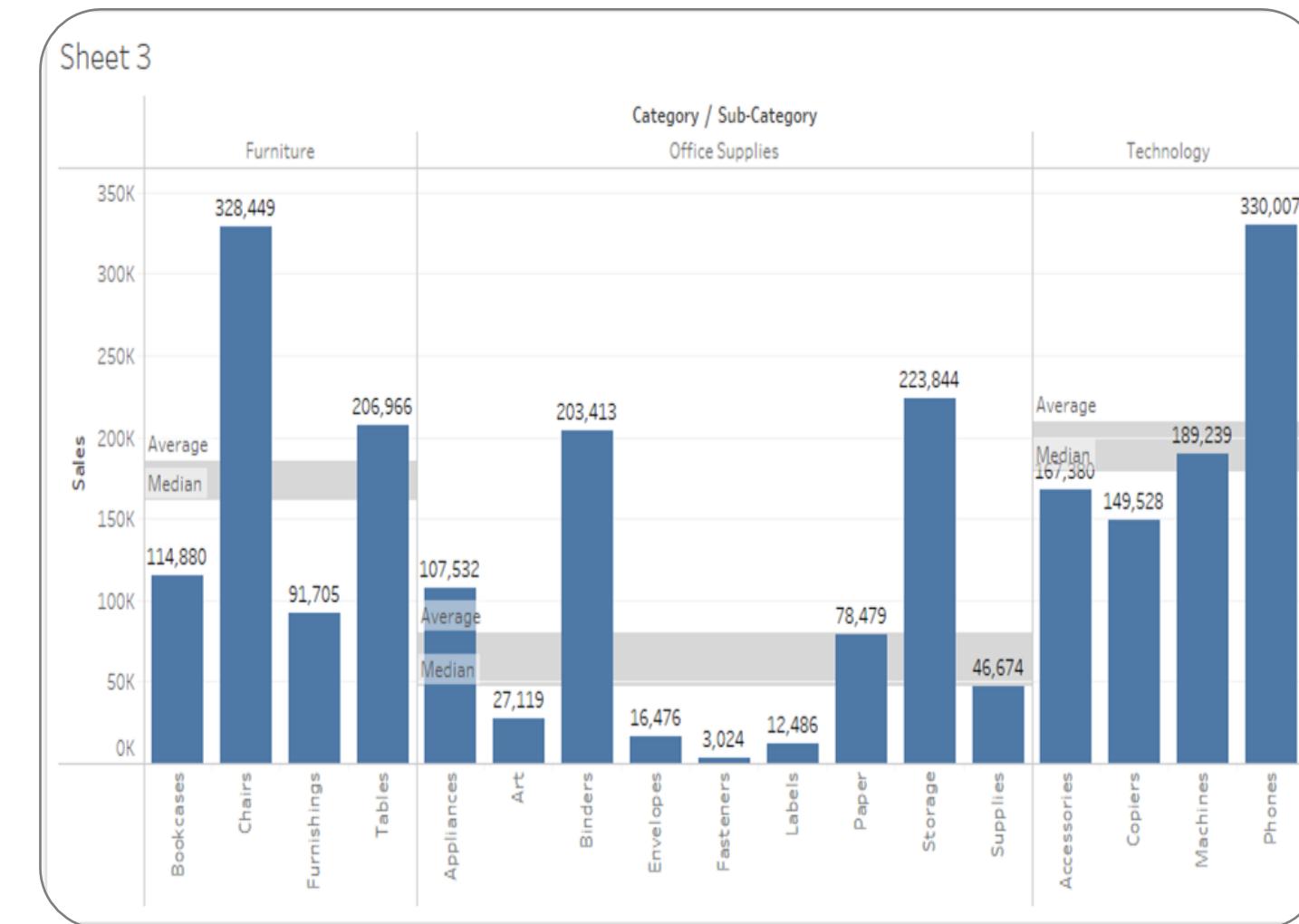
Step 5

Reference line is added to the visualization

Reference Bands

Reference Bands

Reference bands are similar to reference lines which use two values to mark a band of reference.



The band is marked by a color grading between two constant or computed values.

Reference Bands: Steps

Let us look at a scenario that showcases how to create a reference band between Median and Average of Sales.

Course Resources

E-books



Exercises



Tableau Prerequisites



Datasets



Step 1

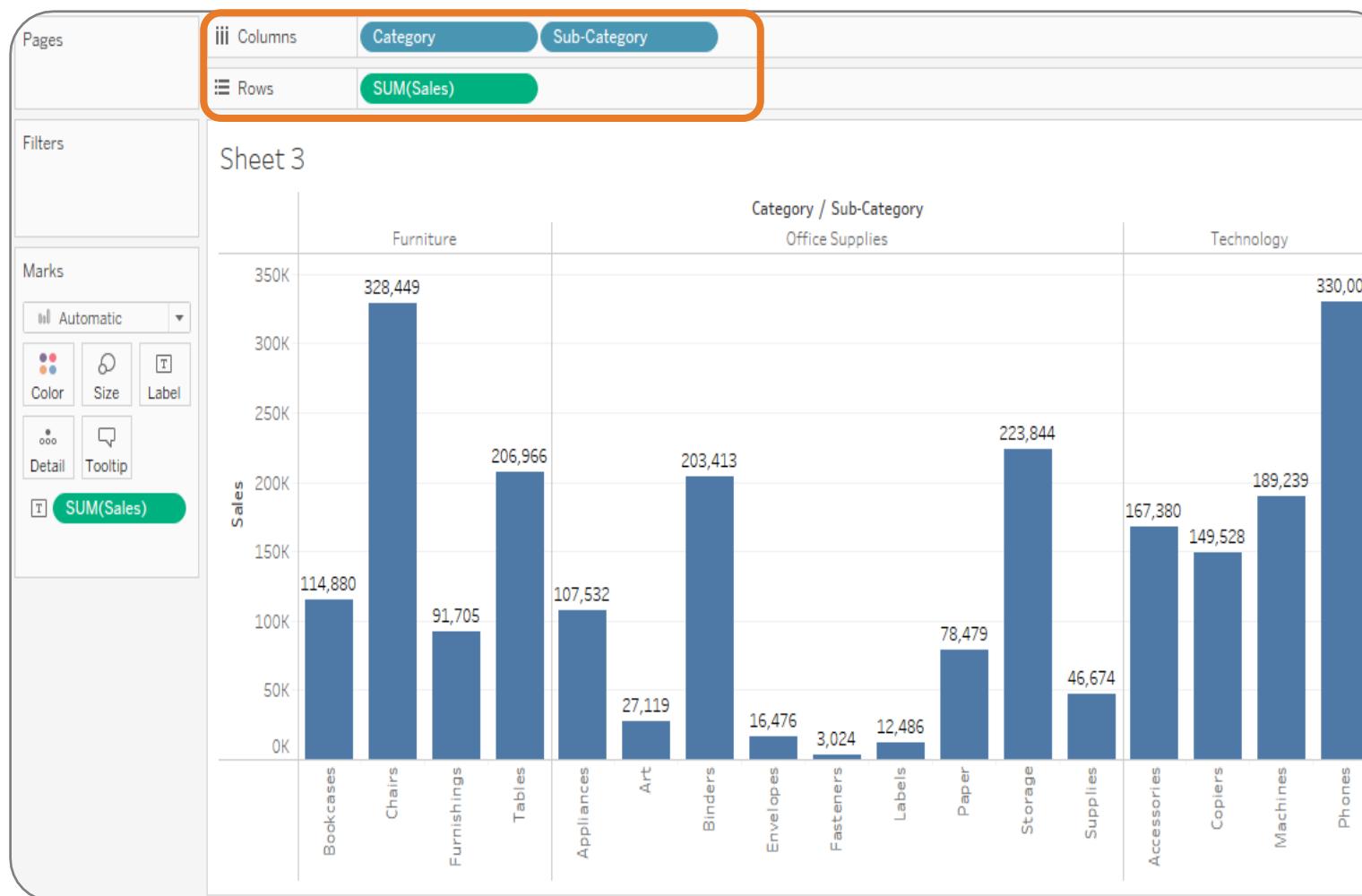
Use Sample Superstore dataset provided in the Simplilearn LMS

Reference Bands: Steps

Sample Superstore dataset in the Simplilearn LMS appears like this:

Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer Segment	Customer Type	Country/Region	City	State	Postal Code	Region	Product ID	Category	Sub-Category	Product Name
1	CA-2019-152156	08-11-2019	11-11-2019	Second Class	CG-12520	Claire Gutierrez	Consumer	United States	Kentucky	42420	South	FUR-BO-1	Furniture	Bookcases	Bush Somerset Collection Bookcase
2	CA-2019-152156	08-11-2019	11-11-2019	Second Class	CG-12520	Claire Gutierrez	Consumer	United States	Kentucky	42420	South	FUR-CH-1	Furniture	Chairs	Hon Deluxe Fabric Upholstered Stacki
3	CA-2019-138688	12-06-2019	16-06-2019	Second Class	DV-13045	Darrin Varner	Corporate	United States	Los Angeles, California	90036	West	OFF-LA-1	Office Supplies	Labels	Self-Adhesive Address Labels for Typ
4	US-2018-108966	11-10-2018	18-10-2018	Standard	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale, Florida	33311	South	FUR-TA-1	Furniture	Tables	Bretford CR4500 Series Slim Rectangu
5	US-2018-108966	11-10-2018	18-10-2018	Standard	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale, Florida	33311	South	OFF-ST-1	Office Supplies	Storage	Eldon Fold 'N Roll Cart System
6	CA-2017-115812	09-06-2017	14-06-2017	Standard	BH-11710	Brosina Hernandez	Consumer	United States	Los Angeles, California	90032	West	FUR-FU-1	Furniture	Furnishings	Eldon Expressions Wood and Plastic D
7	CA-2017-115812	09-06-2017	14-06-2017	Standard	BH-11710	Brosina Hernandez	Consumer	United States	Los Angeles, California	90032	West	OFF-AP-1	Office Supplies	Art	Newell 322
8	CA-2017-115812	09-06-2017	14-06-2017	Standard	BH-11710	Brosina Hernandez	Consumer	United States	Los Angeles, California	90032	West	TEC-PH-1	Technology	Phones	Mitel 5320 IP Phone VoIP phone
9	CA-2017-115812	09-06-2017	14-06-2017	Standard	BH-11710	Brosina Hernandez	Consumer	United States	Los Angeles, California	90032	West	OFF-BI-10	Office Supplies	Binders	DXL Angle-View Binders with Locking P
10	CA-2017-115812	09-06-2017	14-06-2017	Standard	BH-11710	Brosina Hernandez	Consumer	United States	Los Angeles, California	90032	West	OFF-AP-1	Office Supplies	Appliance	Belkin F5C206VTEL 6 Outlet Surge
11	CA-2017-115812	09-06-2017	14-06-2017	Standard	BH-11710	Brosina Hernandez	Consumer	United States	Los Angeles, California	90032	West	FUR-TA-1	Furniture	Tables	Chromcraft Rectangular Conference Ta
12	CA-2017-115812	09-06-2017	14-06-2017	Standard	BH-11710	Brosina Hernandez	Consumer	United States	Los Angeles, California	90032	West	TEC-PH-1	Technology	Phones	Kontrol 250 Conference phone - Charco
13	CA-2017-115812	09-06-2017	14-06-2017	Standard	BH-11710	Brosina Hernandez	Consumer	United States	Los Angeles, California	90032	West	OFF-PA-1	Office Supplies	Paper	Xerox 1967
14	CA-2020-114412	15-04-2020	20-04-2020	Standard	AA-10480	Andrew Alvarado	Consumer	United States	Concord, North Carolina	28027	South	OFF-BI-10	Office Supplies	Binders	Fellowes PB200 Plastic Comb Binding
15	CA-2019-161389	05-12-2019	10-12-2019	Standard	IM-15070	Irene Madrigal	Consumer	United States	Seattle, Washington	98103	West	OFF-AP-1	Office Supplies	Appliance	Holmes Replacement Filter for HEPA /
16	US-2018-118983	22-11-2018	26-11-2018	Standard	HP-14815	Harold Perez	Home Office	United States	Fort Worth, Texas	76106	Central	OFF-BI-10	Office Supplies	Binders	Storex DuraTech Recycled Plastic Fro
17	US-2018-118983	22-11-2018	26-11-2018	Standard	HP-14815	Harold Perez	Home Office	United States	Fort Worth, Texas	76106	Central	OFF-ST-1	Office Supplies	Storage	Stur-D-Stor Shelving, Vertical 5-Shelf, 7
18	CA-2017-105893	11-11-2017	18-11-2017	Standard	PK-19075	Pete Kriz	Consumer	United States	Madison, Wisconsin	53711	Central	OFF-ST-1	Office Supplies	Storage	Fellowes Super Stor/Drawer
19	CA-2017-167164	13-05-2017	15-05-2017	Second Class	CAG-10270	Alejandro Contreras	Consumer	United States	West Jordan, Utah	84084	West	OFF-AR-1	Office Supplies	Art	Newell 341
20	CA-2017-143336	27-08-2017	01-09-2017	Second Class	ZD-21925	Zuschuss	Consumer	United States	San Francisco, California	94109	West	TEC-PH-1	Technology	Phones	Cisco SPA 501G IP Phone
21	CA-2017-143336	27-08-2017	01-09-2017	Second Class	ZD-21925	Zuschuss	Consumer	United States	San Francisco, California	94109	West	OFF-BI-10	Office Supplies	Binders	Wilson Jones Hanging View Binder, W
22	CA-2019-137330	09-12-2019	13-12-2019	Standard	KB-16585	Ken Black	Corporate	United States	Fremont, Nebraska	68025	Central	OFF-AP-1	Office Supplies	Art	Newell 318
23	CA-2019-137330	09-12-2019	13-12-2019	Standard	KB-16585	Ken Black	Corporate	United States	Fremont, Nebraska	68025	Central	OFF-AP-1	Office Supplies	Appliance	Acco Six-Outlet Power Strip, 4' Cord Le
24	US-2020-156909	16-07-2020	18-07-2020	Second Class	SF-20065	Sandra Flores	Consumer	United States	Philadelphia, Pennsylvania	19140	East	FUR-CH-1	Furniture	Chairs	Global Deluxe Stacking Chair, Gray
25	CA-2018-106320	25-09-2018	30-09-2018	Standard	EB-13870	Emily Burns	Consumer	United States	Orem, Utah	84057	West	FUR-TA-1	Furniture	Tables	Bretford CR4500 Series Slim Rectangu
26	CA-2019-121755	16-01-2019	20-01-2019	Second Class	EH-13945	Eric Hoffman	Consumer	United States	Los Angeles, California	90049	West	OFF-BI-10	Office Supplies	Binders	Wilson Jones Active Use Binders
27	CA-2019-121755	16-01-2019	20-01-2019	Second Class	EH-13945	Eric Hoffman	Consumer	United States	Los Angeles, California	90049	West	TEC-AC-1	Technology	Accessories	Imation 8GB Mini TravelDrive USB 2.0
28	US-2018-150630	17-09-2018	21-09-2018	Standard	TB-21520	Tracy Blue	Consumer	United States	Philadelphia, Pennsylvania	19140	East	FUR-BO-1	Furniture	Bookcases	Riverside Palais Royal Lawyers Book
29	US-2018-150630	17-09-2018	21-09-2018	Standard	TB-21520	Tracy Blue	Consumer	United States	Philadelphia, Pennsylvania	19140	East	OFF-BI-10	Office Supplies	Binders	Avery Recycled Flexi-View Covers for
30	US-2018-150630	17-09-2018	21-09-2018	Standard	TB-21520	Tracy Blue	Consumer	United States	Philadelphia, Pennsylvania	19140	East	FUR-FU-1	Furniture	Furnishings	Howard Miller 13-3/4" Diameter Brush
31	US-2018-150630	17-09-2018	21-09-2018	Standard	TB-21520	Tracy Blue	Consumer	United States	Philadelphia, Pennsylvania	19140	East	OFF-EN-1	Office Supplies	Envelopes	Poly String Tie Envelopes

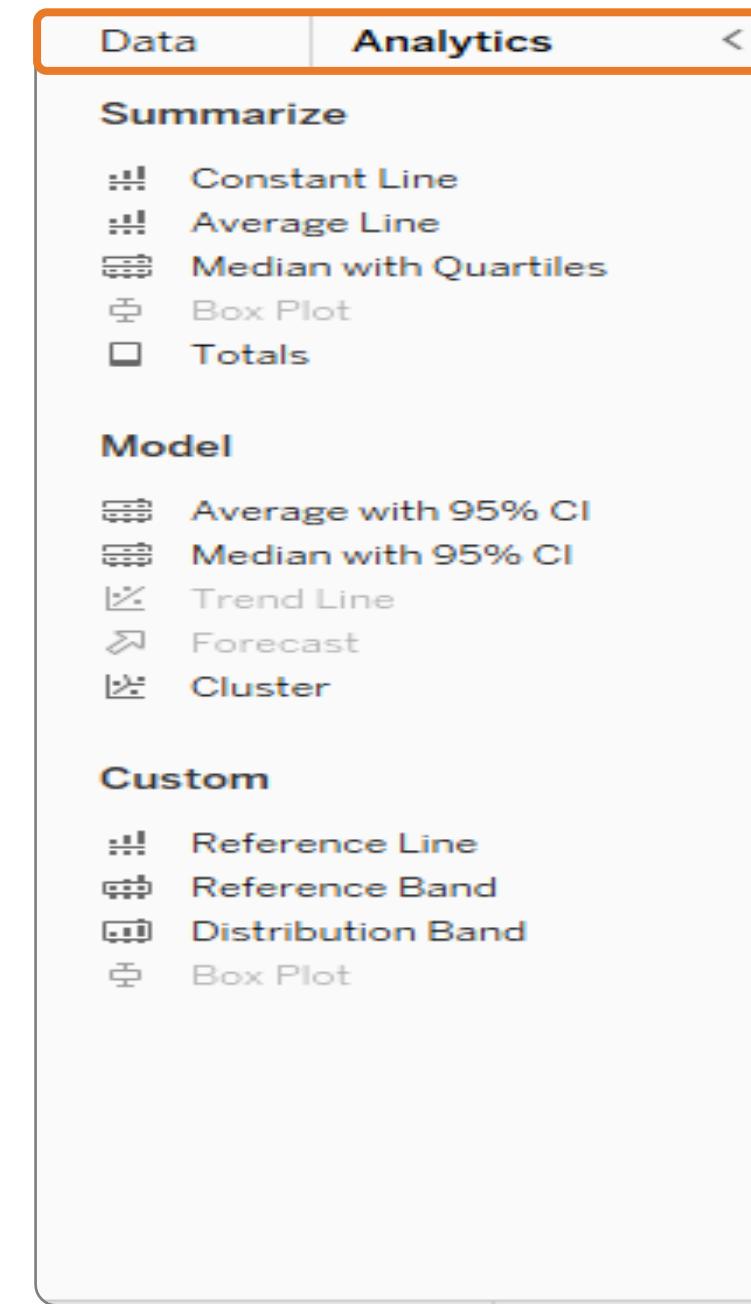
Reference Bands: Steps



Step 2

Create a bar chart with **Category** and **Sub-Category** in Columns and **Sales** in Rows

Reference Bands: Steps

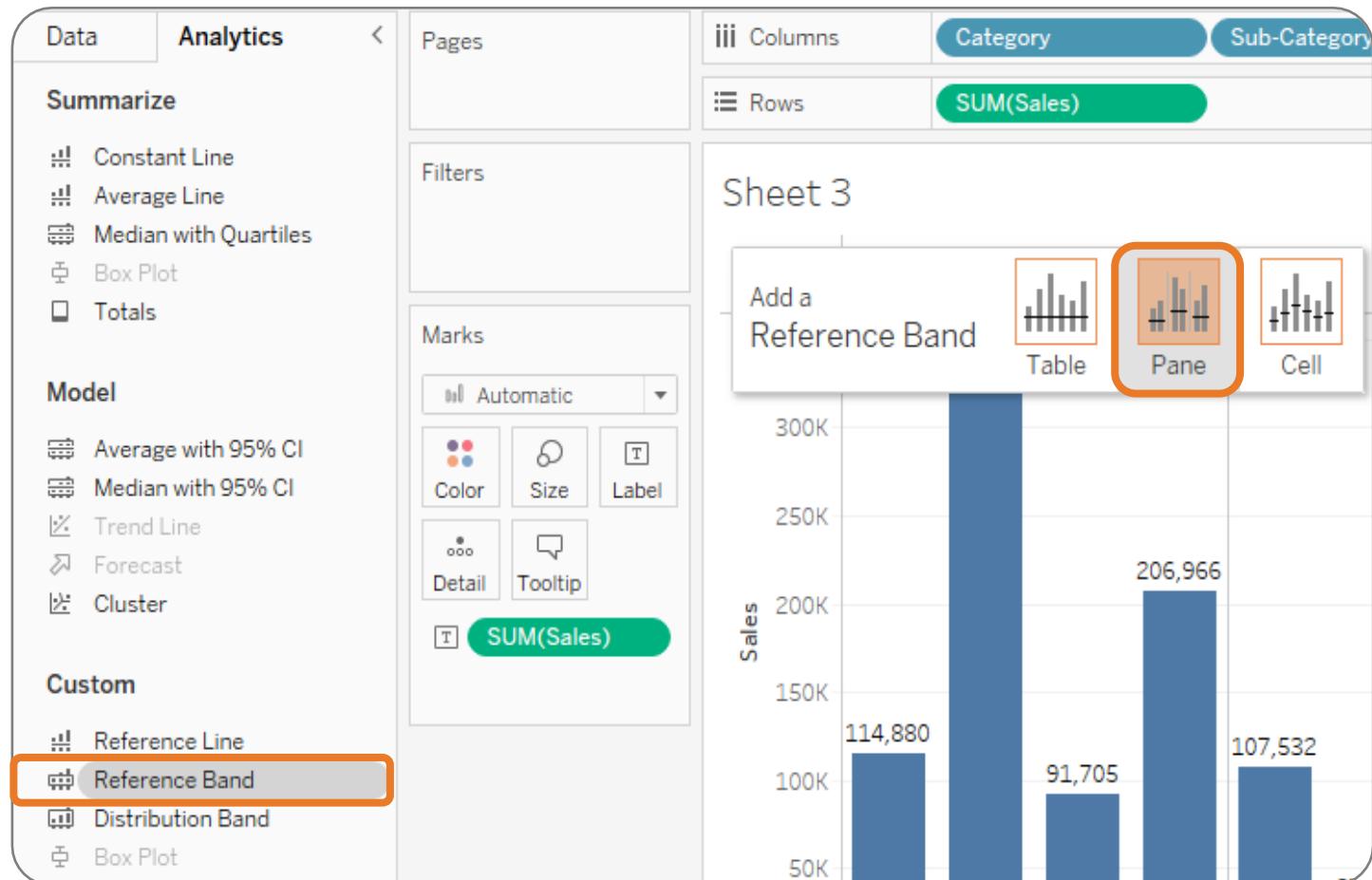


Step 3

Go to the **Analytics** pane on the worksheet



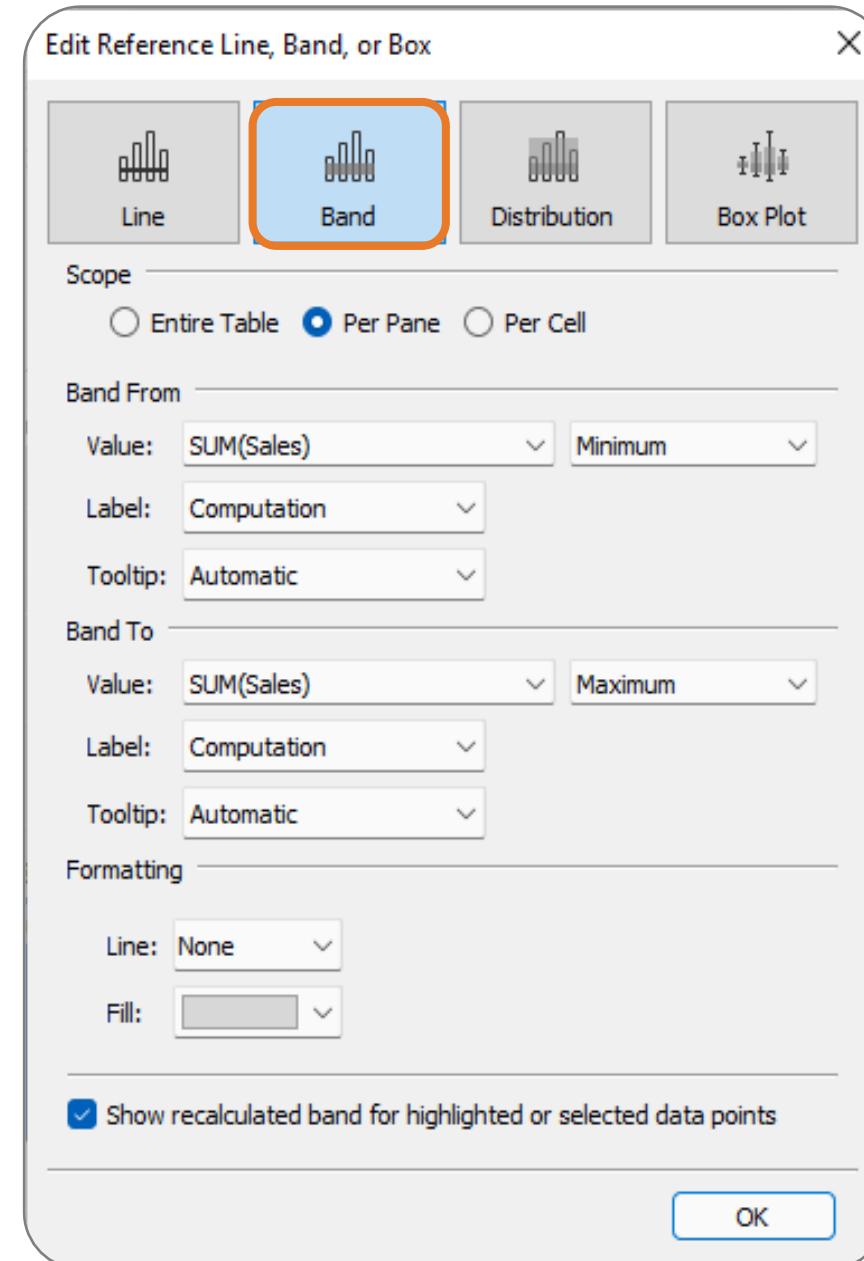
Reference Bands: Steps



Step 4

Drag Reference Band for Pane scope

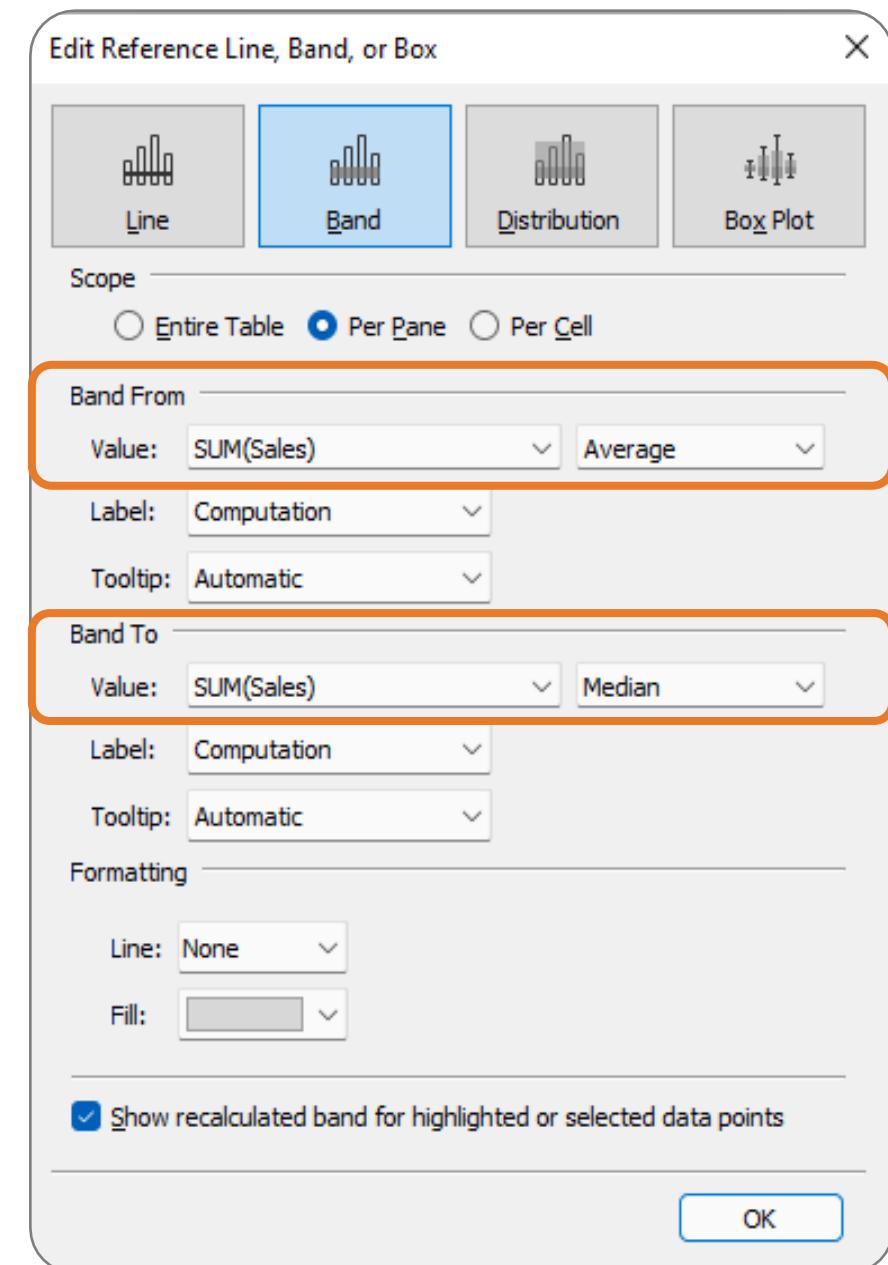
Reference Bands: Steps



Step 5

Edit Reference Band window

Reference Bands: Steps

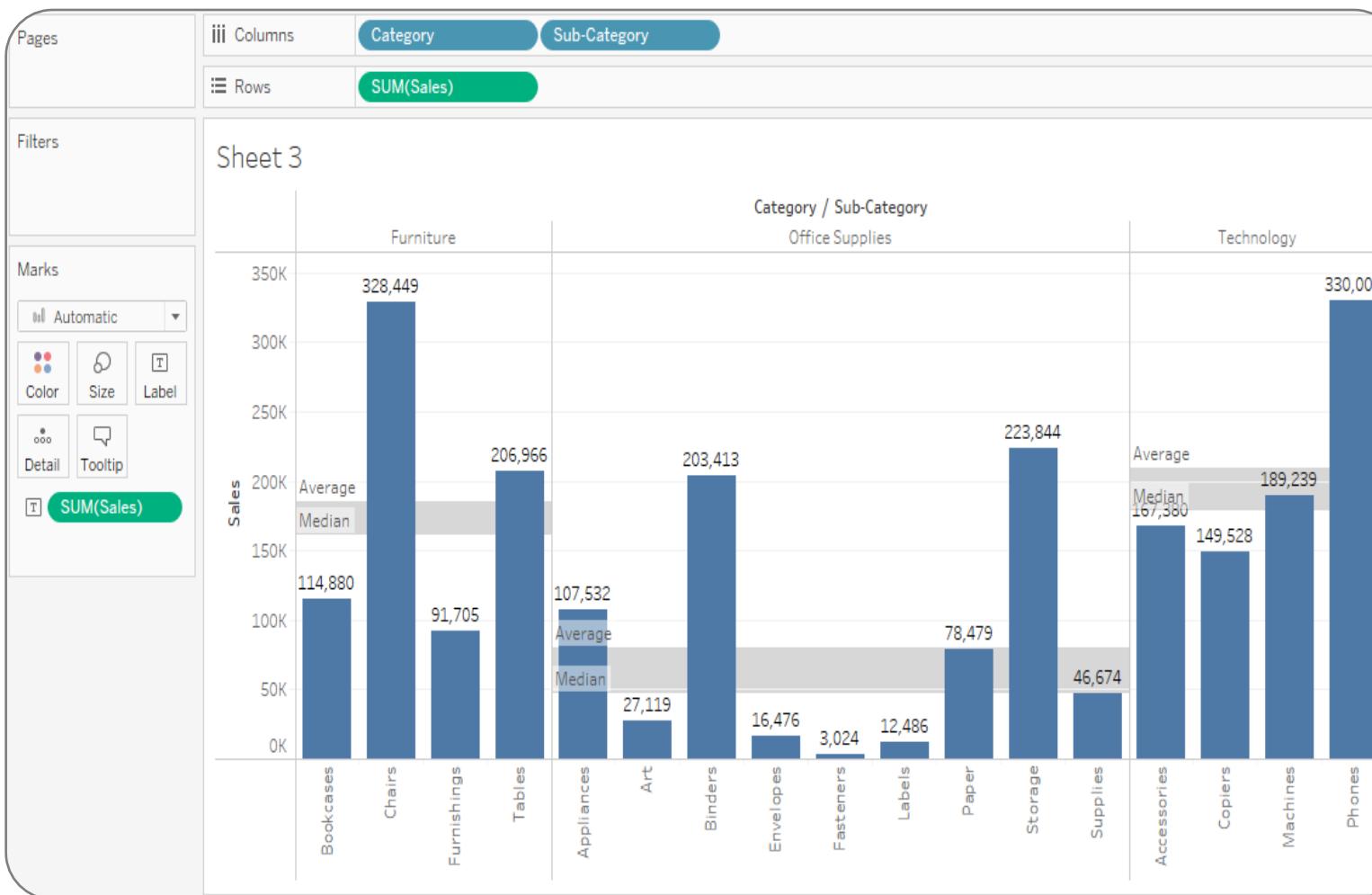


Step 6

Select Scope as **Per Pane** and set Band From $\text{SUM}(\text{Sales})$ as **Average** and Band To $\text{SUM}(\text{Sales})$ as **Median**

Reference Bands: Steps

Note: Add a measure to the detail to have the field not be part of the current visualization in creating a reference band.

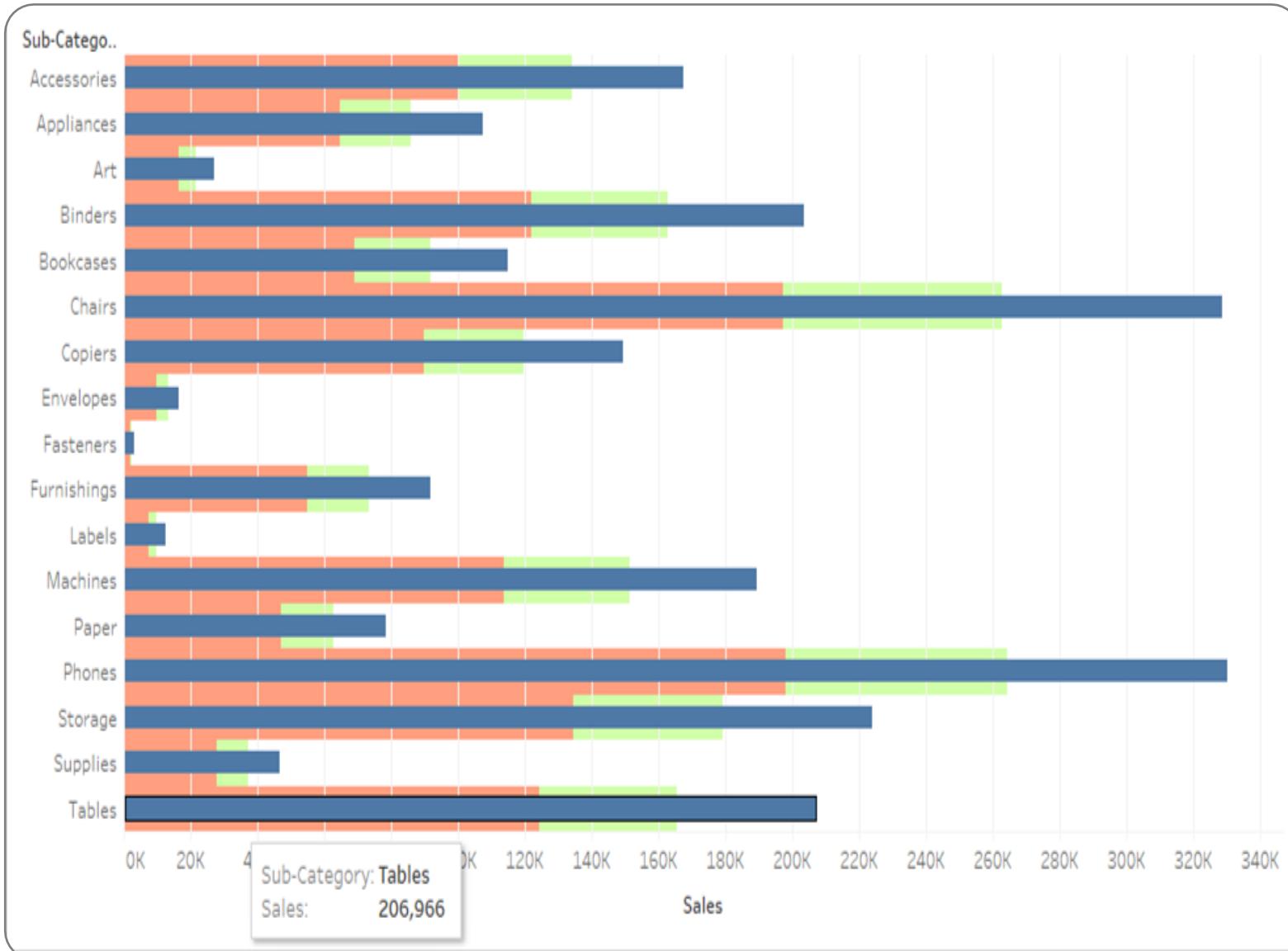


Step 7

Click on **OK** to see the Reference Band
in the bar chart

Distribution Bands

Distribution Bands

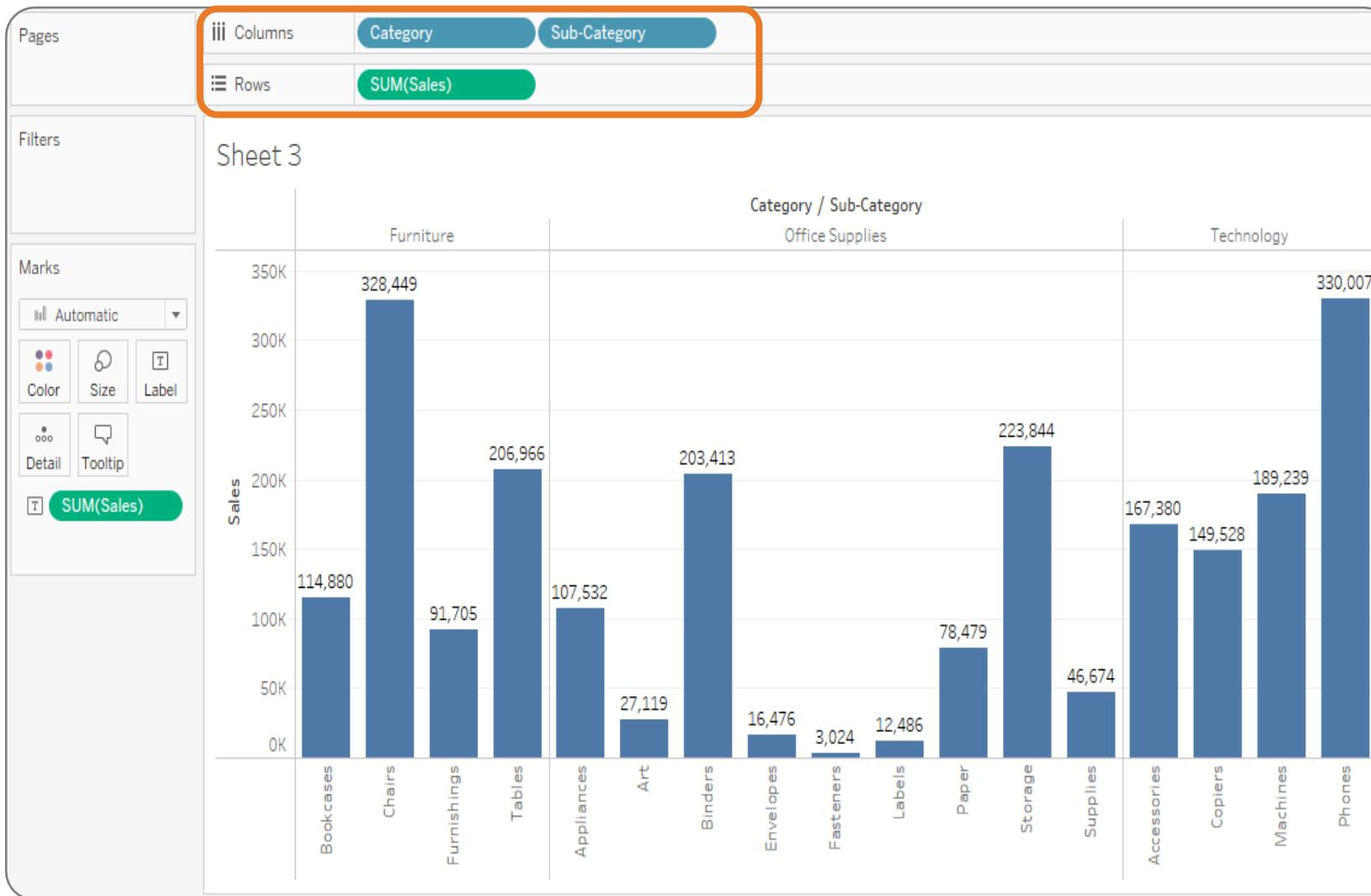


Distribution bands display a band for reference.

It is mainly used in comparing two values with one value.

The progress of the bar chart can be tracked and compared to the distribution of other values.

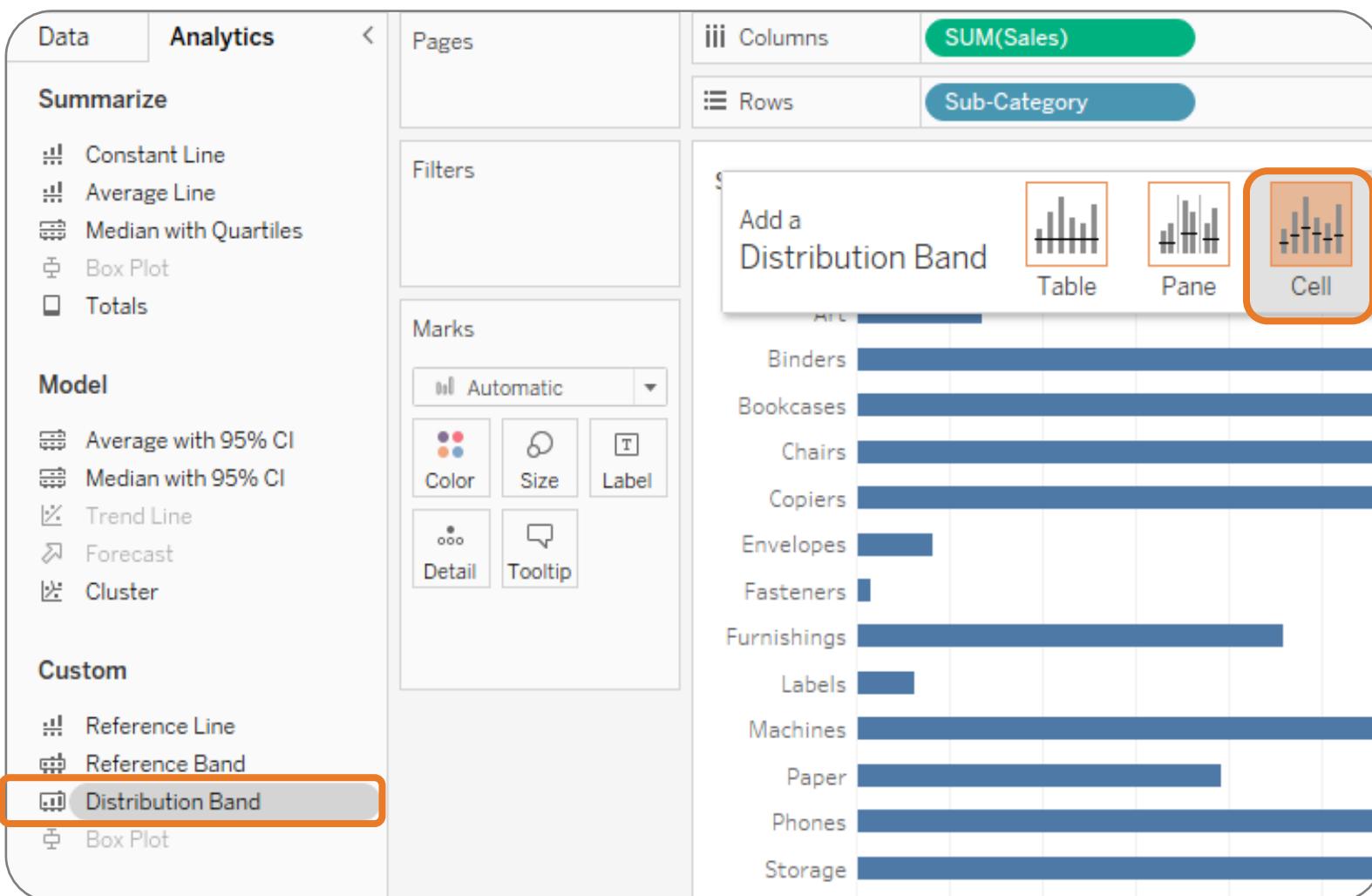
Distribution Bands: Steps



Step 1

Create a Bar Chart with **Category** and **Sub-Category** in Columns and Sales in Rows

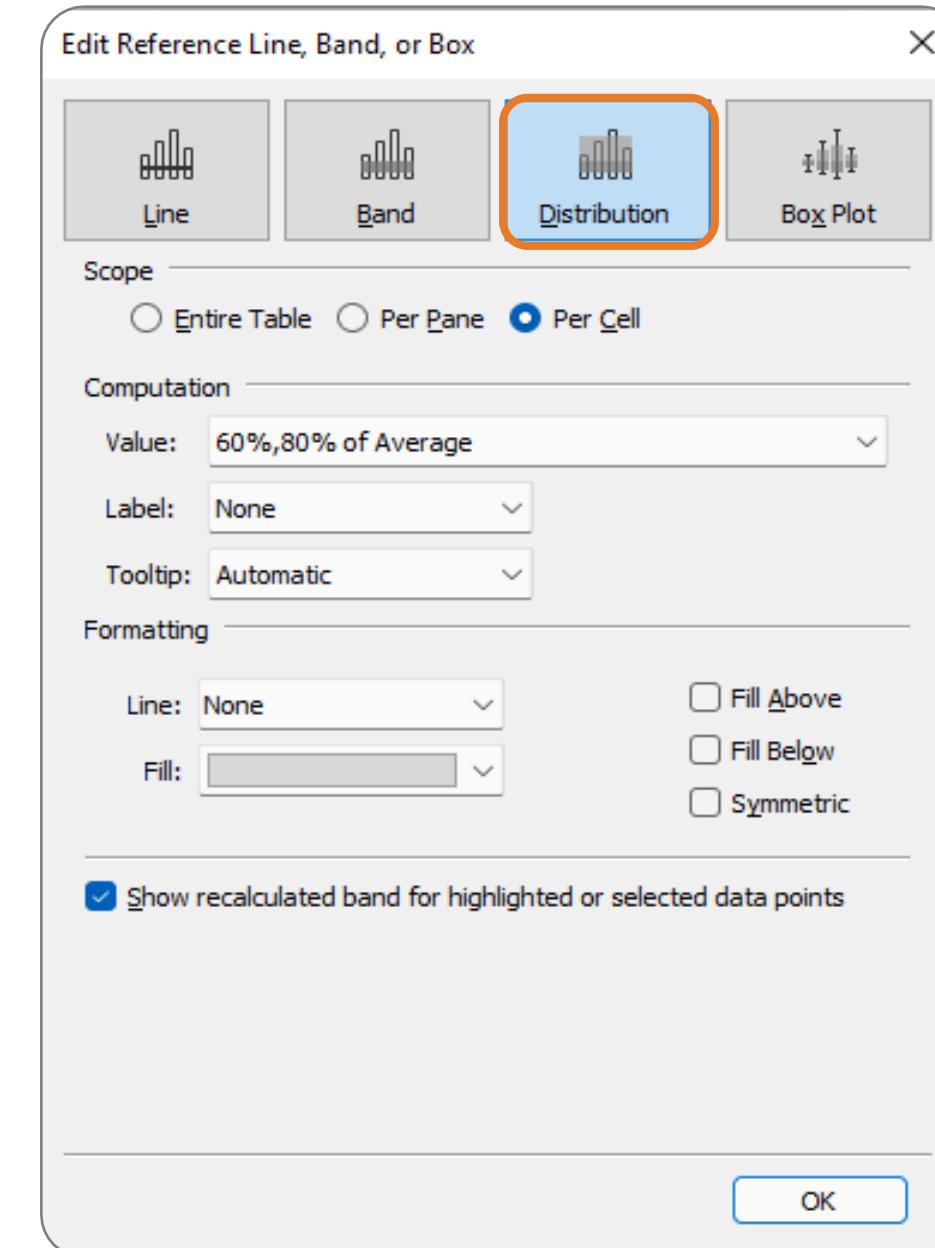
Distribution Bands: Steps



Step 2

Go to Analytics Pane and drag
Distribution Band per Cell

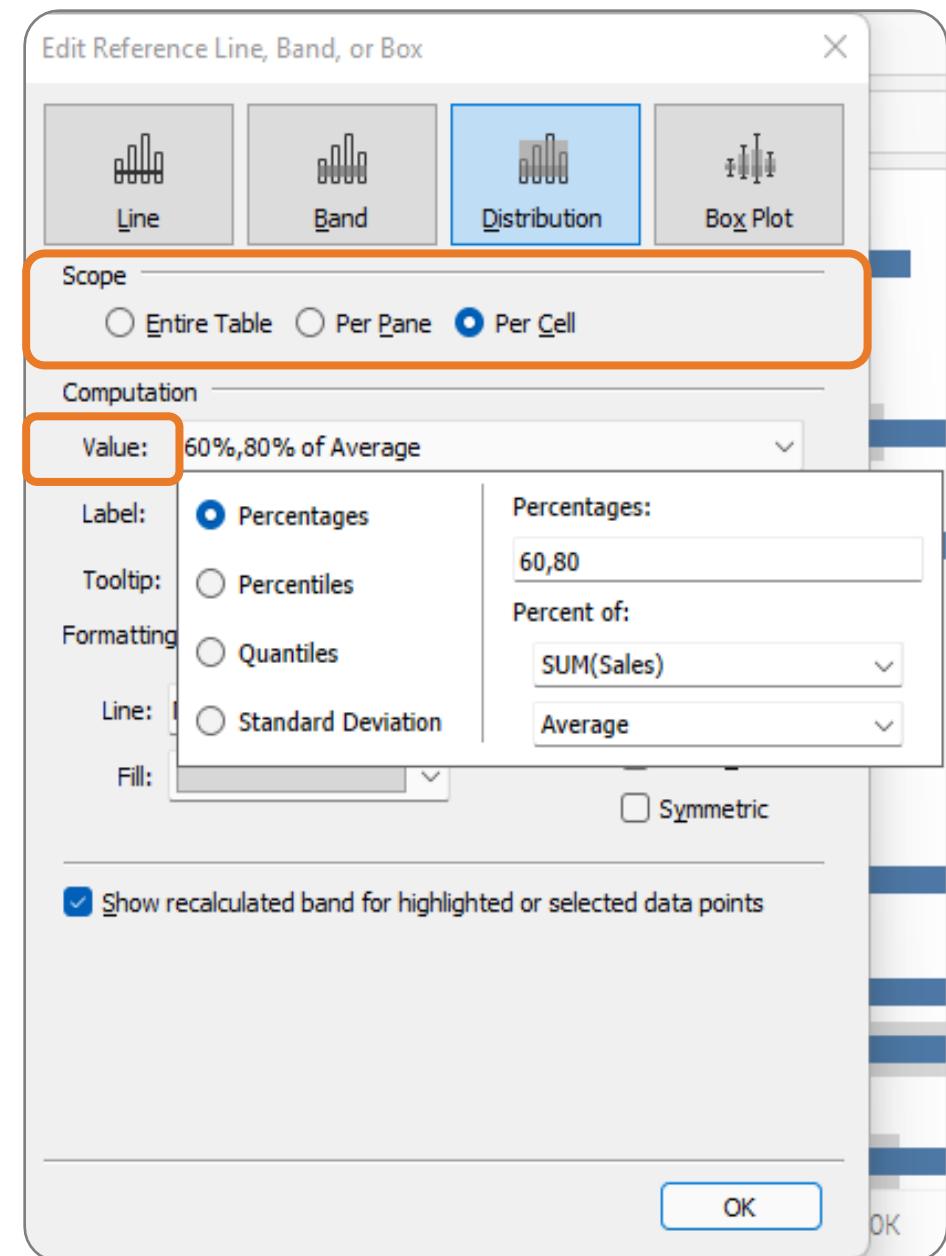
Distribution Bands: Steps



Step 3

Edit the Distribution Band

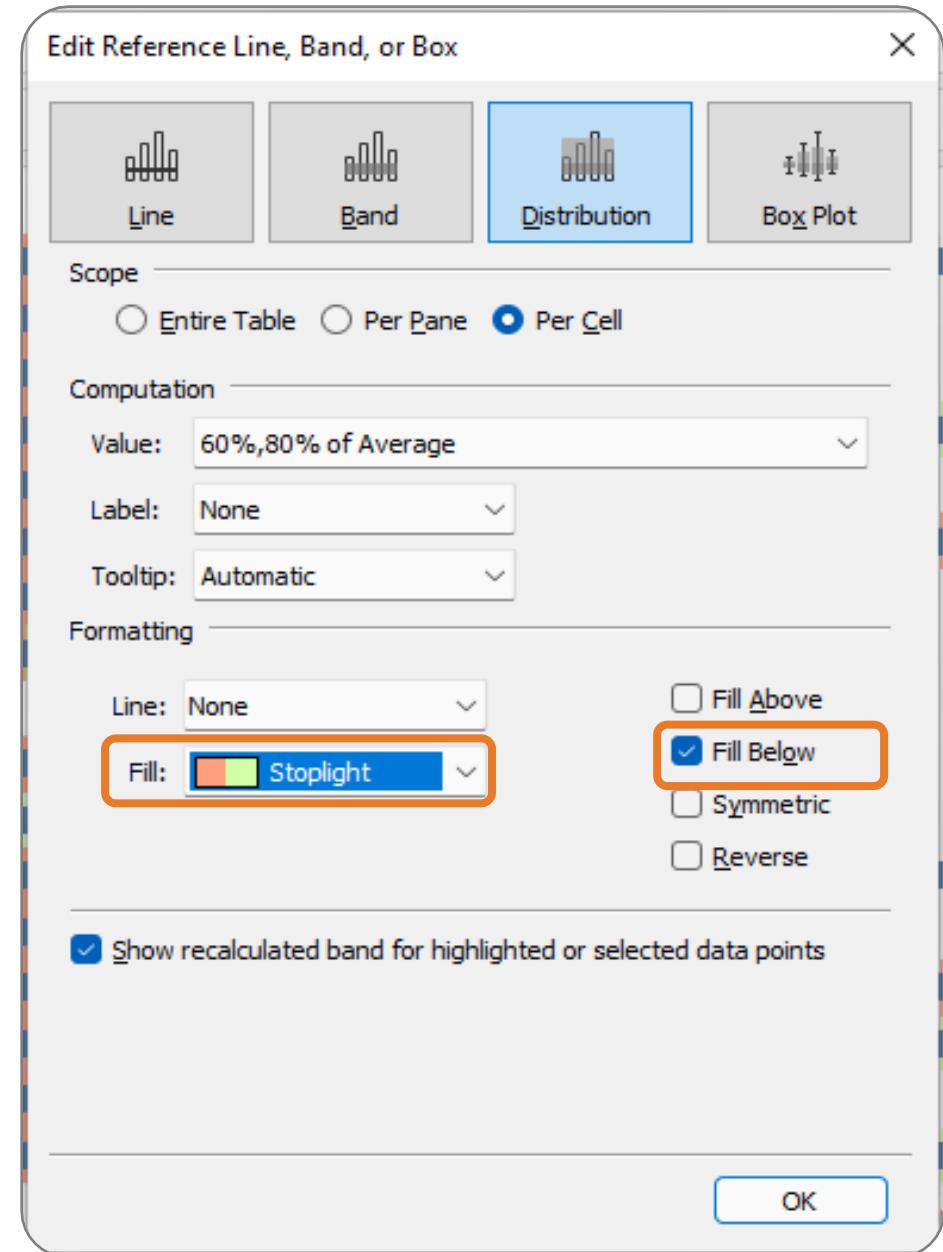
Distribution Bands: Steps



Step 4

Select Scope as **Per Cell** and click on the **Value** under Computation

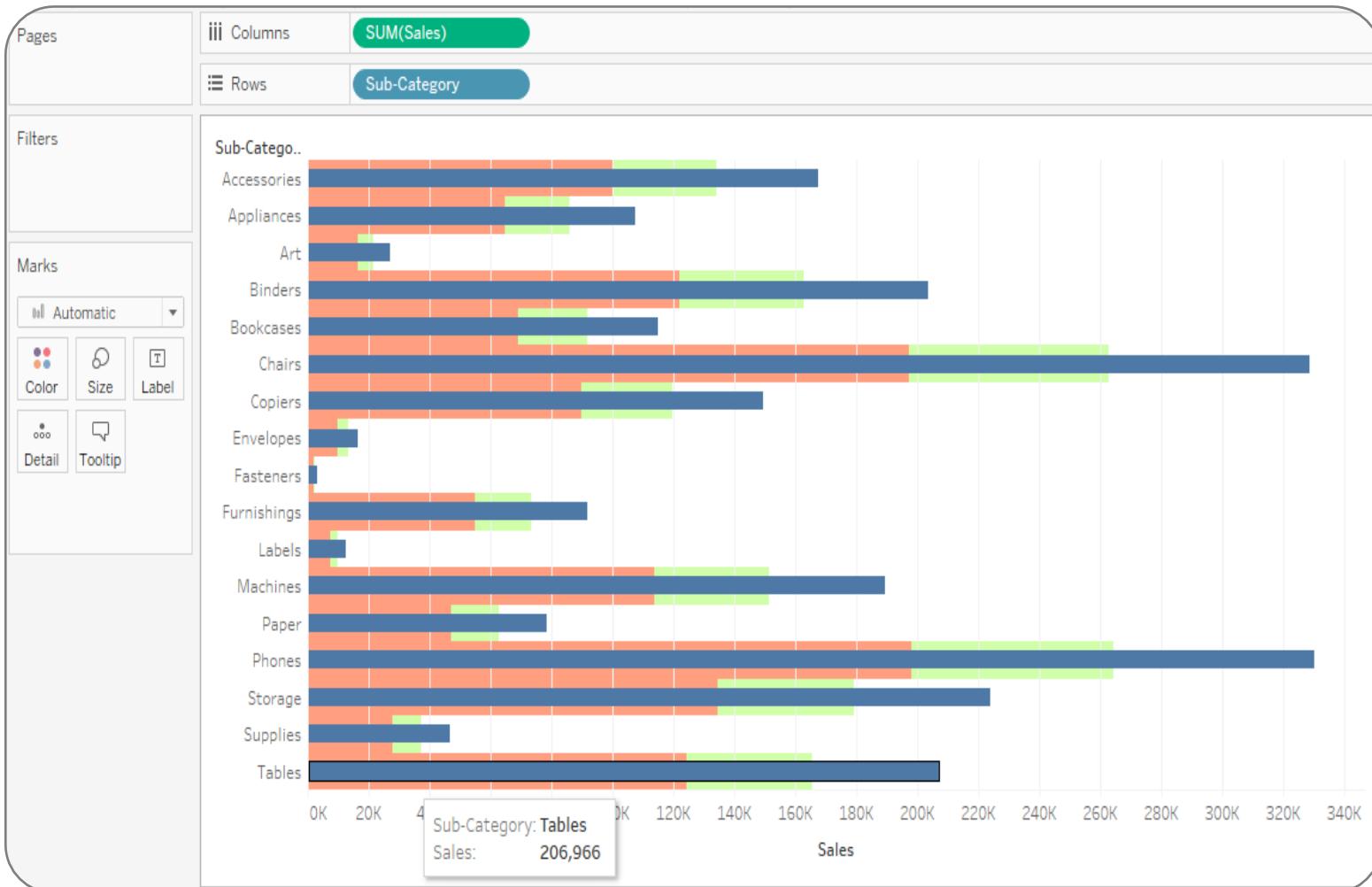
Distribution Bands: Steps



Step 5

Select **Fill Below** in Formatting and
Stoplight in Fill Option

Distribution Bands: Steps

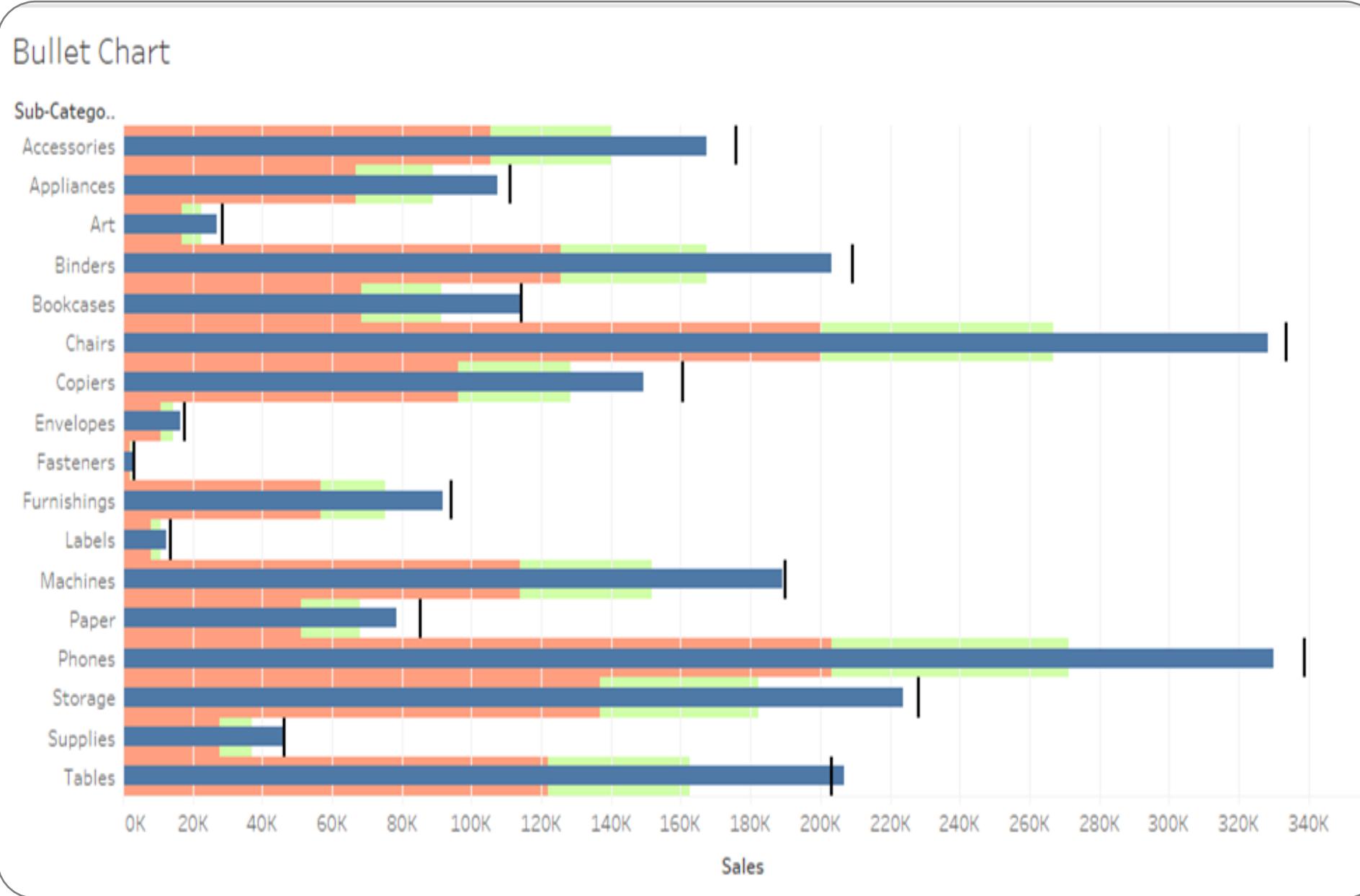


Step 6

Click **OK**, and it will showcase the Bar Chart with the Distribution Band

Bullet Chart

Bullet Chart



The bullet chart showcases the progress of actuals against the target.

It uses a combination of horizontal bar charts, distribution bands, and reference lines to show the comparisons.

The actuals are used in the bar chart, and the targets are used as distribution bands and reference lines to showcase the variance.

Bullet Chart: Steps

Estimated Sales

X

```
SUM([Sales]) + (SUM([Profit]) * 0.5)
```

The calculation is valid.

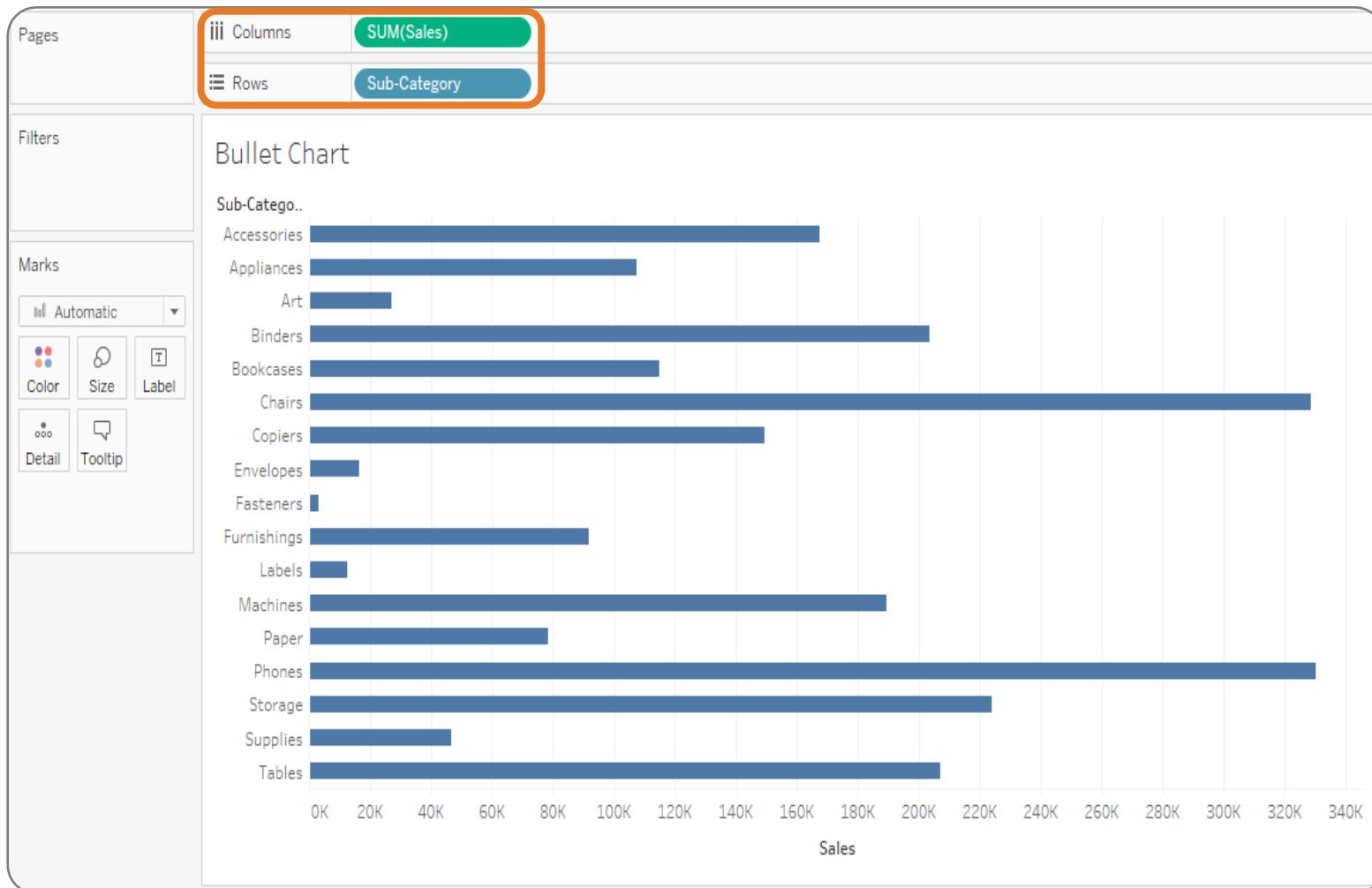
1 Dependency ▾

Apply OK

Step 1

Use Sample Superstore dataset and create Calculated Field Estimated Sales

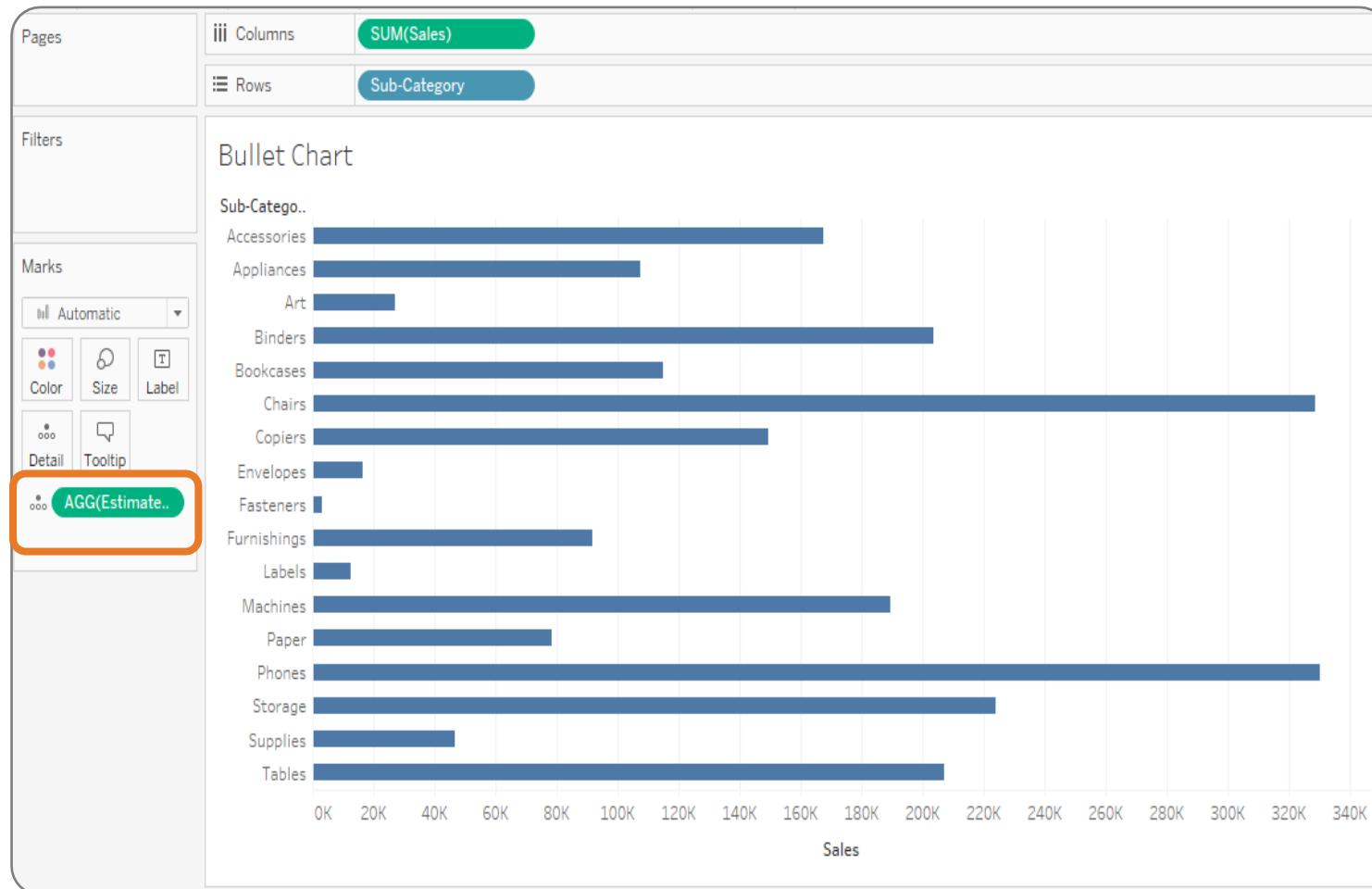
Bullet Chart: Steps



Step 2

Create a horizontal Bar Chart with
Sub-Category in Rows and **Sales** in
Columns

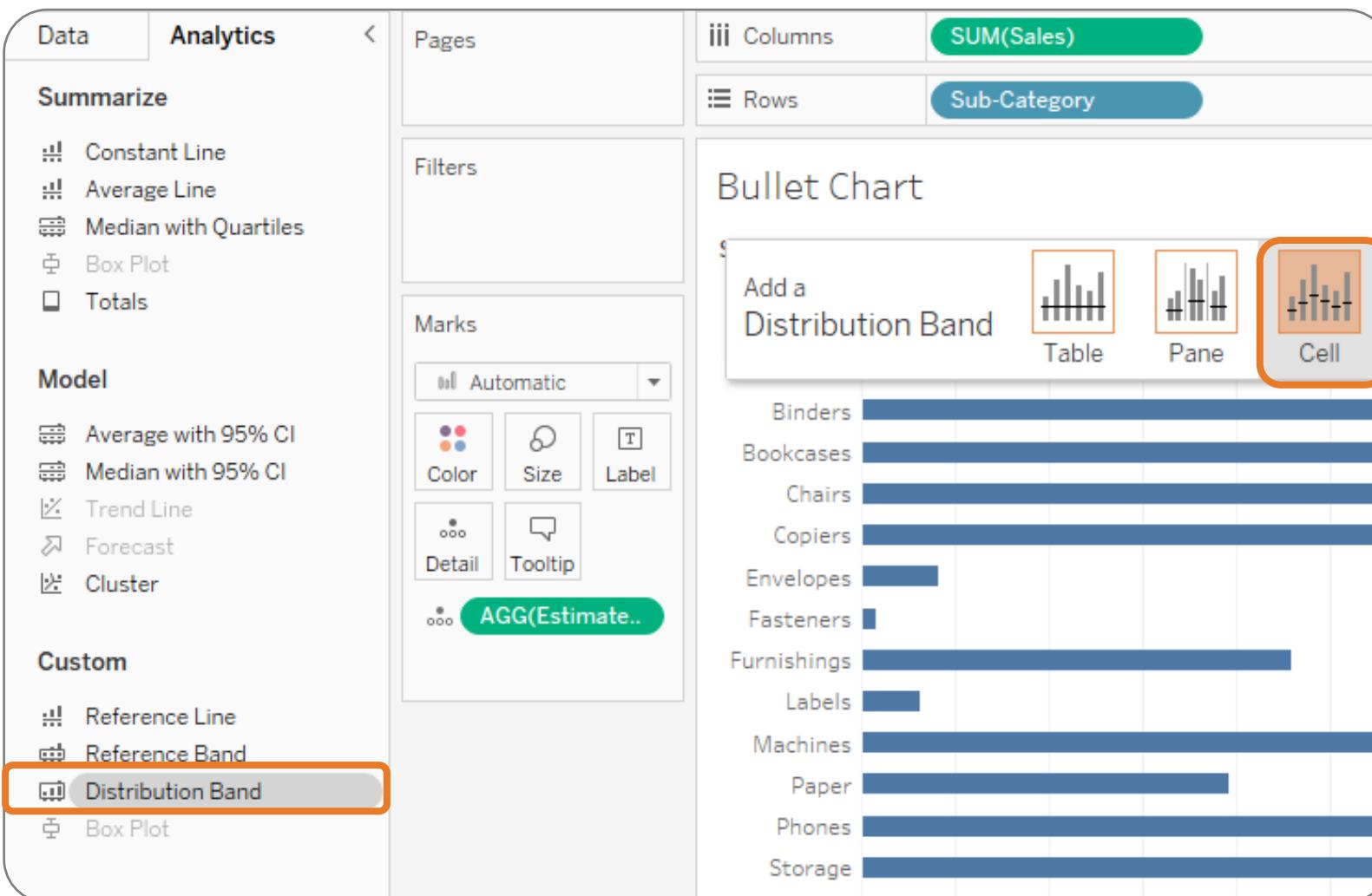
Bullet Chart: Steps



Step 3

Add **Estimated Sales** to Detail

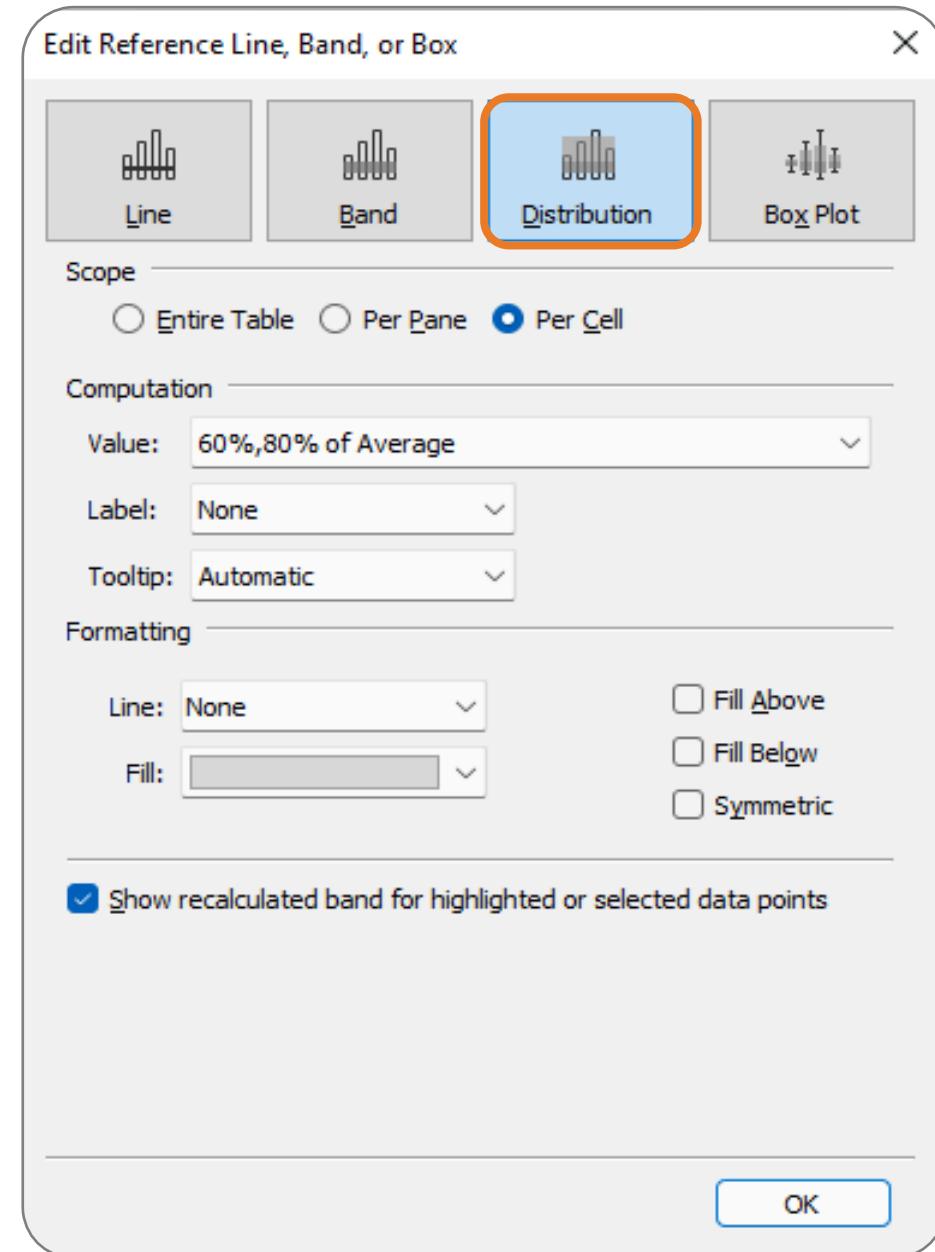
Bullet Chart: Steps



Step 4

Go to Analytics Pane and drag
Distribution Band per cell

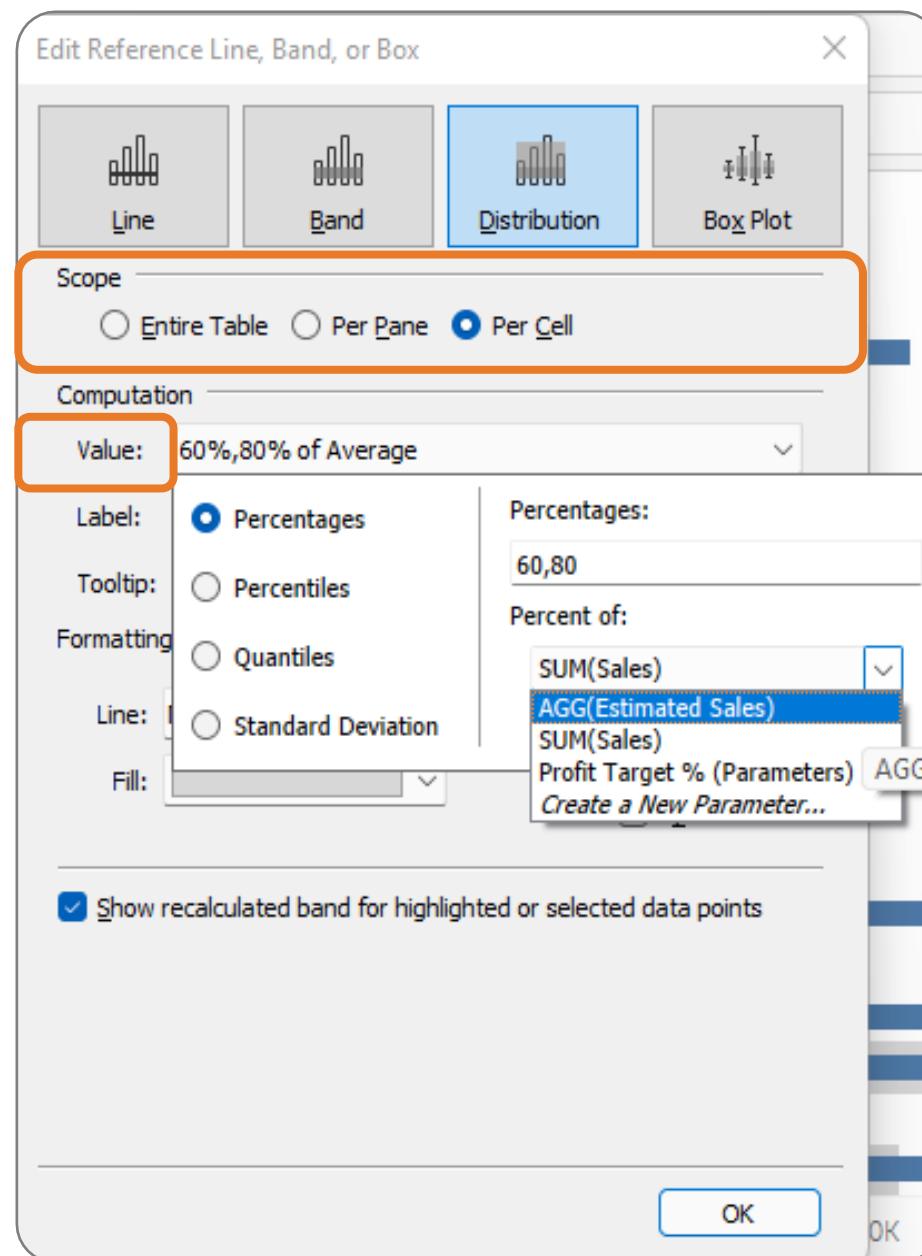
Bullet Chart: Steps



Step 5

This opens edit Distribution Band window

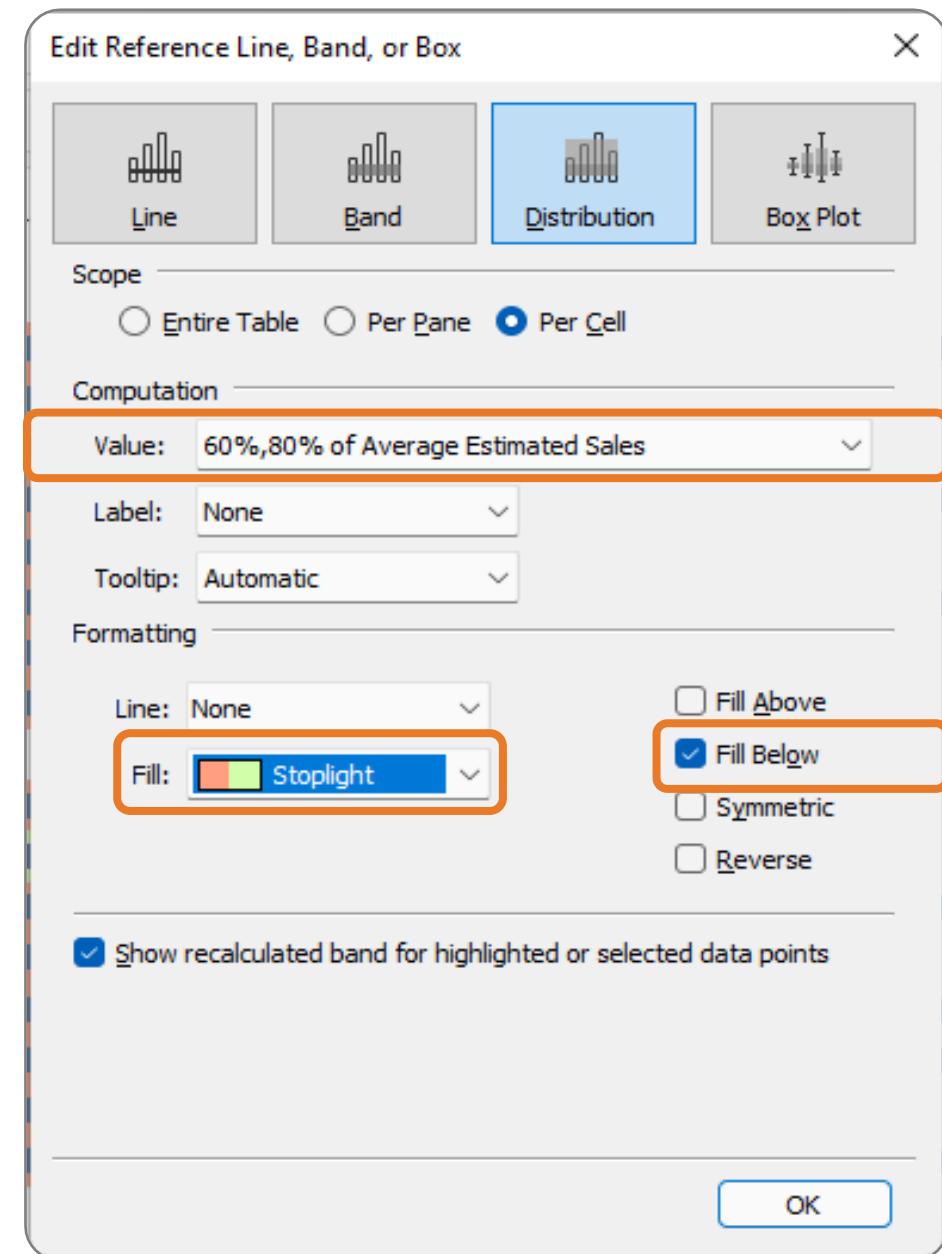
Bullet Chart: Steps



Step 6

Select Scope as **Per Cell** and **Value** under Computation

Bullet Chart: Steps



Step 7

Select **Estimated Sales** under Value and select **Fill Below** in formatting and **Stoplight** in Fill

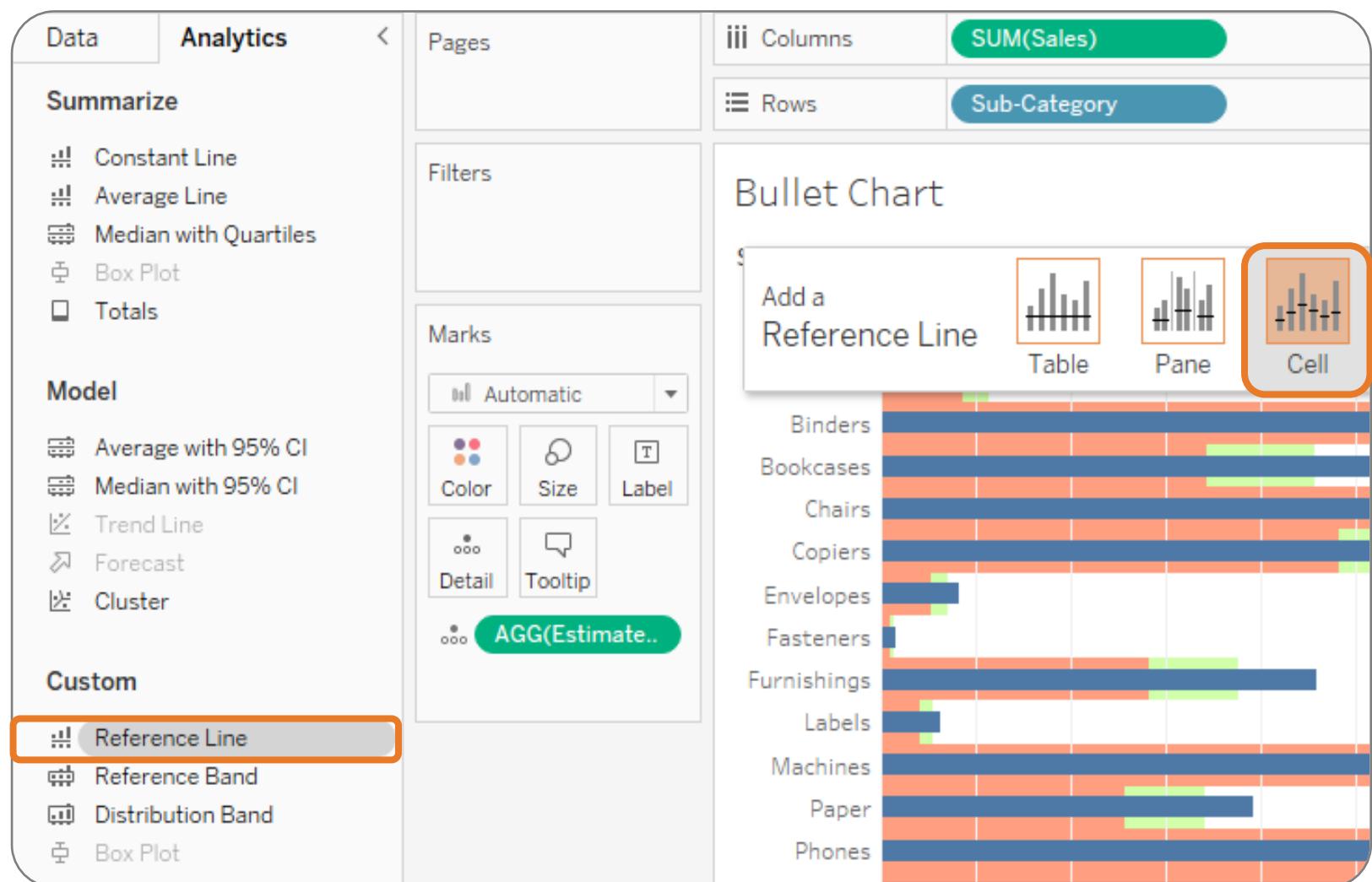
Bullet Chart: Steps



Step 8

Click **OK**, and this window will appear

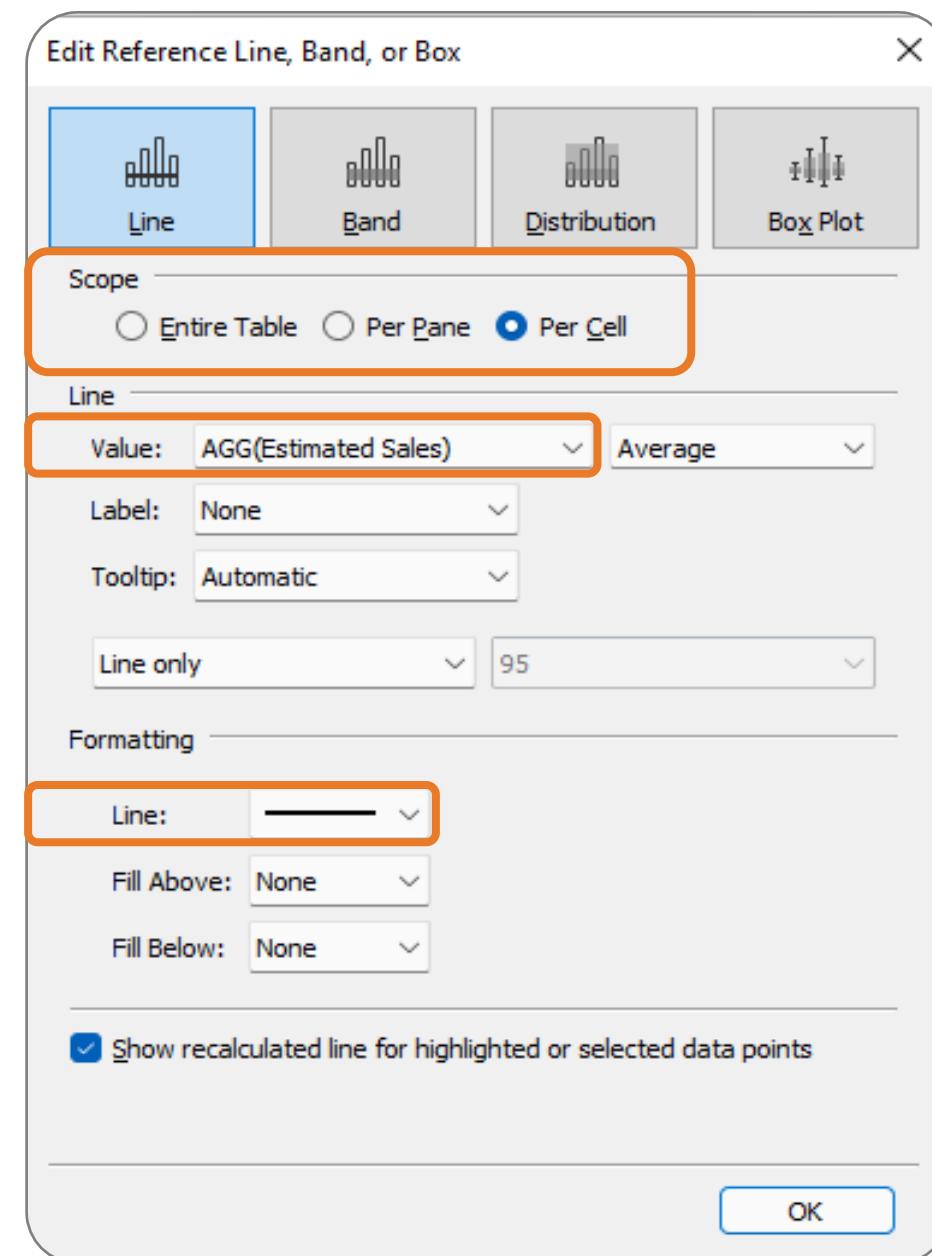
Bullet Chart: Steps



Step 9

Drag Reference Line per Cell from Analytics Pane

Bullet Chart: Steps



Step 10

- In the Edit Reference Line window, select Scope as **Per Cell**
- Select Computation value as **Estimated Sales** and Line color as **Black**. This will create the bullet chart

Bullet Chart

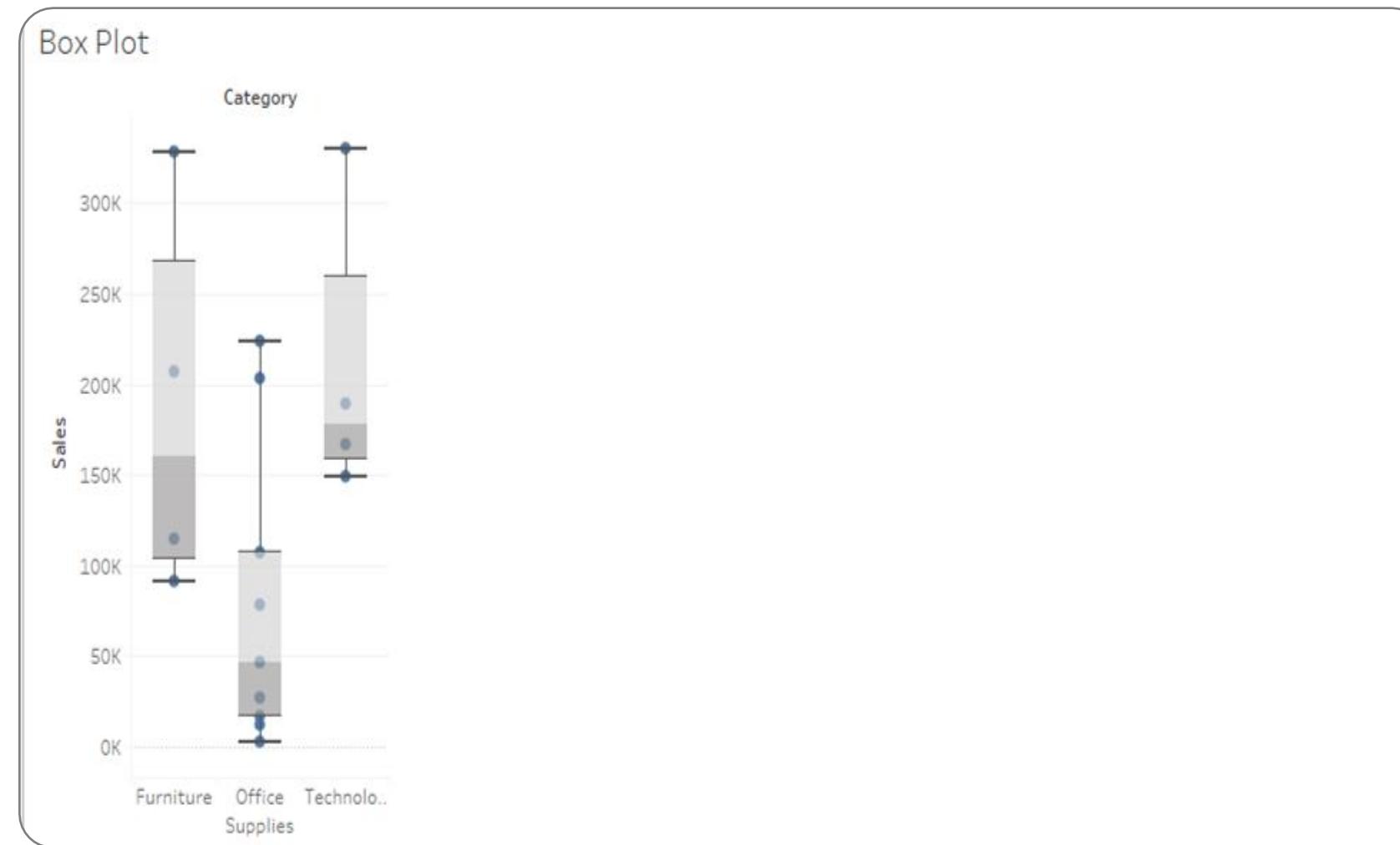
Add calculated fields to compare sales and estimated sales for adding color-coding to the bars in the bullet chart.



Box Plot

Box Plot

A box plot showcases the data distribution and the corresponding outliers.



Box plot is called lower/upper hinge as well as lower/upper whisker.

Box Plot

Each box plot will have five mandatory components:

Minimum

1st Quadrant

Median

3rd Quadrant

Maximum

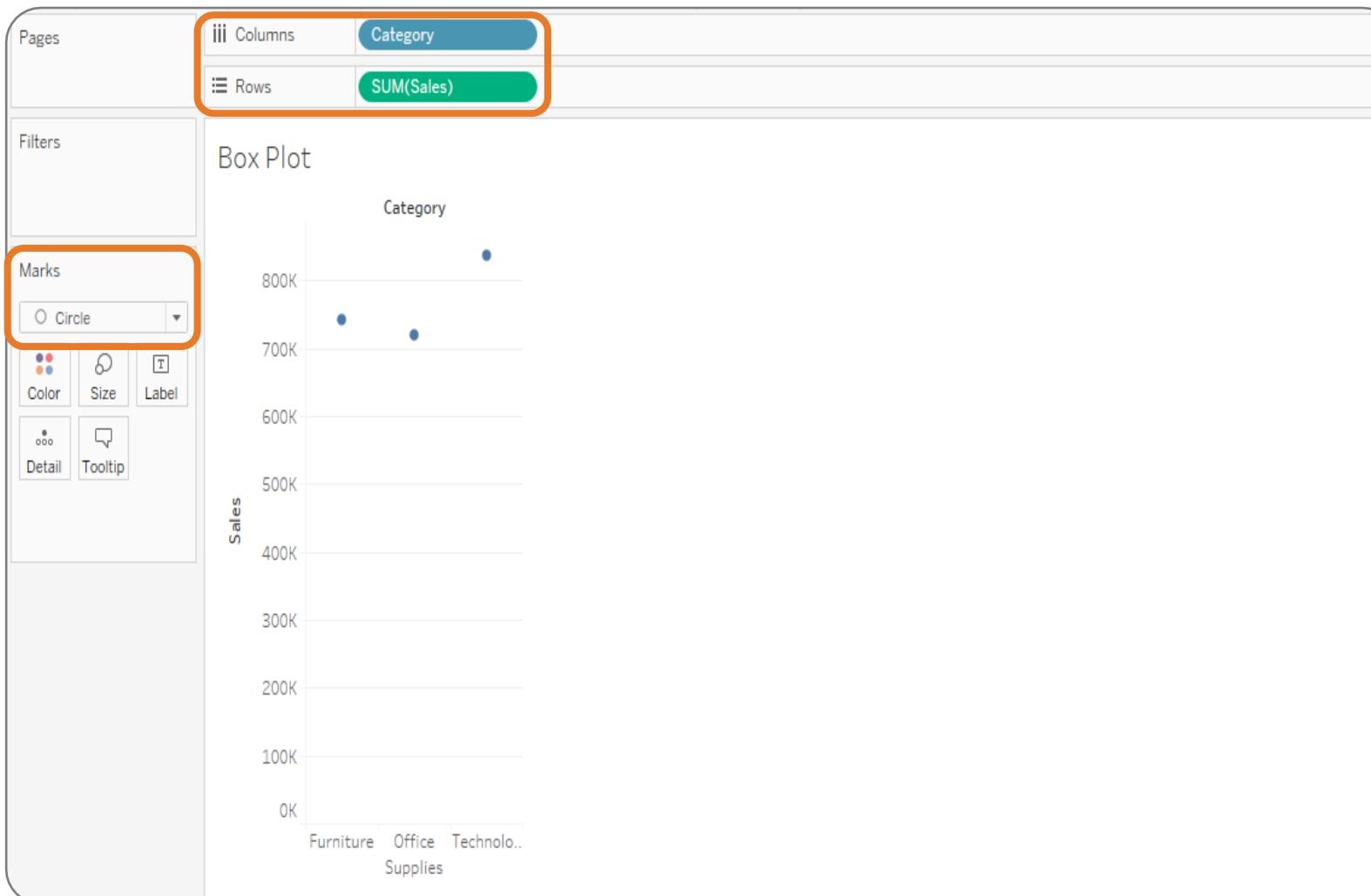
Box Plot

There are values that don't fall under any of the above pointers, and they are referred to as outliers.

Outliers are calculated based on the Interquartile Range. The distance between the first and third quadrants is used to calculate IQR.

IQR and any data points above this range will be considered outliers.

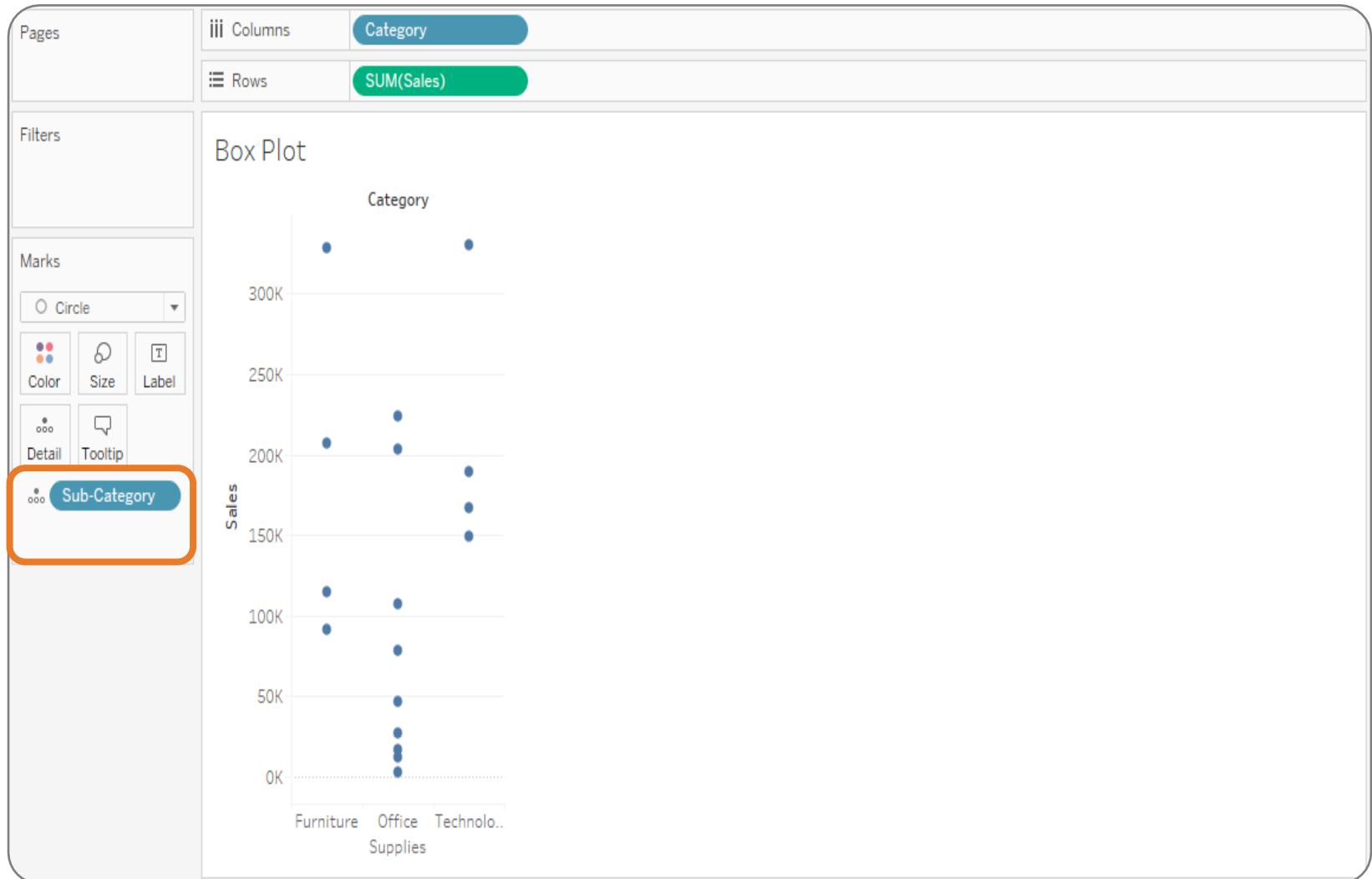
Box Plot: Steps



Step 1

Use Sample Superstore dataset, select **Marks** type as **Circle**, and drag **Category** to Columns and **Sales** to Rows

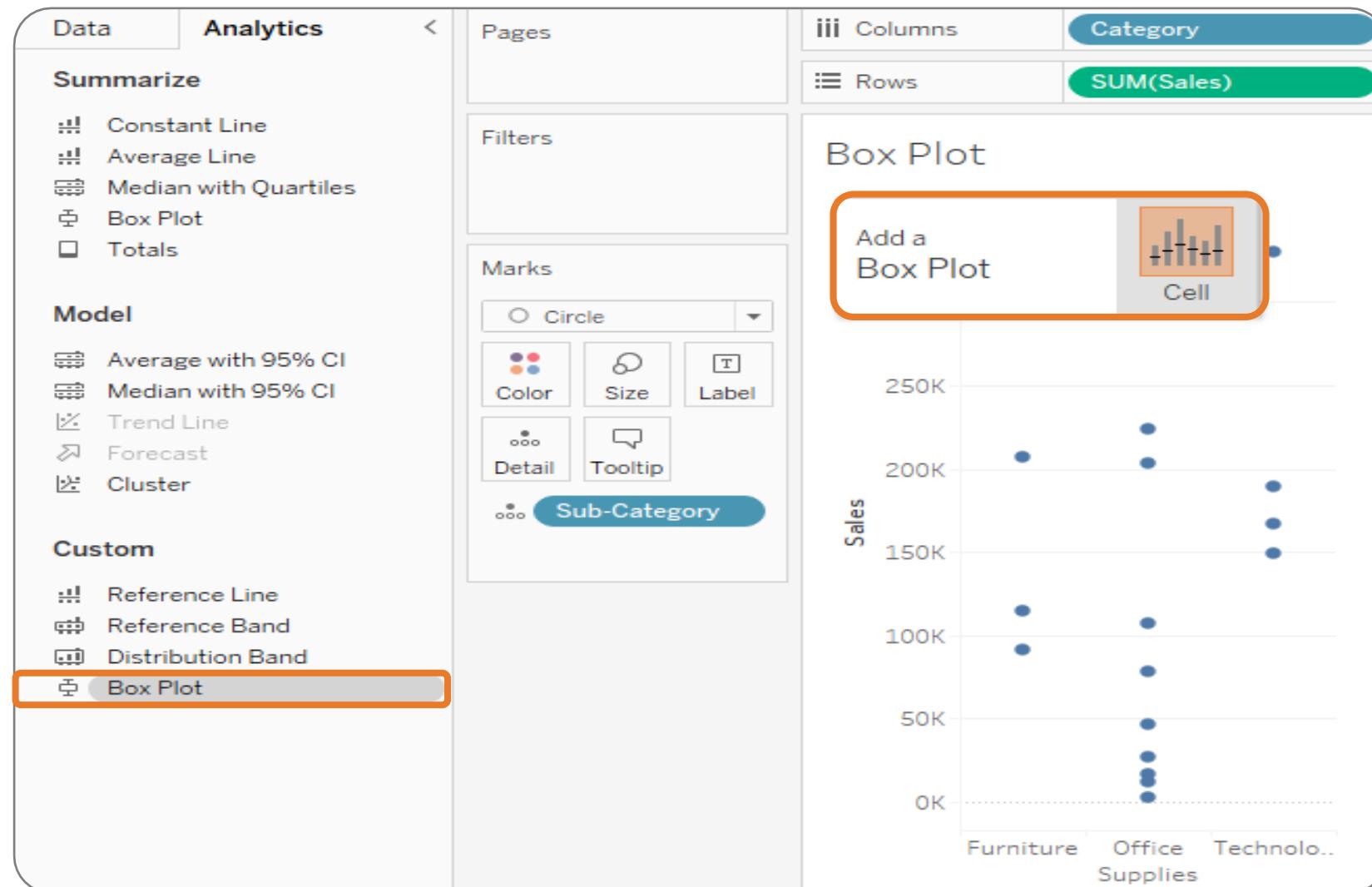
Box Plot: Steps



Step 2

Drag Sub-Category to Detail

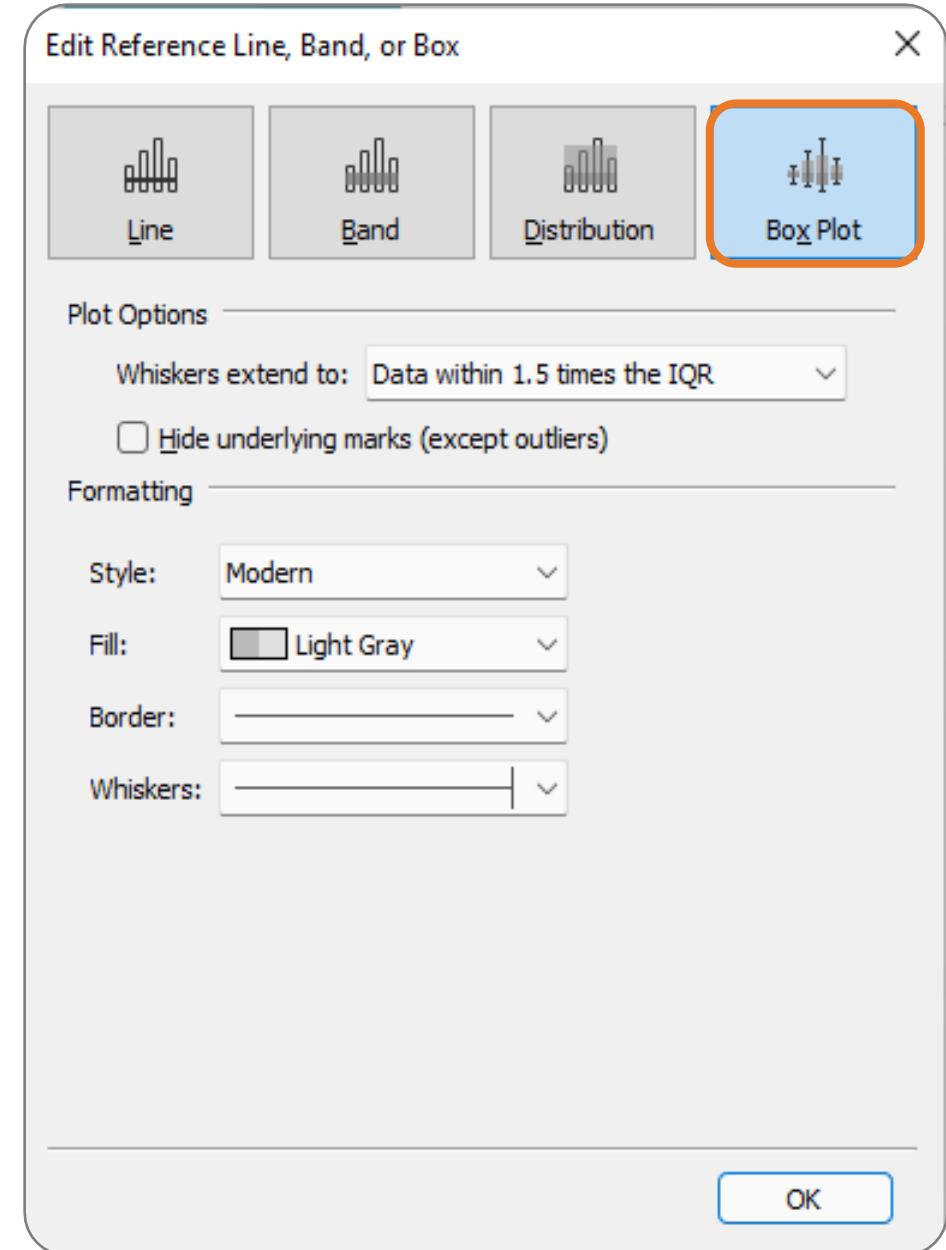
Box Plot: Steps



Step 3

In Analytics Pane, drag **Box Plot** to **Cell**

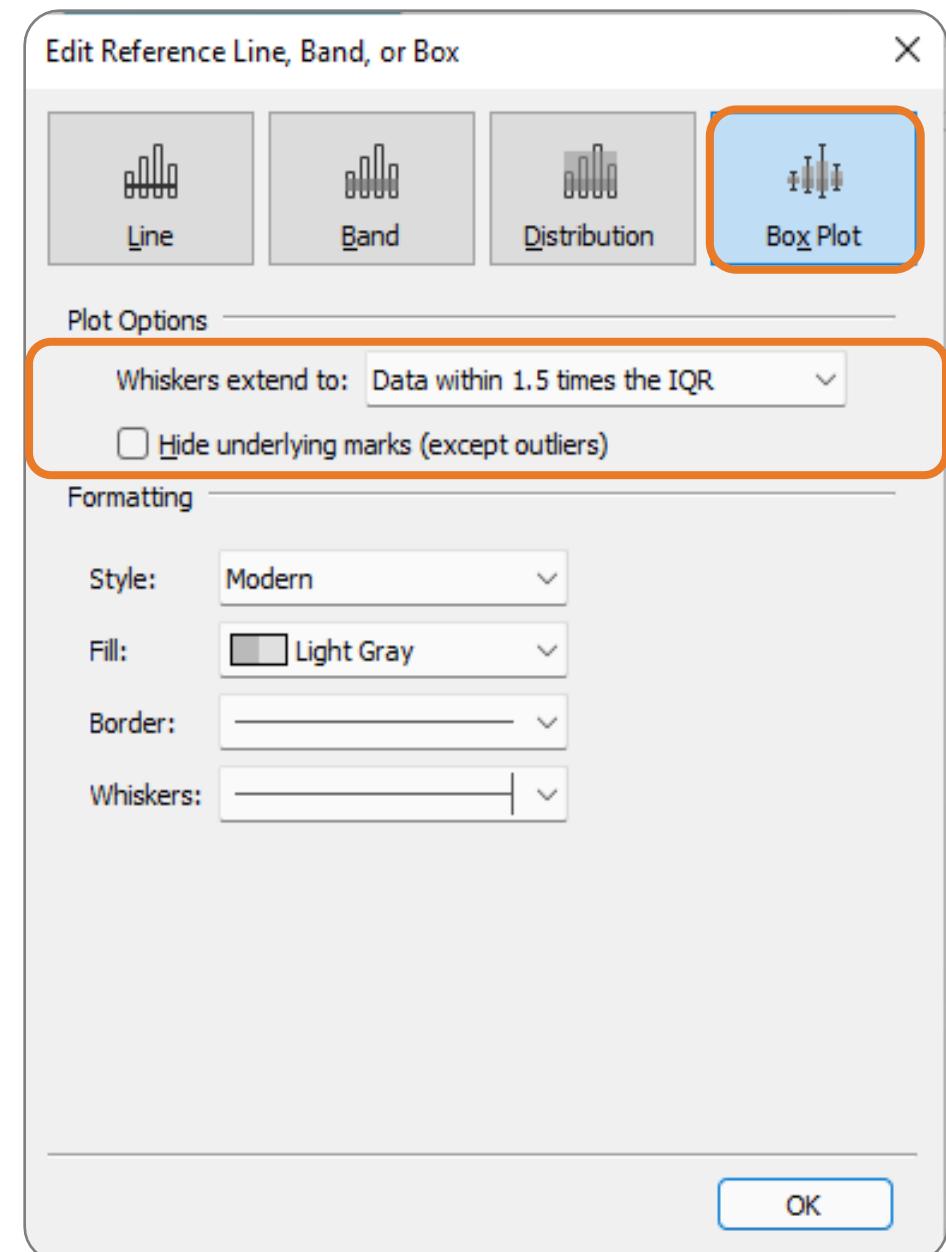
Box Plot: Steps



Step 4

Edit Box Plot window

Box Plot: Steps

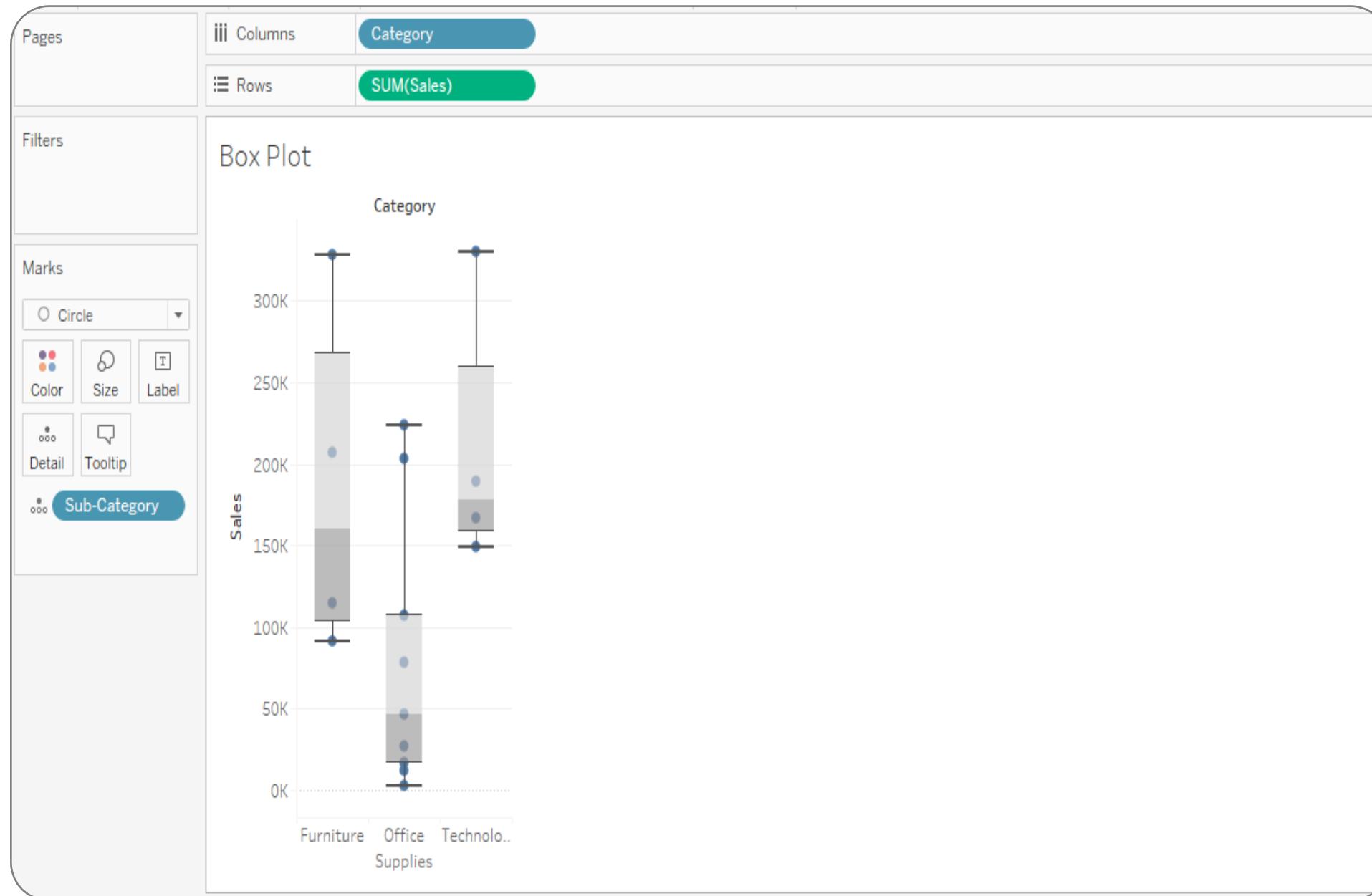


Step 5

Select Plot Options as either outlier above **1.5 times IQR** or maximum range, select the formatting styles, and click **OK**

Box Plot

This creates the Box Plot



Forecasting

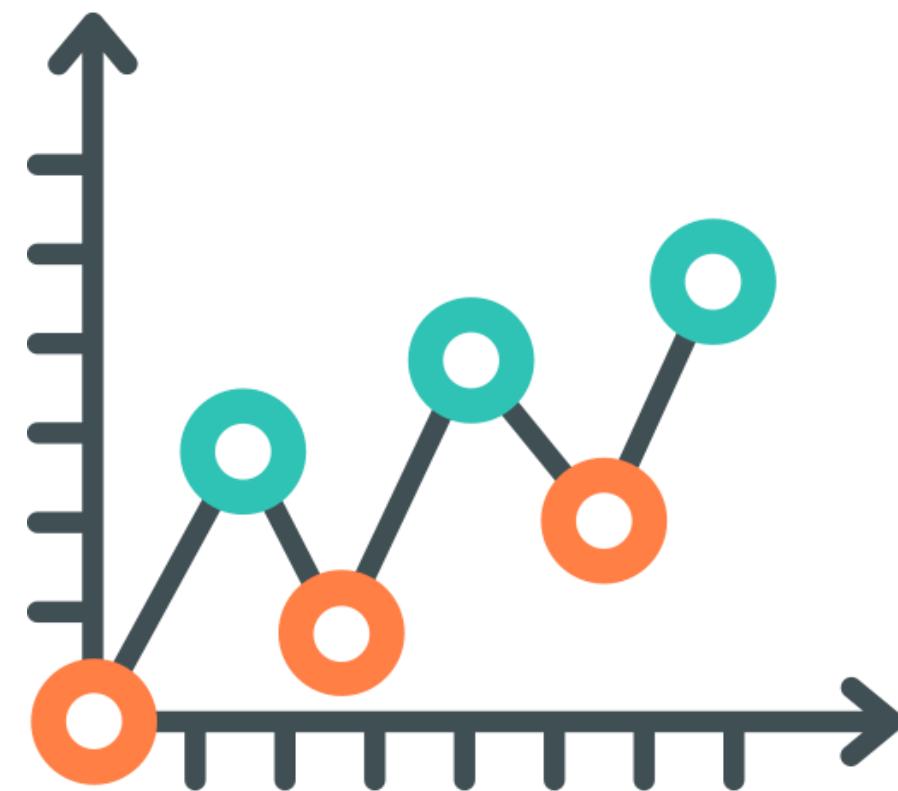
Forecasting

Forecasting is the process of fitting models using historical data to predict future observations.



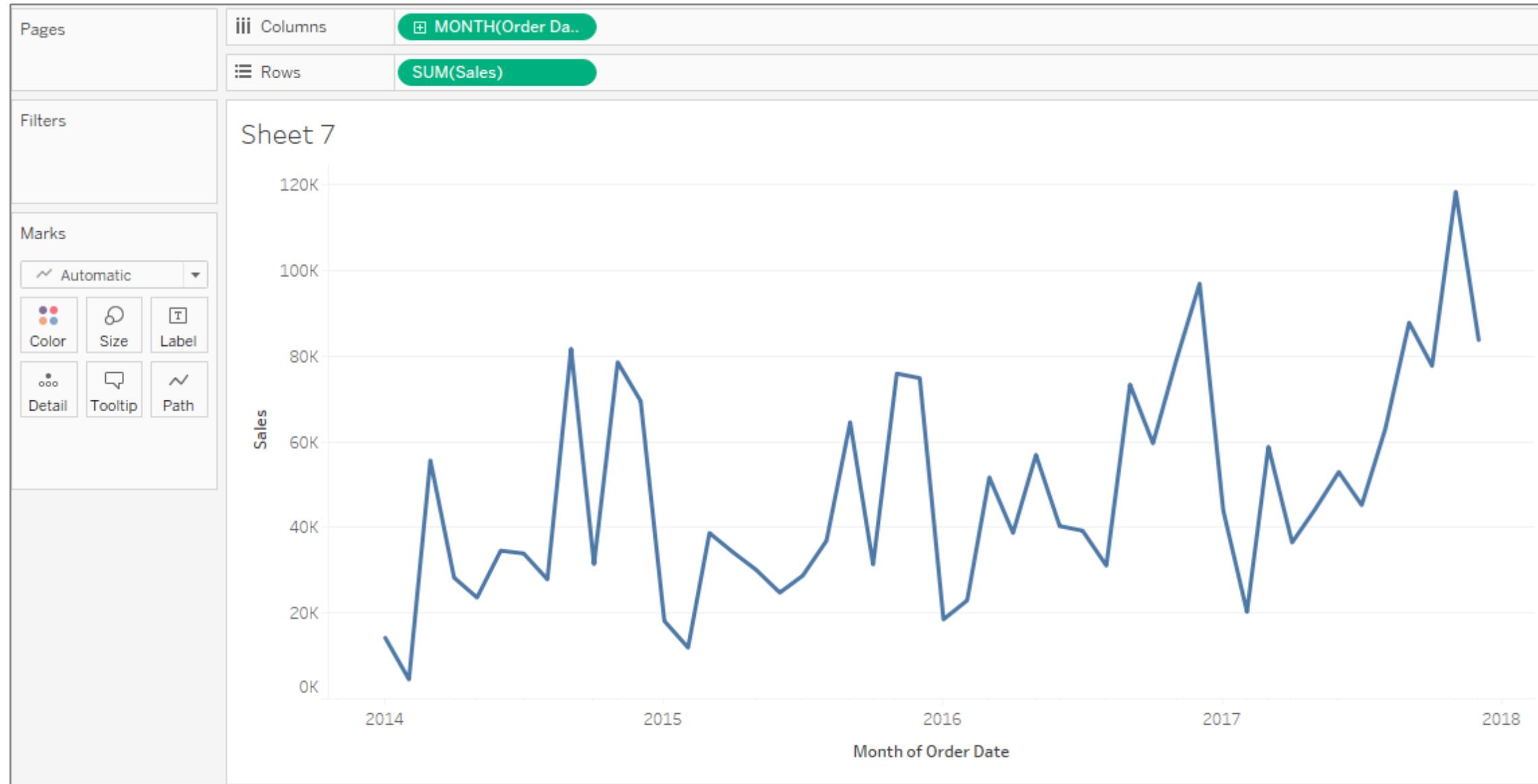
Forecasting

The accuracy of the forecast depends on the number of historical data points available, with more weight given to recent data.

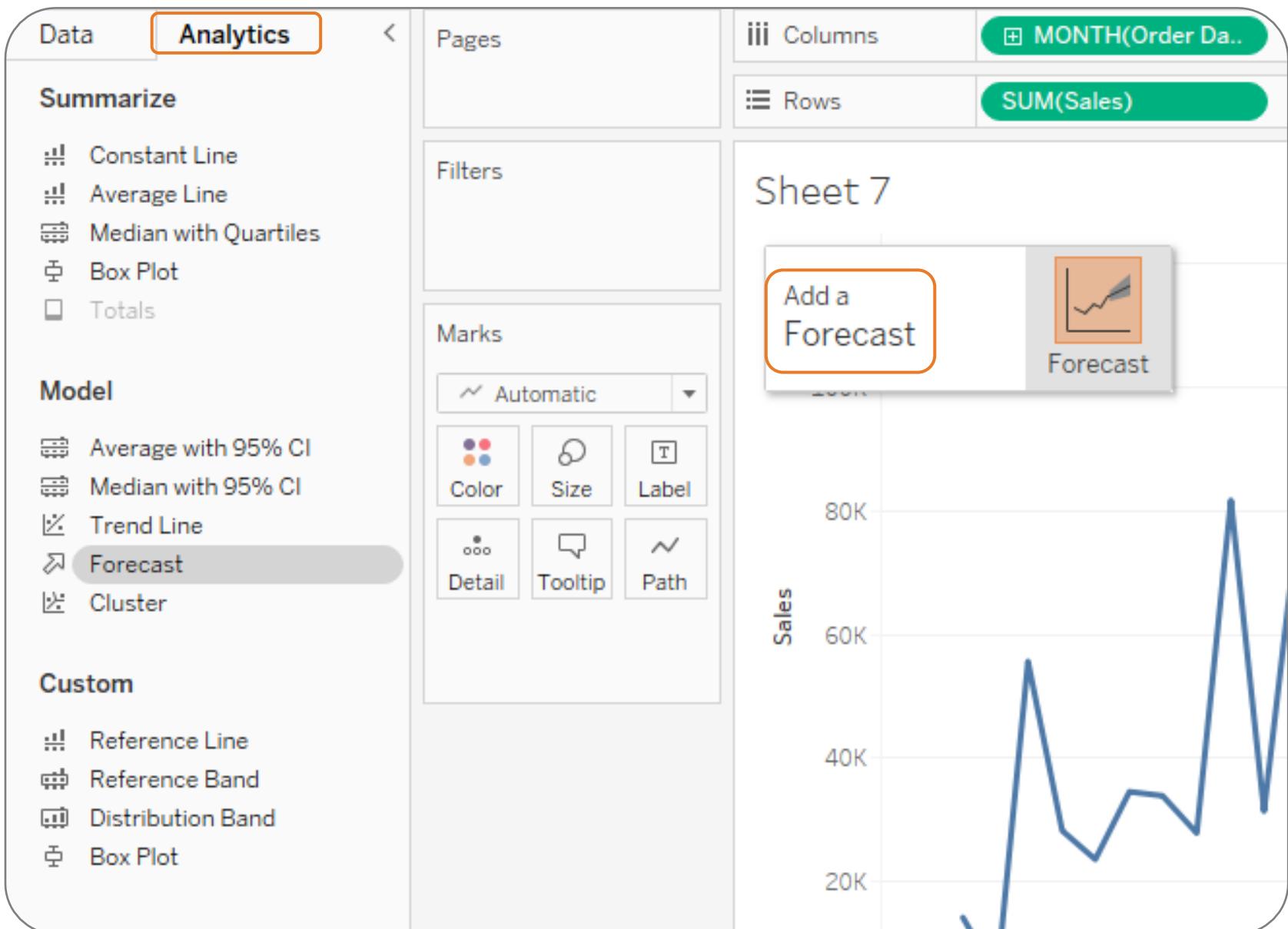


Forecasting

Steps to create a line chart with Date Value month of Order Date and Sales.



Forecasting

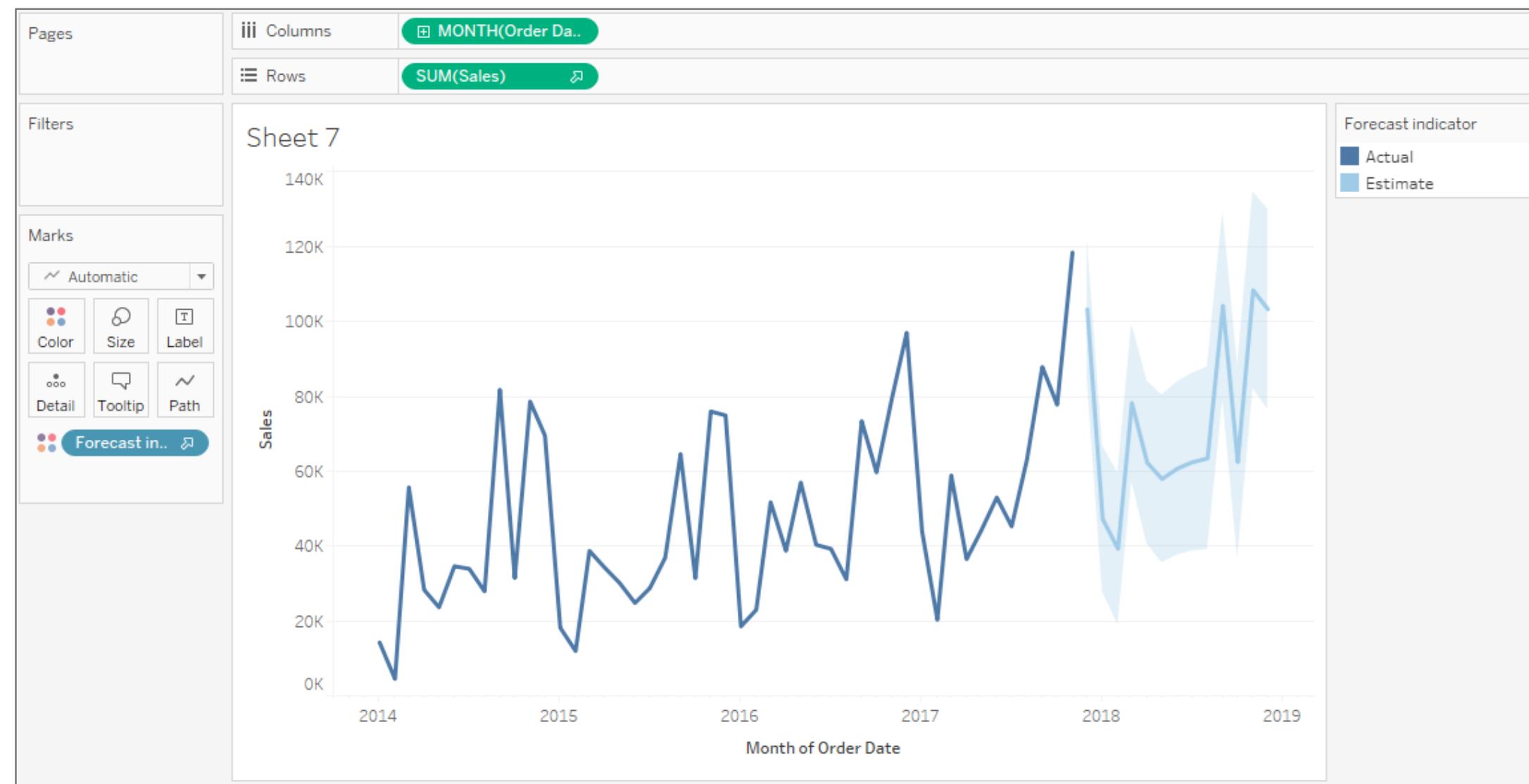


Step 1

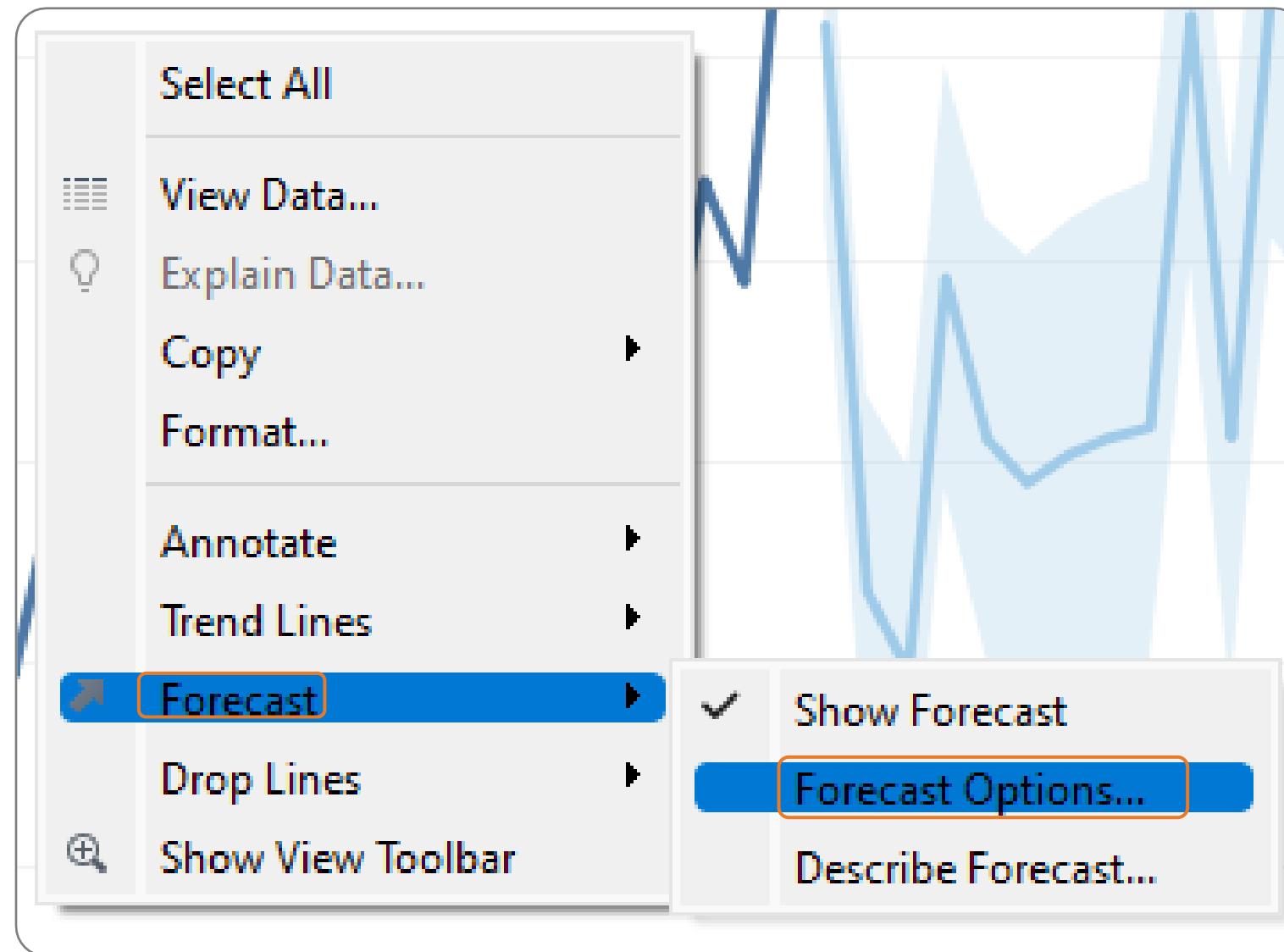
Go to the Analytics pane and drag the forecast in the view

Forecasting

It highlights the forecasted estimate in a lighter color, and the prediction has been added to the colors.



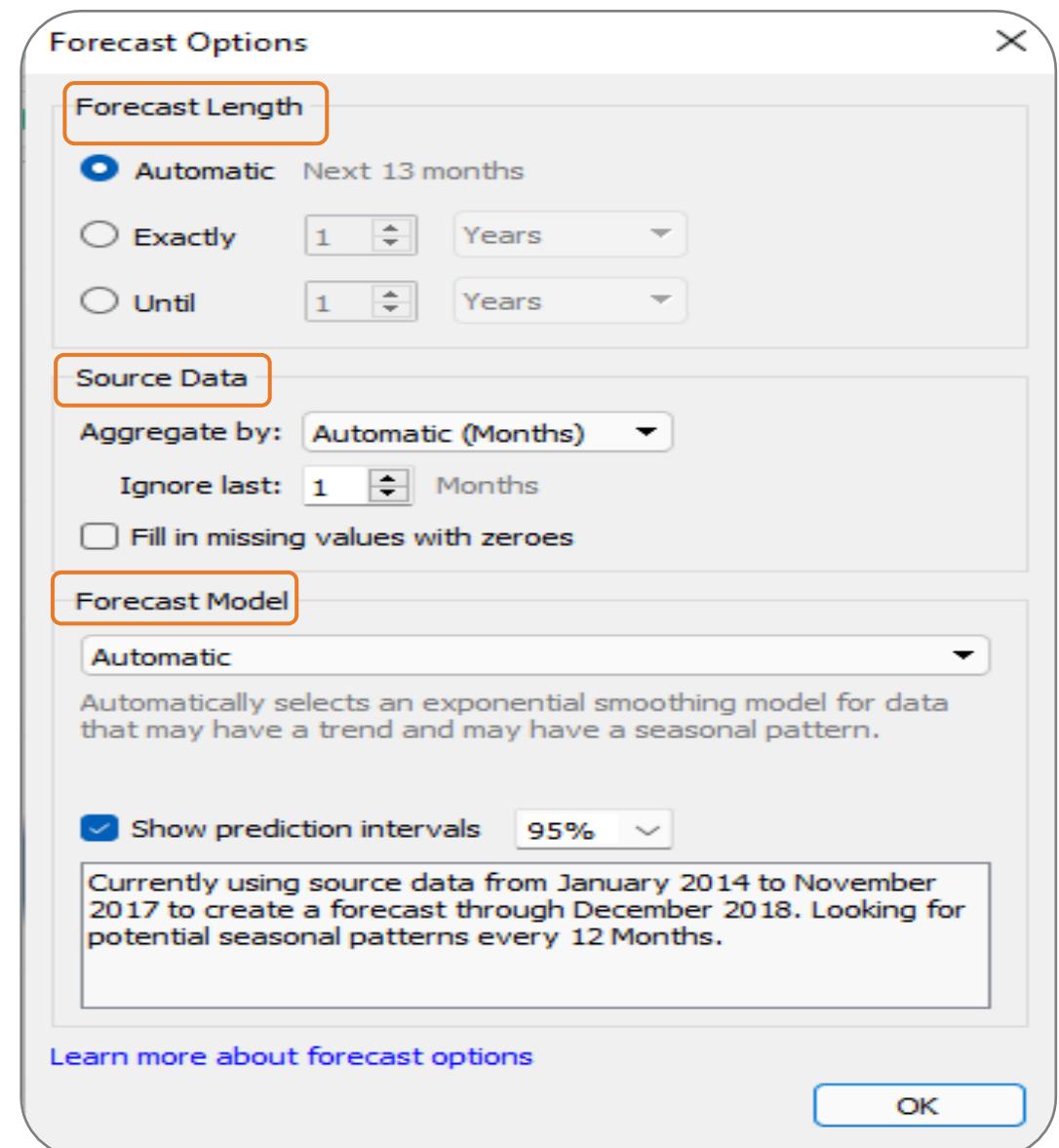
Forecasting



Step 2

Right-click on the graphic to see and change the forecast options. Under Forecast, select **Forecast Options**

Forecasting



Step 3

Forecast Length, Source Data and Forecast Model from the window can be modified to check the changes based on the selections

Assisted Practice: Reference Line, Trend Line, and Forecasting



Duration: 20 minutes

Problem statement:

The CEO of a retail company is preparing for the annual meetings. He needs to show the sales trend of his company. He also wants to view future values for sales and a line representing the overall average sales.

ASSISTED PRACTICE

Assisted Practice Guidelines



Steps to follow:

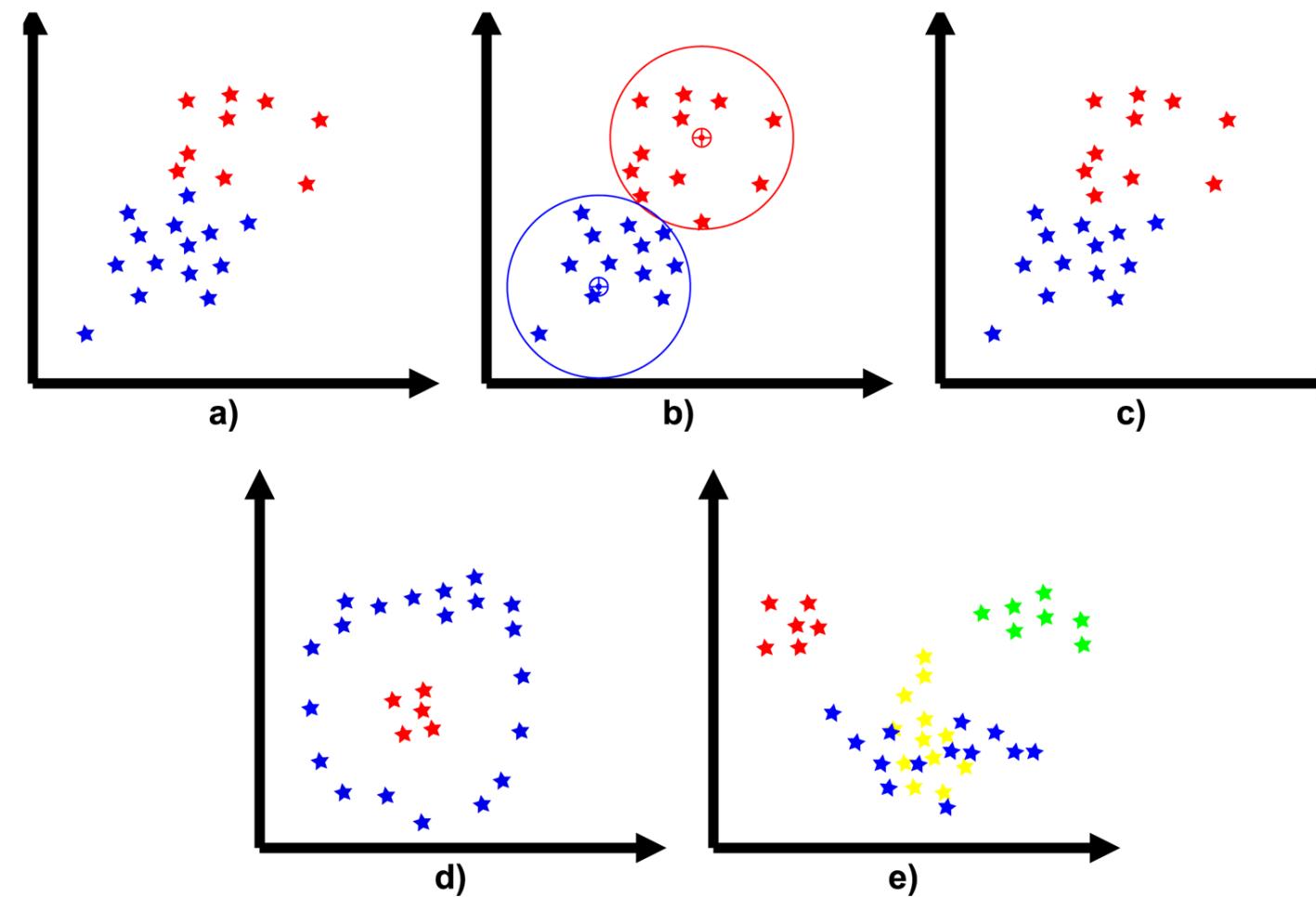
- Step 1: Create a line chart with a continuous order date at the month level and sales
- Step 2: Add a reference line and customize the label
- Step 3: Add forecasting to the view
- Step 4: Add a trend line excluding the forecasted values
- Step 5: Show labels only for minimum and maximum values, excluding the forecasted values

ASSISTED PRACTICE

Clustering

Clustering

Clustering is grouping data points together and separating them from other dissimilar data objects in other groups or clusters.



Clustering



The clusters formed can be utilized as new dimensions in various visualizations and analyses.

Clusters are used in exploratory analysis, enforcing structure on data, and finding complex relationships.

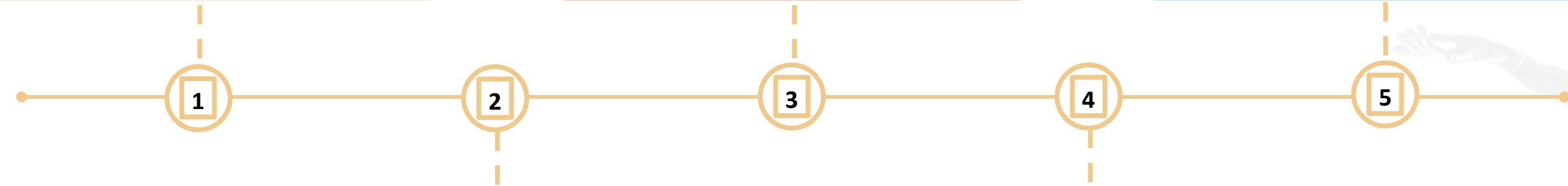
K-means Clustering

The default clustering technique used in Tableau is K-means clustering.

The algorithm divides the data into k clusters for a specified number of clusters.

They are used to perform exploratory analysis, provide structure to data, and find complex relationships.

They are used in exploratory analysis, enforcing structure on data, and finding complex relationships.

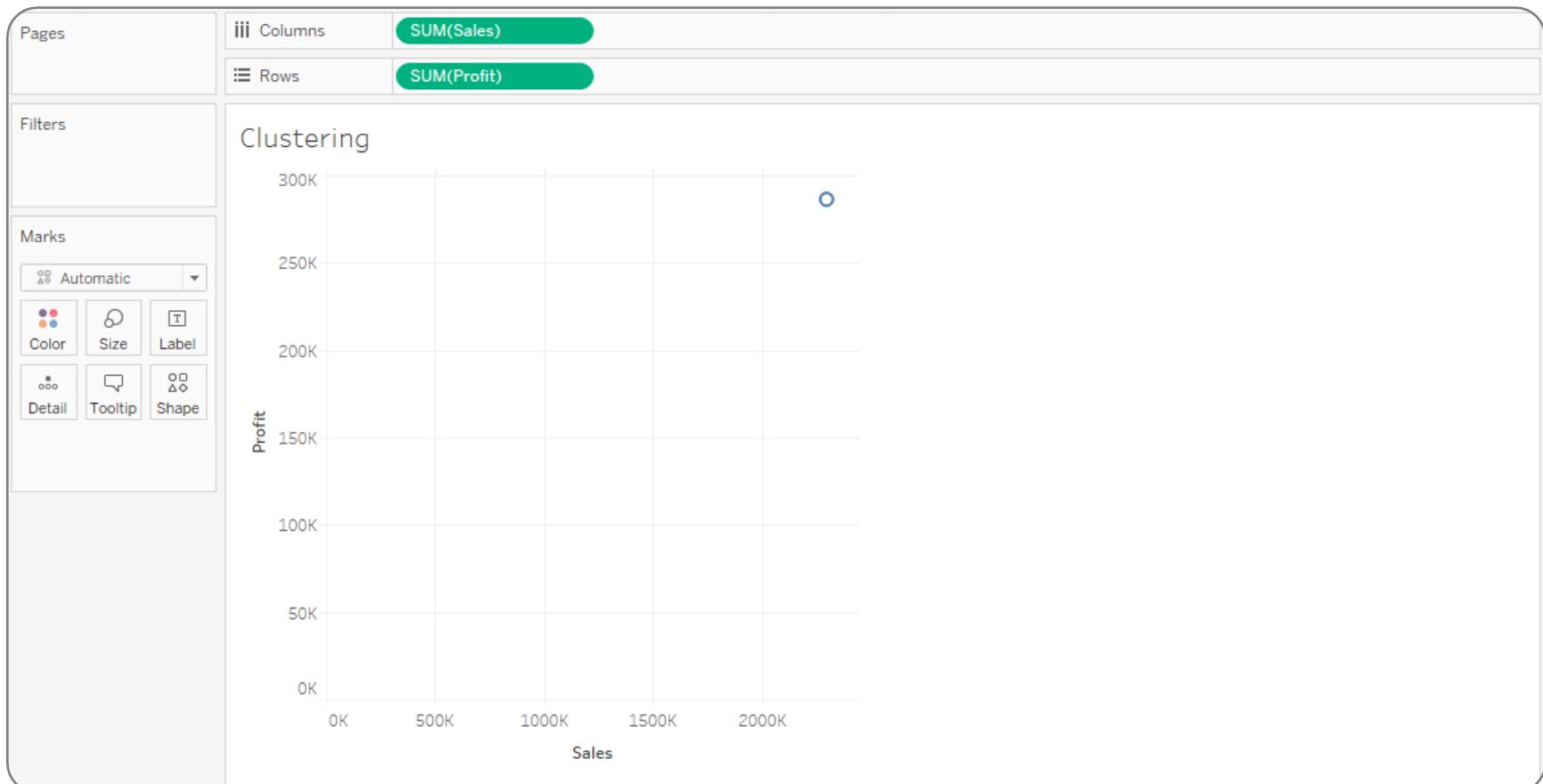


Each cluster has a center, which is the average value of all the points within it.

The clusters created can be used as new dimensions in other visualizations and analyses.

Clustering Example

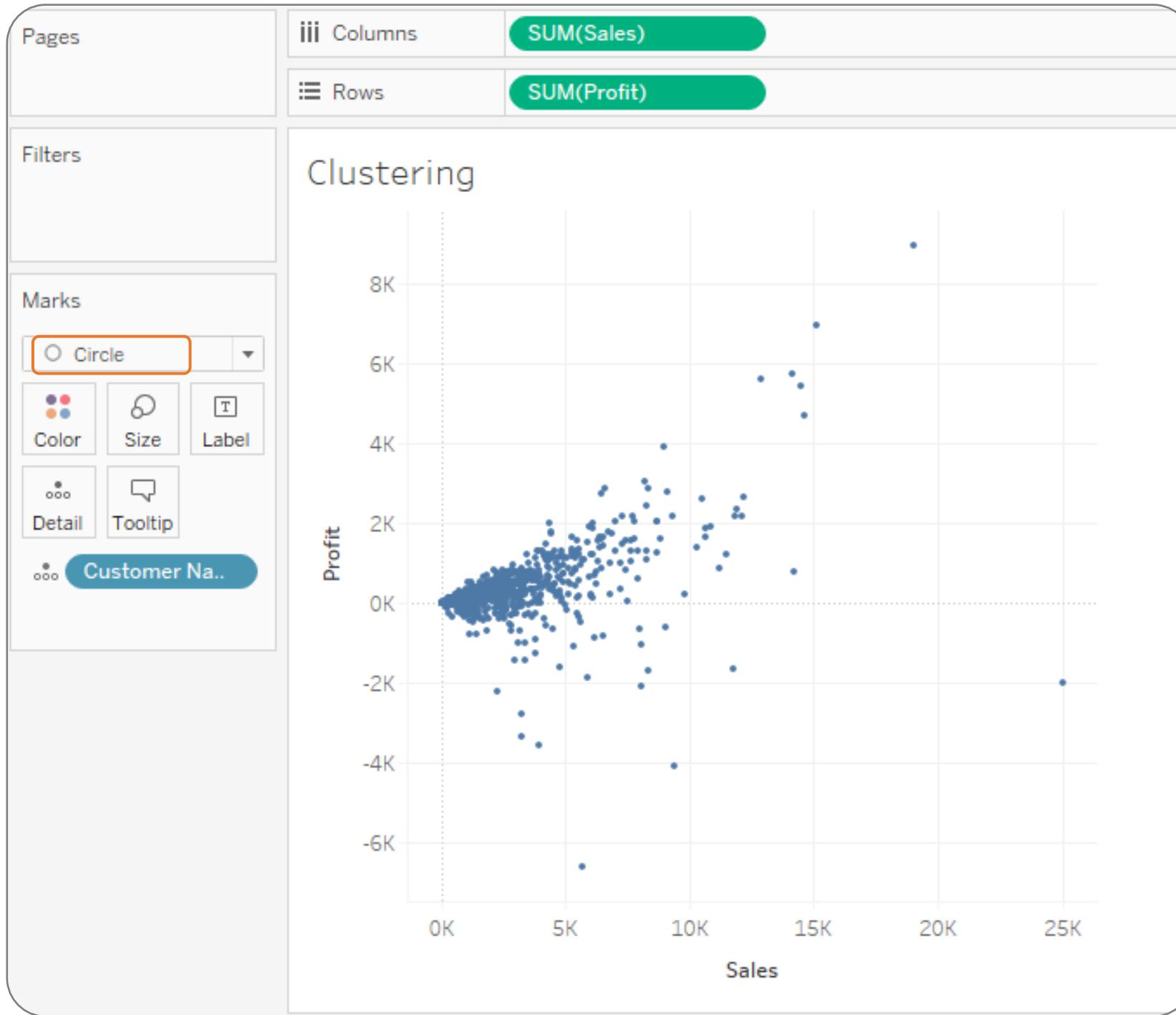
Steps to create a cluster map with Profit in Row and Sales in Column



Step 1

Use Sample Superstore dataset

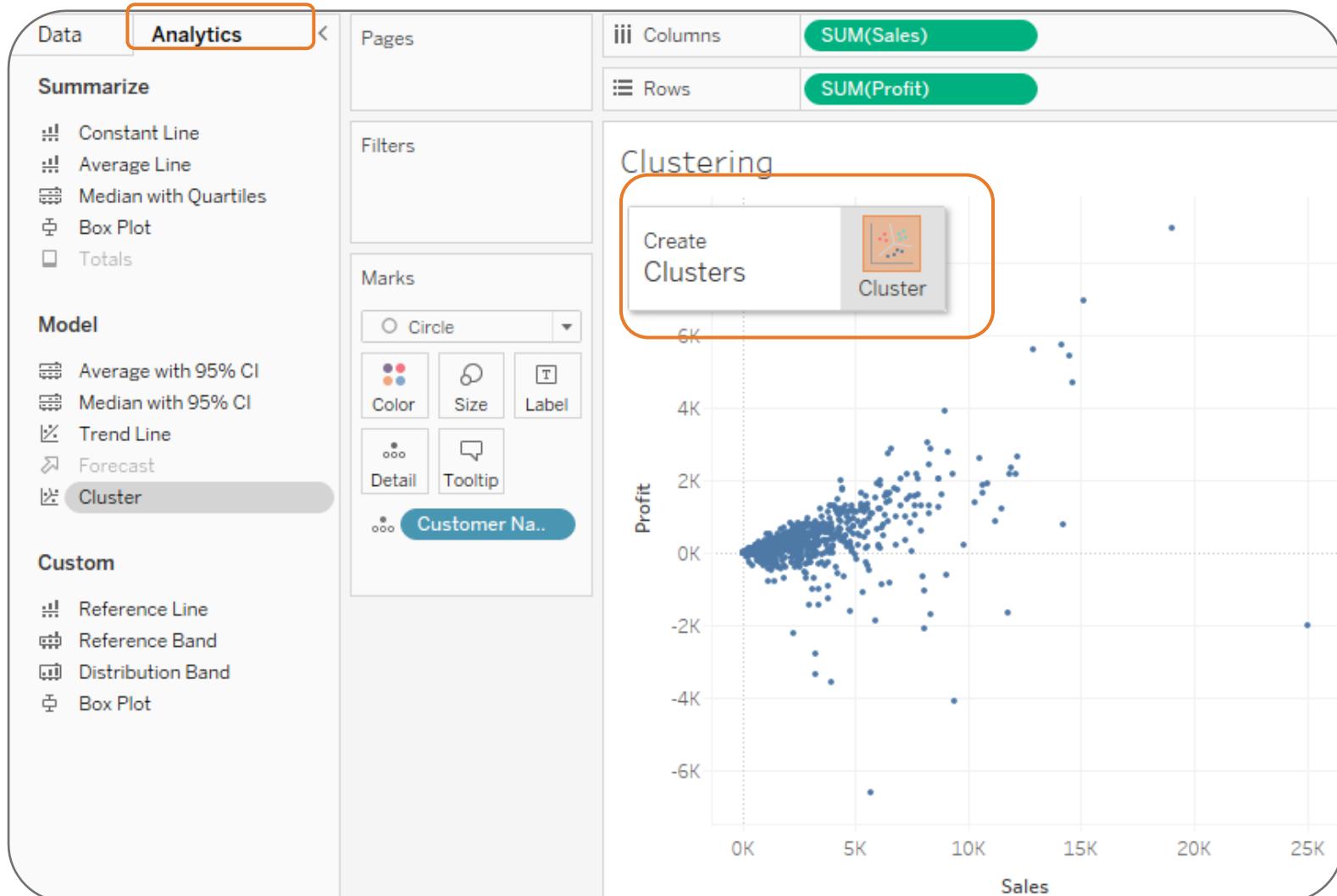
Clustering Example



Step 2

Select Marks type as **Circle** and Drag
Customer Name to Detail

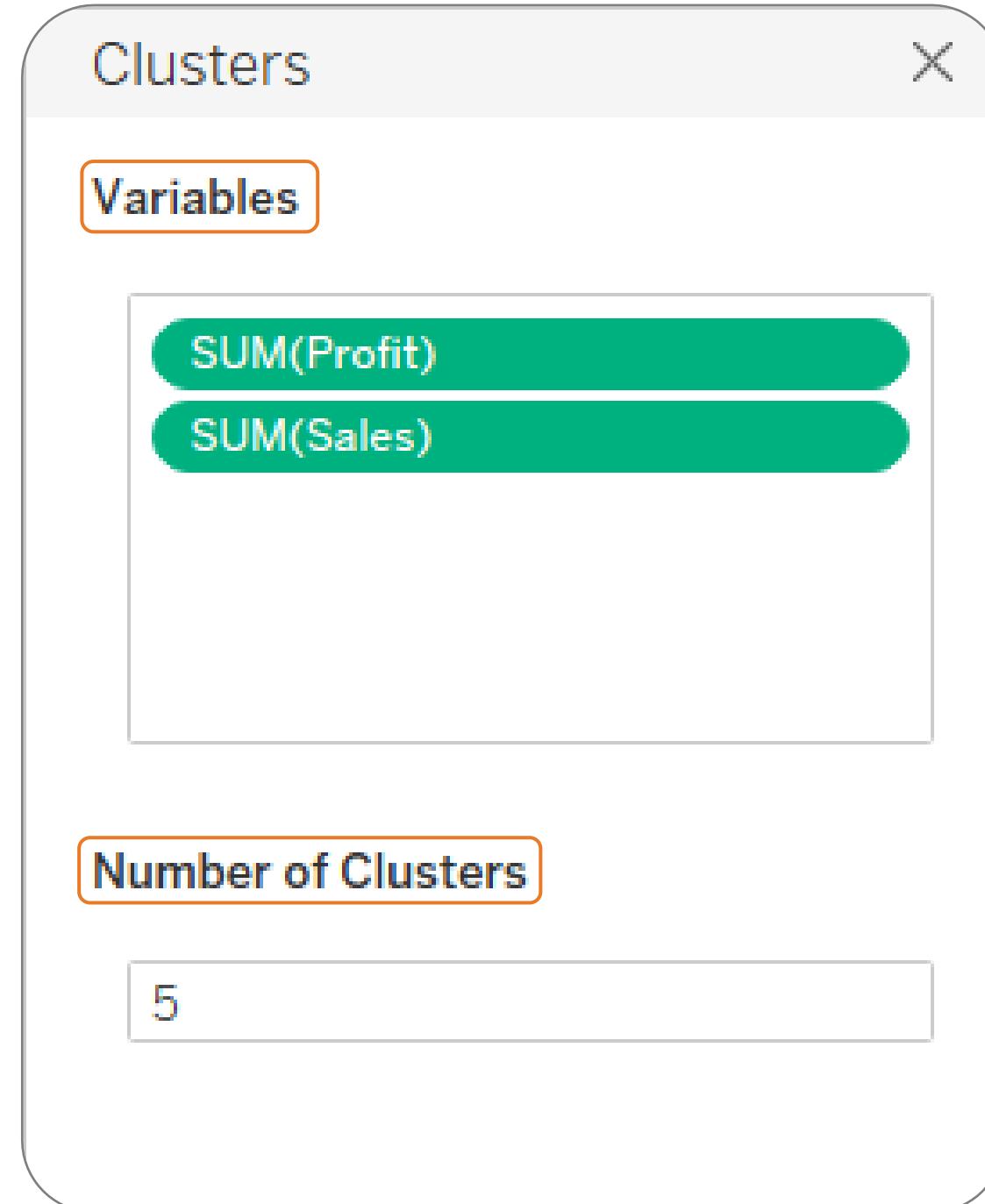
Clustering Example



Step 3

Go to Analytics Pane and drag **Cluster** to the visualization

Clustering Example



Step 4

In the cluster window, Tableau automatically chooses the variables and the number of clusters

Clustering Example



Step 5

Closing the window showcases the scatter plot with 5 clusters

Assisted Practice: Clustering



Duration: 20 minutes

Problem statement:

A well-known travel company wants to expand its customer base. The company's branding manager needs to devise an effective scheme to appeal to potential customers. He needs to analyze the life expectancy and population of each country to help the company identify the countries where the right kind of clientele is present.

Assisted Practice Guidelines



Steps to follow:

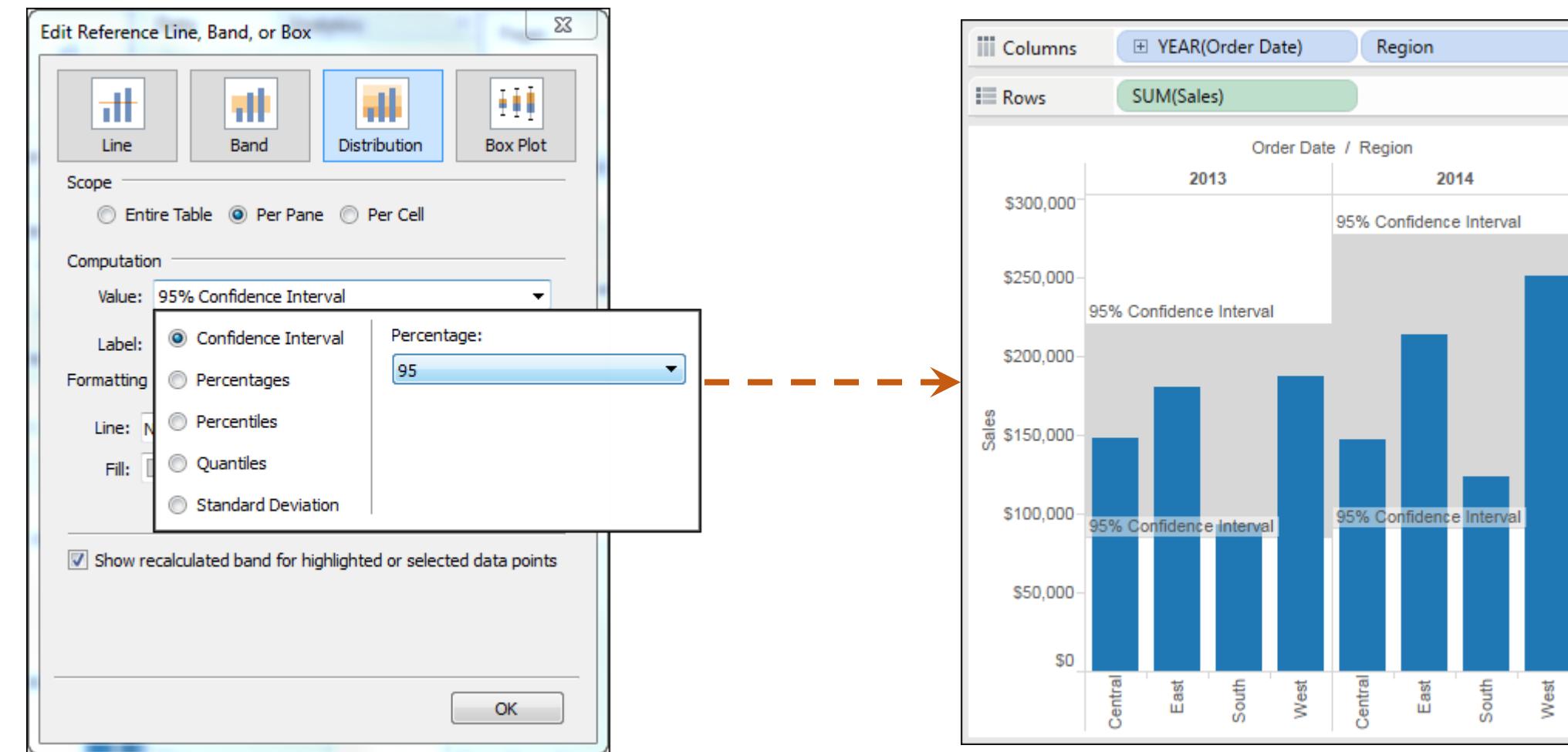
- Step 1: Use the saved world indicators data source
- Step 2: Create a filled map view
- Step 3: Create a calculated field to show the money that the people of a country spend annually on international travel
- Step 4: Add a cluster to the view
- Step 5: Select describe clusters to view the information

ASSISTED PRACTICE

Reference Distributions

Reference Distribution

A reference distribution adds a gradient of shading to visualize the distribution of values along the axis.



In this example, the reference distribution helps the user understand the distribution of the data.

Use Case: One



- Genelia's company intends to launch new stores in selected high-performing regions.
- She needs a visualization depicting the category sales in each region.
- She may concentrate her efforts on product categories that fulfill the regional average sales objectives.
- The monthly sales vs. forecast sales report is required to find the best month to open the store in the upcoming year.

Use Case One: Solution

Genelia's first step is to create a calculated field to show the difference between the sales and the sales target.

Sales over (under) Target Sample - Superstore X

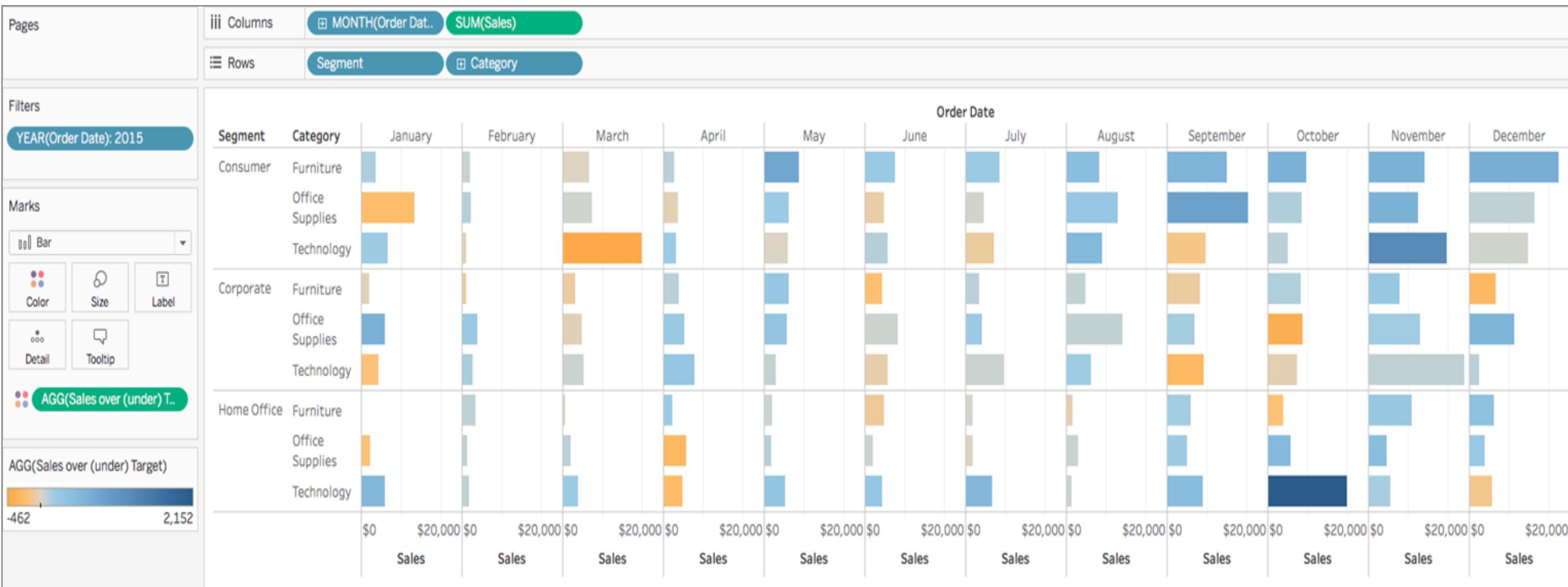
Sum([Sales])-(SUM([Sales Target].[Sales Target]))

The calculation is v... Sheets Affe... ▼

Apply OK

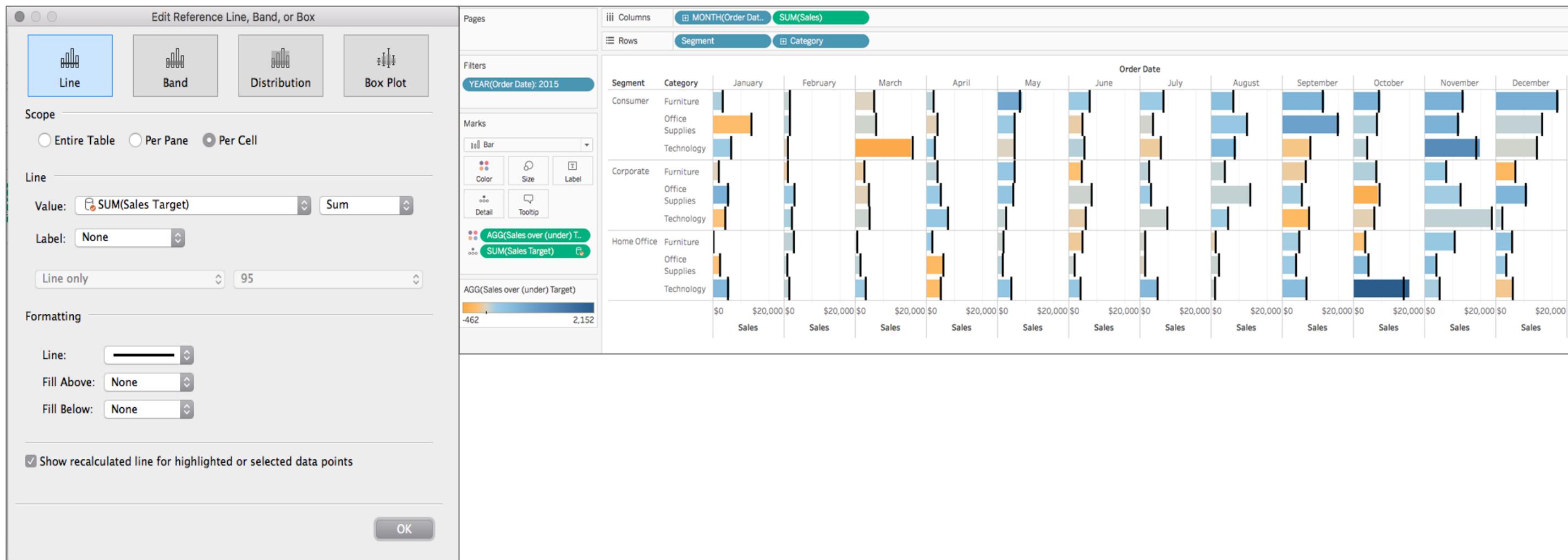
Use Case One: Solution

She will create a bar chart that shows the sales by segment, category, and month for 2015.



Use Case One: Solution

She will also add a reference line for the sales target for each segment, category, and month.



Statistical Summary Card

Statistical Summary Card

The summary card can be enabled from the worksheet menu in the Tableau workspace.

The screenshot illustrates the process of enabling a statistical summary card in Tableau. On the left, a context menu is open over a scatter plot, with the 'Show Summary' option highlighted by a blue selection bar and a checked checkbox icon. An orange arrow points from this menu to the summary card on the right. The summary card, also outlined in orange, displays statistical details for two measures: SUM(Profit) and SUM(Sales). The data for SUM(Profit) includes:

Statistic	Value
Count	6 (8.8%)
Sum	\$42,886 (15...)
Average	\$7,148
Minimum	\$1,483
Maximum	\$12,315
Median	\$7,852

The data for SUM(Sales) includes:

Statistic	Value
Sum	\$567,327 (2...
Average	\$94,554
Minimum	\$84,755
Maximum	\$101,781
Median	\$97,473

The central part of the image shows a scatter plot with Sales on the x-axis (ranging from \$0 to \$100,000) and Profit on the y-axis (ranging from -\$10,000 to \$20,000). The plot features several colored bubbles representing different data points, with a light gray grid in the background.

Statistical Summary Card

It has some default statistics

➤ Sum

➤ Average

➤ Maximum

➤ Minimum

➤ Median



The summary card views information about a selection or all the data in a view.

It shows some additional statistics

➤ Standard Deviation

➤ First Quartile

➤ Third Quartile

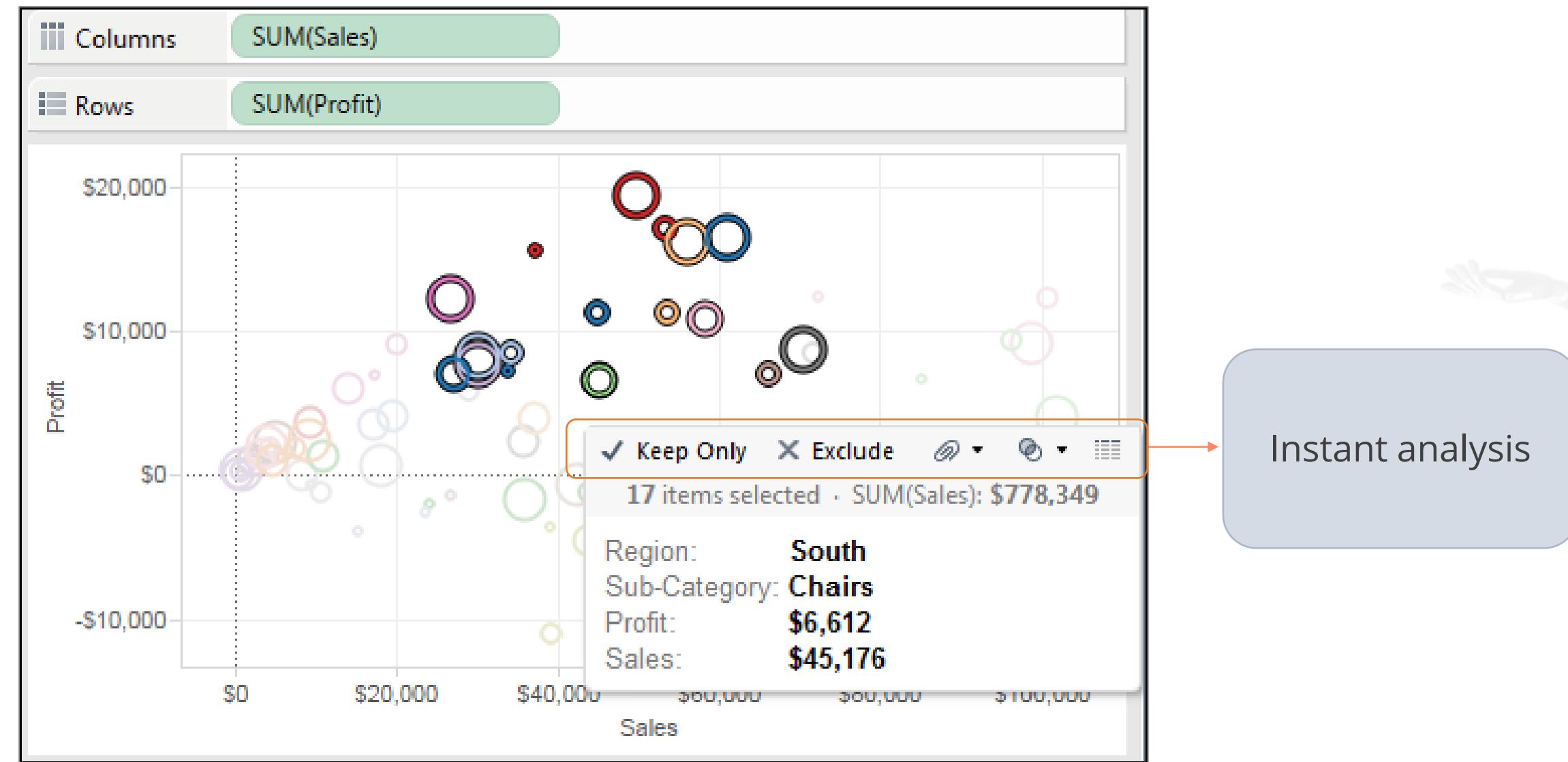
➤ Skewness

➤ Excess Kurtosis

Instant Analytics

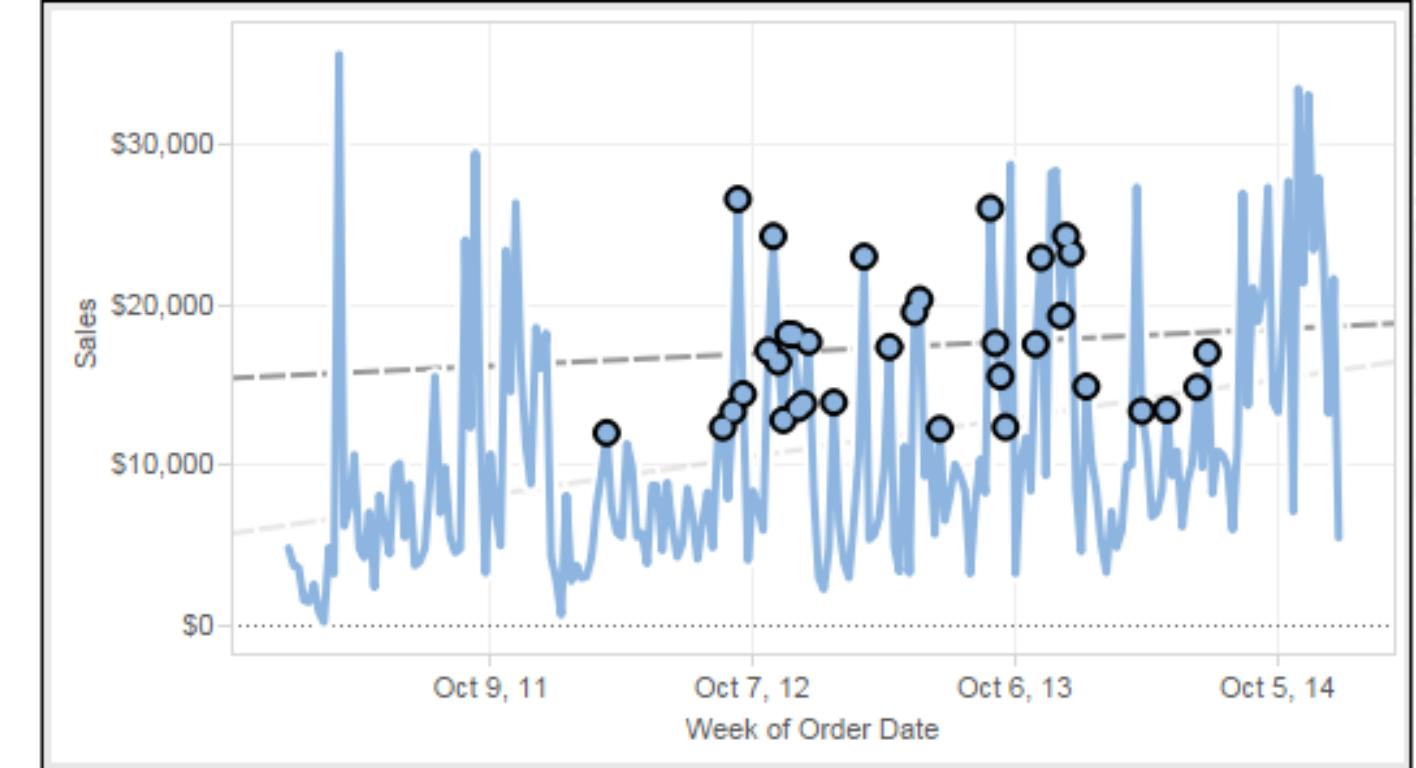
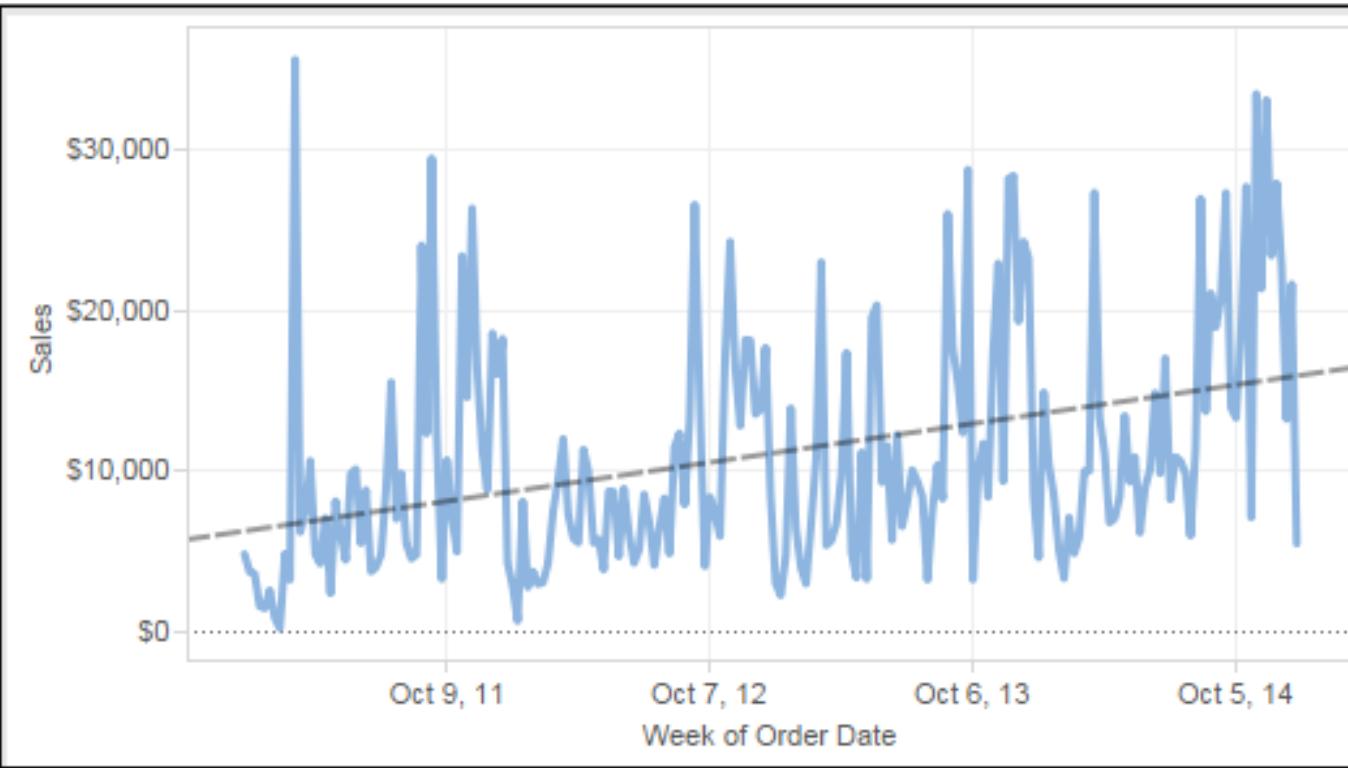
Instant Analytics

Instant analysis allows studying a single mark or a group of marks in real-time view.



Instant Analytics

Analytics such as trend lines or reference lines are updated based on the view selected.



Key Takeaways

- Parameters are variables that can be changed at run time using the parameter controls.
- Tooltip visualization complements the main visualization.
- Tableau allows its user to add trend lines, reference lines, bands, distribution, bullet charts and box charts to a worksheet.
- Instant analysis allows studying a single mark or a group of marks in real-time view.





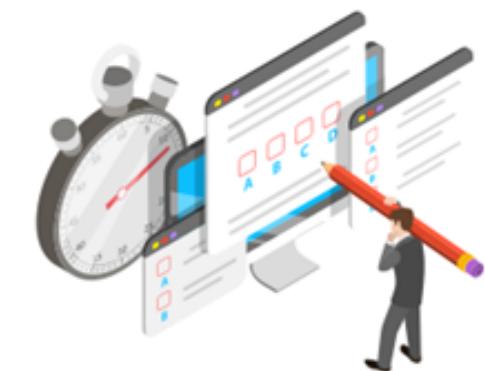
Knowledge Check

Knowledge Check

1

is the process of fitting models using historical data.

- A. Instant analytics
- B. Clustering
- C. Forecasting
- D. Parameters



Knowledge Check

1

is the process of fitting models using historical data.

- A. Instant analytics
- B. Clustering
- C. Forecasting
- D. Parameters



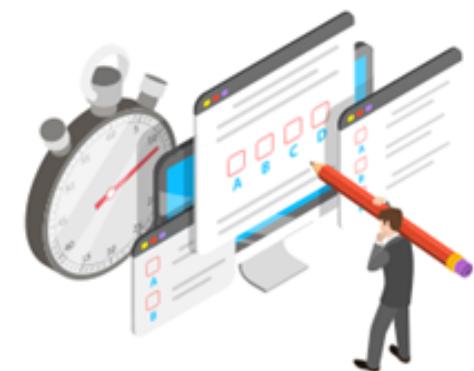
The correct answer is **C**

Forecasting is the process of fitting models using historical data to predict future observations.

**Knowledge
Check
2**

Which of the following is NOT a supported distributed computation in the Distribution Band?

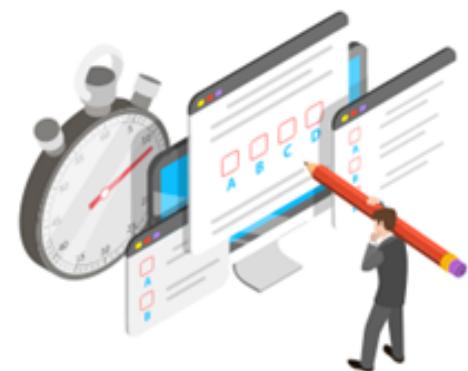
- A. Quantile
- B. Percentile
- C. Percentage
- D. Median



**Knowledge
Check
2**

Which of the following is NOT a supported distributed computation in the Distribution Band?

- A. Quantile
- B. Percentile
- C. Percentage
- D. Median



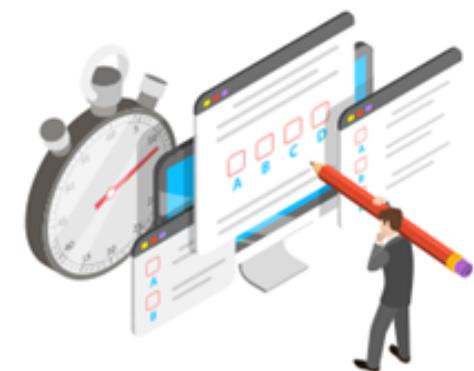
The correct answer is **D**

Median is a value and not a method of distribution.

**Knowledge
Check**
3

Which of the following is FALSE about Bullet Charts?

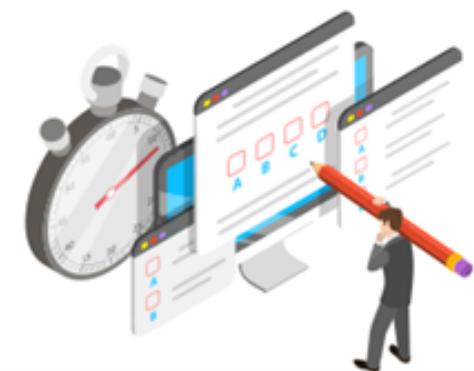
- A. Reference line is added per cell.
- B. Bullet chart can be created on a vertical bar chart.
- C. Reference band is added per cell.
- D. Color coding on actual is done by adding a measure to color.



**Knowledge
Check
3**

Which of the following is FALSE about Bullet Charts?

- A. Reference line is added per cell.
- B. Bullet chart can be created on a vertical bar chart.
- C. Reference band is added per cell.
- D. Color coding on actual is done by adding a measure to color.



The correct answer is **C**

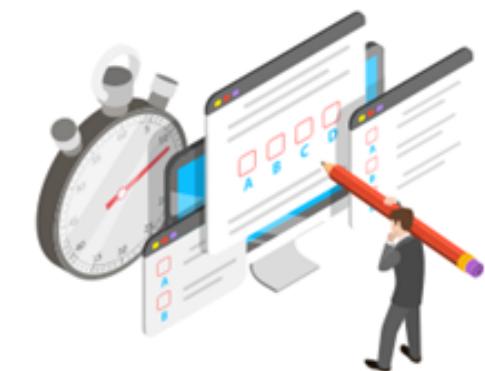
Reference Band is not used in bullet chart.

**Knowledge
Check**

4

Which of the following can be used as a dimension?

- A. Forecast
- B. Clusters
- C. Parameter
- D. Distribution

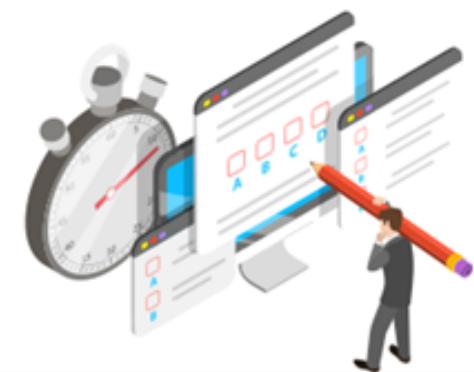


**Knowledge
Check**

4

Which of the following can be used as a dimension?

- A. Forecast
- B. Clusters
- C. Parameter
- D. Distribution



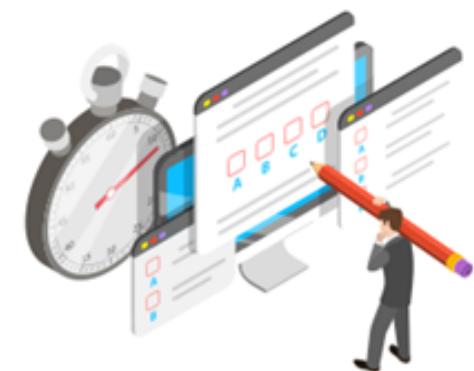
The correct answer is **B**

Clusters can be dragged to dimensions in the data pane and used for further analysis.

**Knowledge
Check**
5

Which of the following is NOT True about Trend Lines?

- A. Trend lines can be created only on line chart involving data field.
- B. Logarithmic trend lines are only for logarithmic axis.
- C. R-squared should be equal to 1 for perfect trend.
- D. P-value and R-squared define the correctness of the trend.



**Knowledge
Check**
5

Which of the following is NOT True about Trend Lines?

- A. Trend lines can be created only on line chart involving data field.
- B. Logarithmic trend lines are only for logarithmic axis.
- C. R-squared should be equal to 1 for perfect trend.
- D. P-value and R-squared define the correctness of the trend.



The correct answer is **A**

Trend lines can be created on scatter plots as well.