

Visualization with Tableau

What we are going to create...

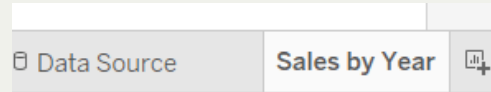


Importing Data

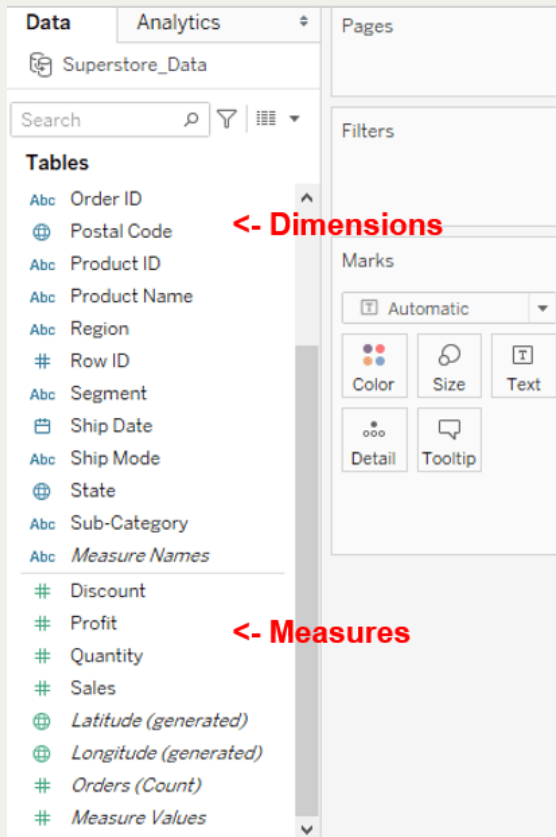
Download “Superstore Data” from course website or [here](#).
You can choose a spreadsheet as your data, e.g., “Orders.”
Once the dataset is available, check the data types first.

Creating a Worksheet

Let's create a new worksheet by clicking on "Sheet 1"! You can customize the name for your worksheet.



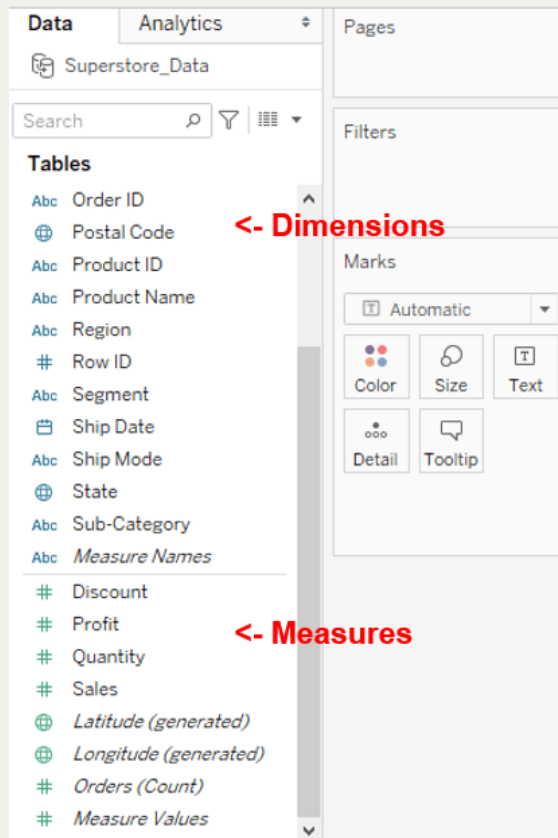
Dimensions vs. Measures



There are two types of variables available, dimensions vs. measures.

What are the differences between dimensions and measures?

Dimensions vs. Measures



There are two types of variables available, dimensions vs. measures.

Measures are variables that can be used for calculation whereas dimensions are used to partition the measures.

Basics

Lines

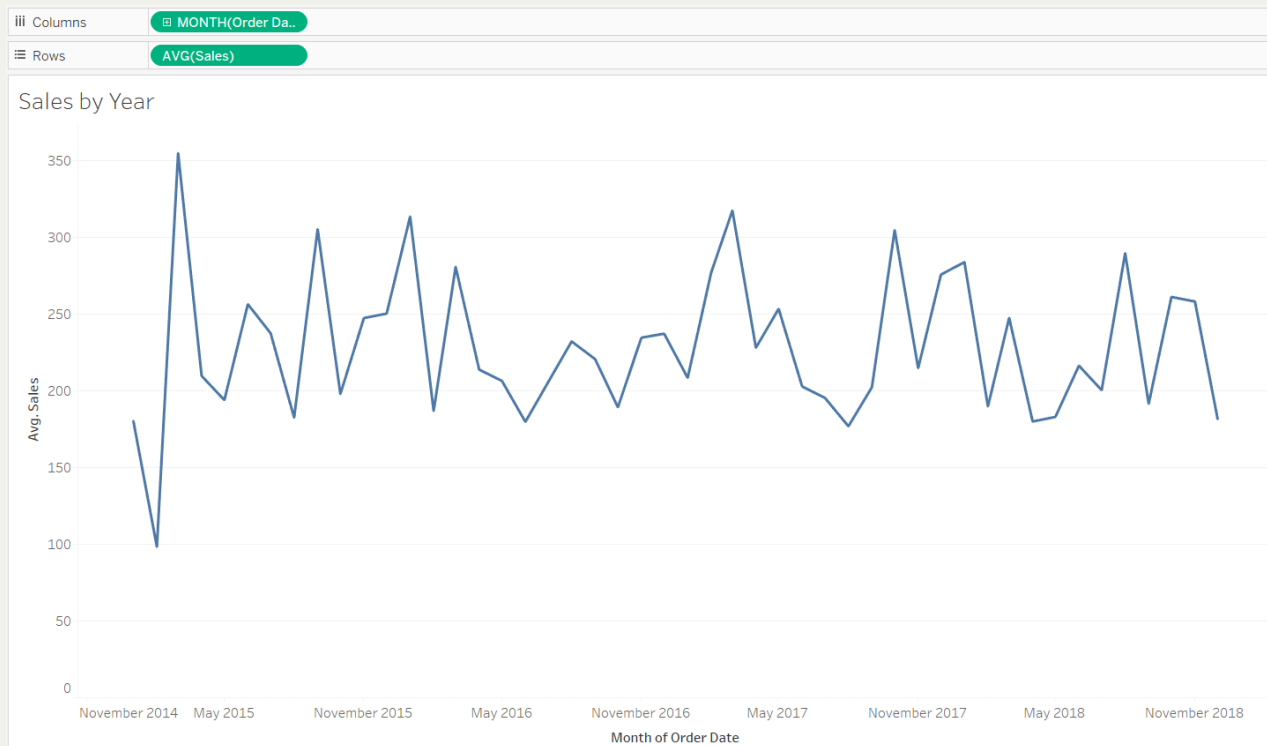
Draw **Order Date** to **Columns** and **Sales** to **Rows**.

You get your first Tableau visualization now!

Columns	YEAR(Order Date)
Rows	SUM(Sales)

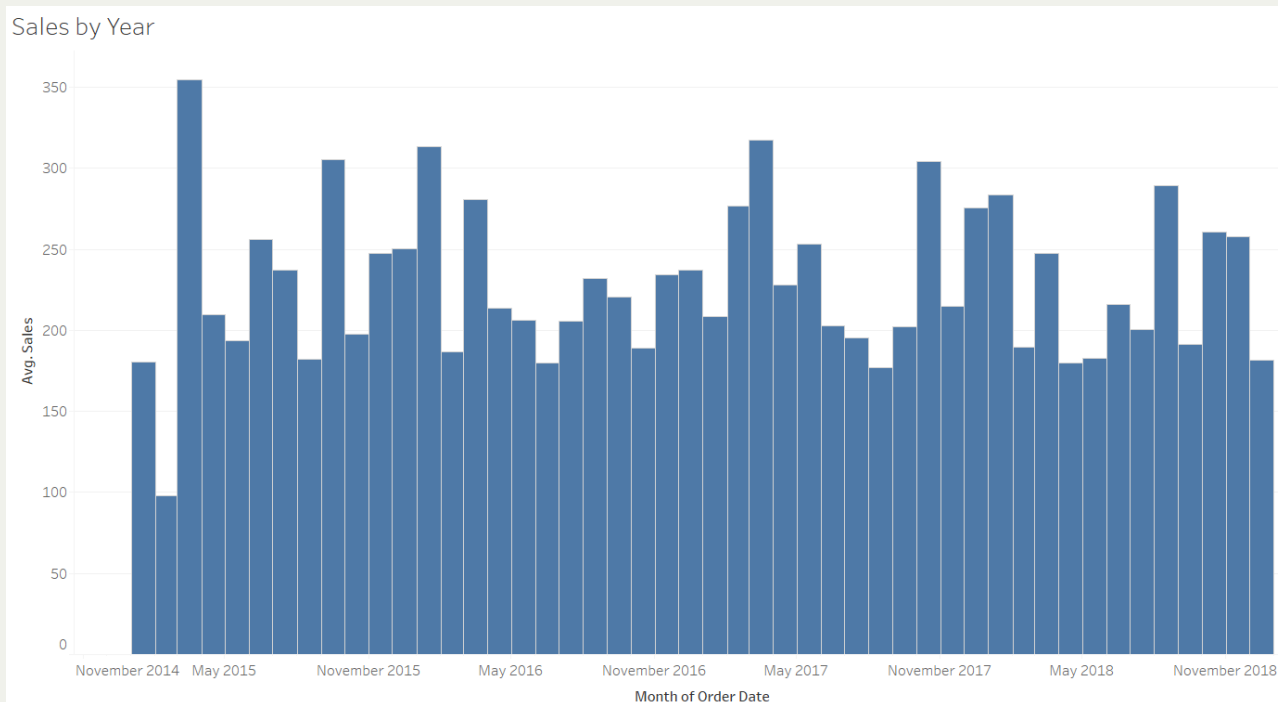
Lines

Change **Order Data** from **Year** to **Month-Year** and **Sales** from **Sum** to **Average**.



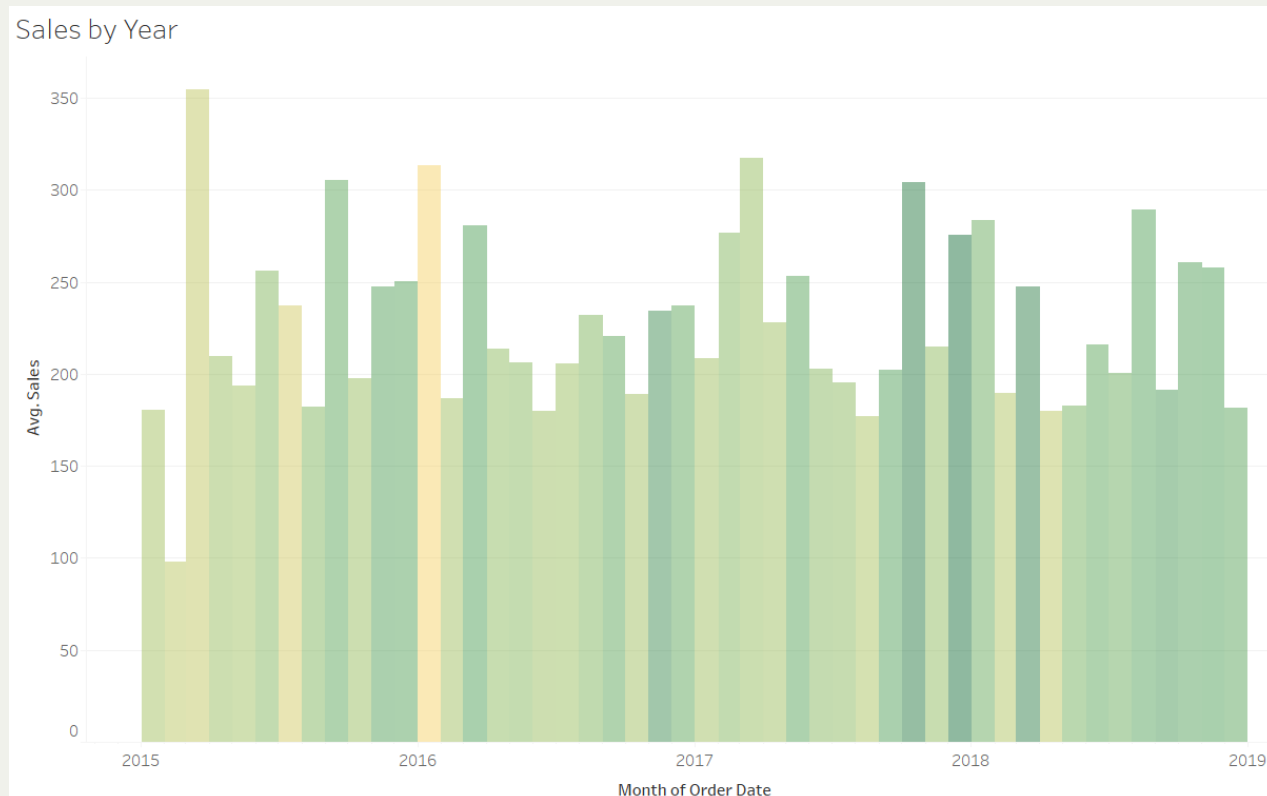
Bars

If you don't like lines, try bars! Click the dropdown menu on **Marks** and select **Bars**. See what will happen!



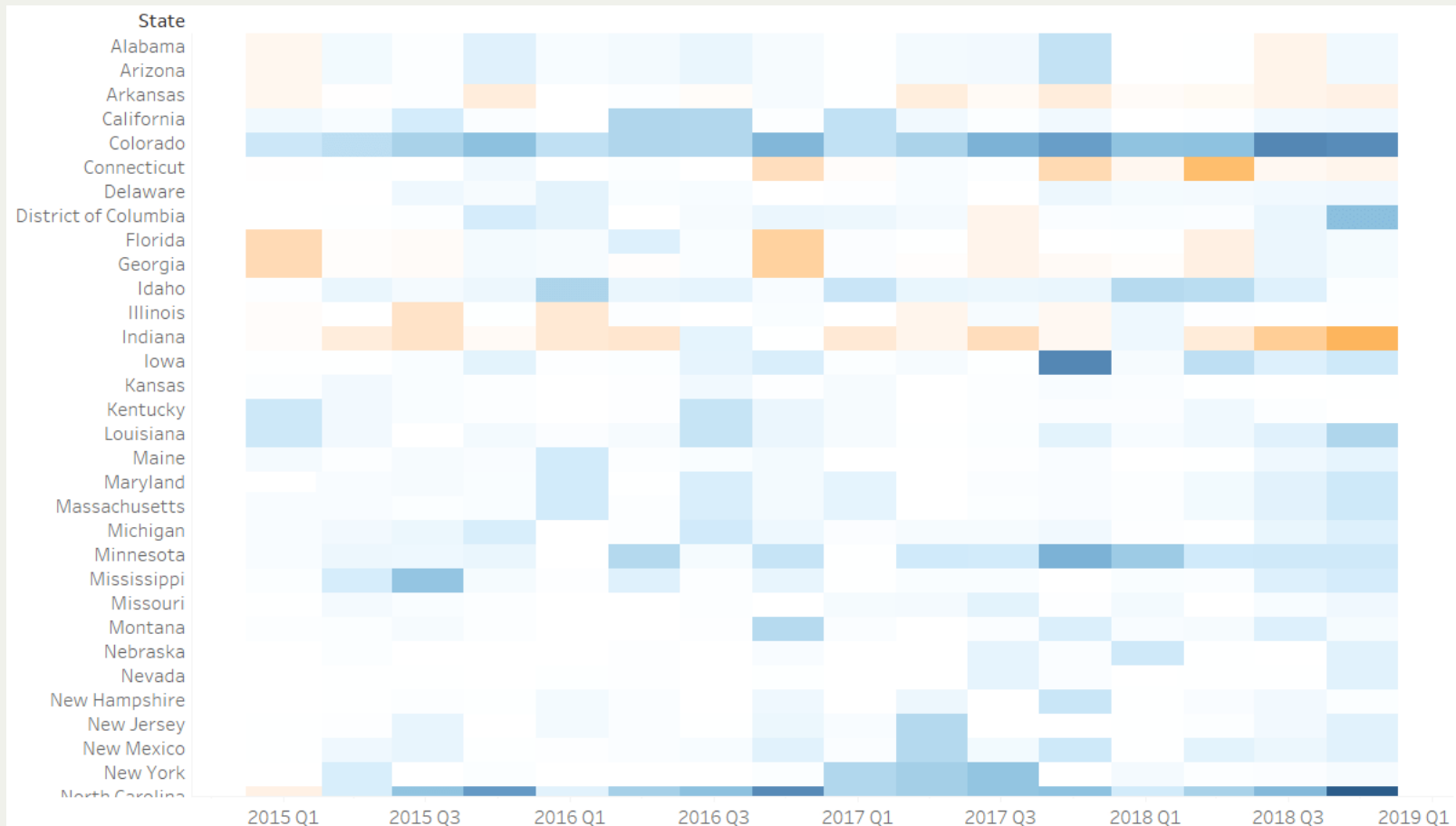
Colors

Add colors to your bars! Drag **Profit** to **Color**, and you can customize the color scheme by clicking on **Color**.



Heat Map

We are creating the following heatmap!



Heatmap

Create a new worksheet called “Heatmap.”

Drag **Order Date** to **Columns** and specify Quarter Year.

Drag **State** to **Rows**.

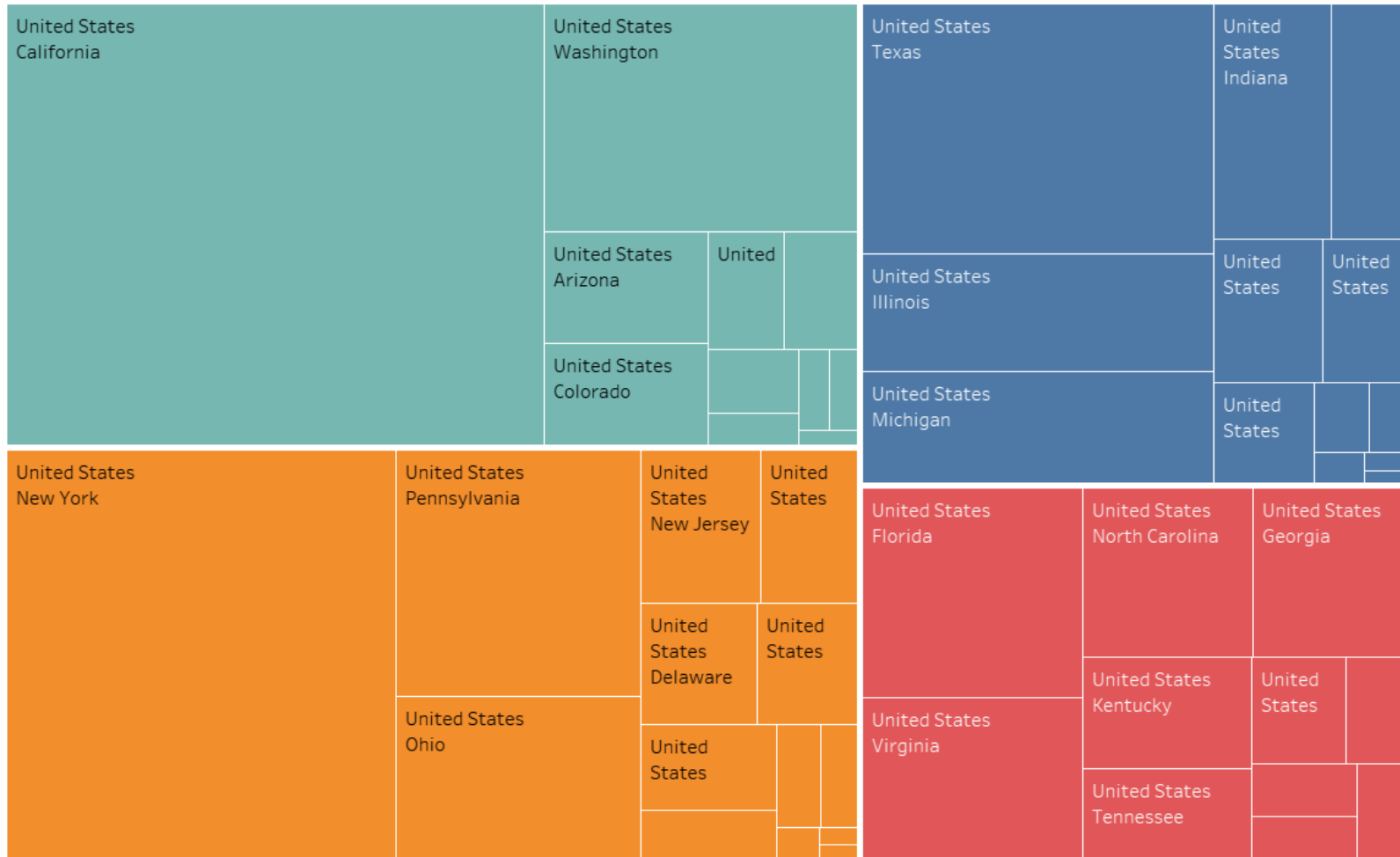
Click the dropdown menu on **Marks** and select **Square**.

Drag **Profit** to **Color**.

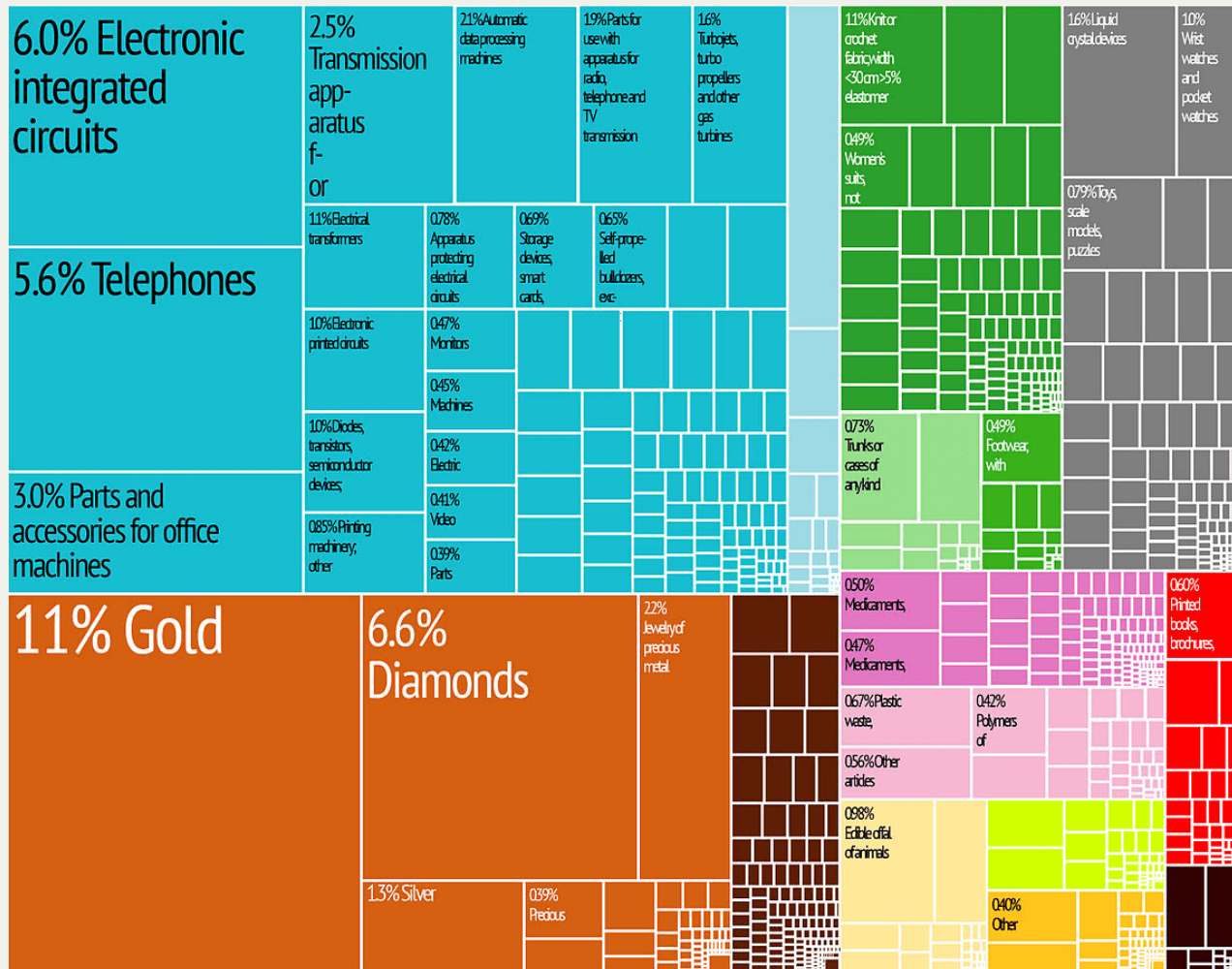
Click on **Size** and **Color** to customize your square size and your color.

Treemap

We are creating a treemap!



This is a Hong Kong export treemap, found on [Wikipedia](#). How is it created?



Treemap

Start with a new worksheet “treemap.”

Drag **Country**, **State**, **Sales** all to your **Columns**.

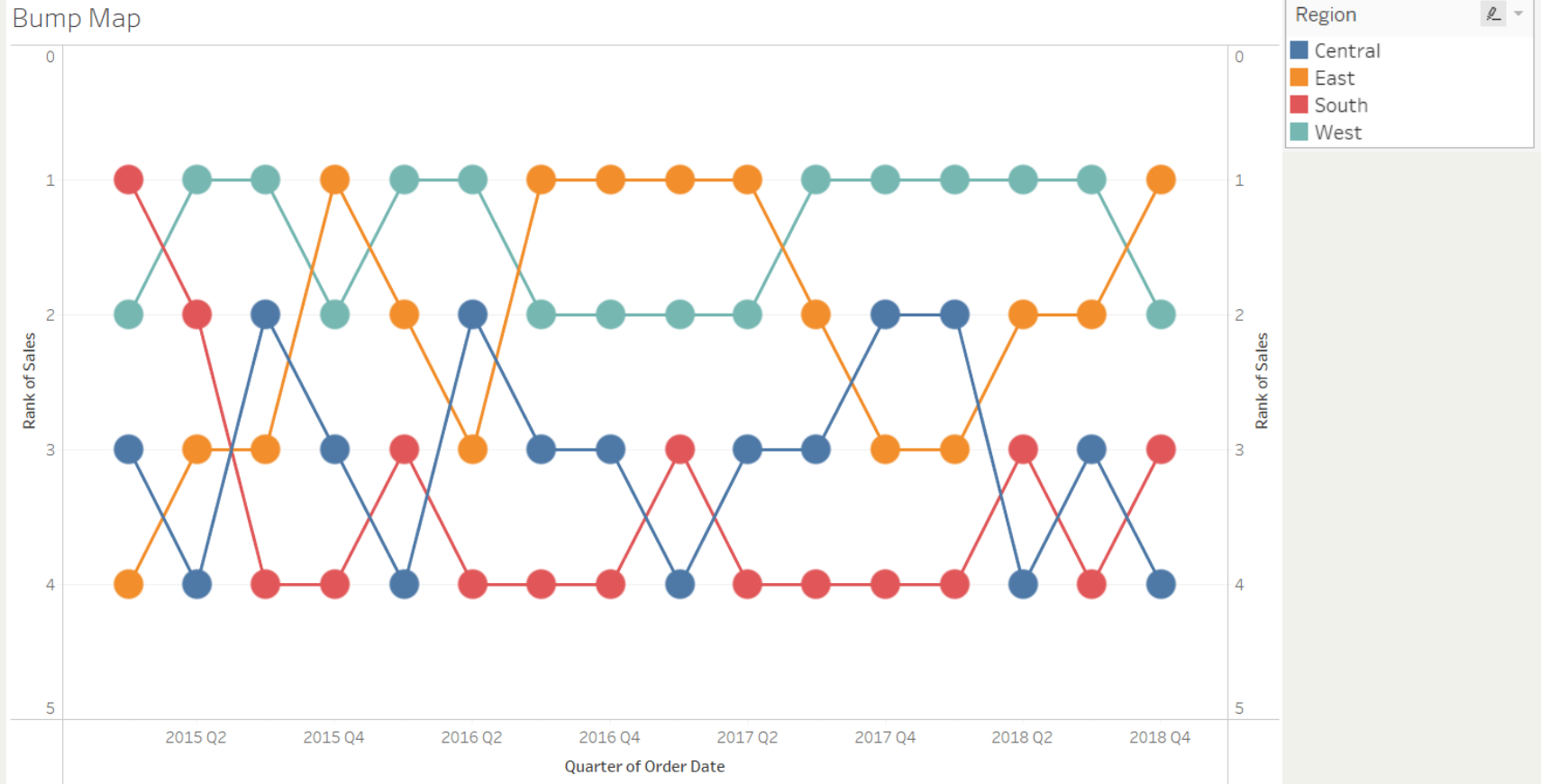
On the right-hand side, click **Show Me**, and select the **treemap icon**:



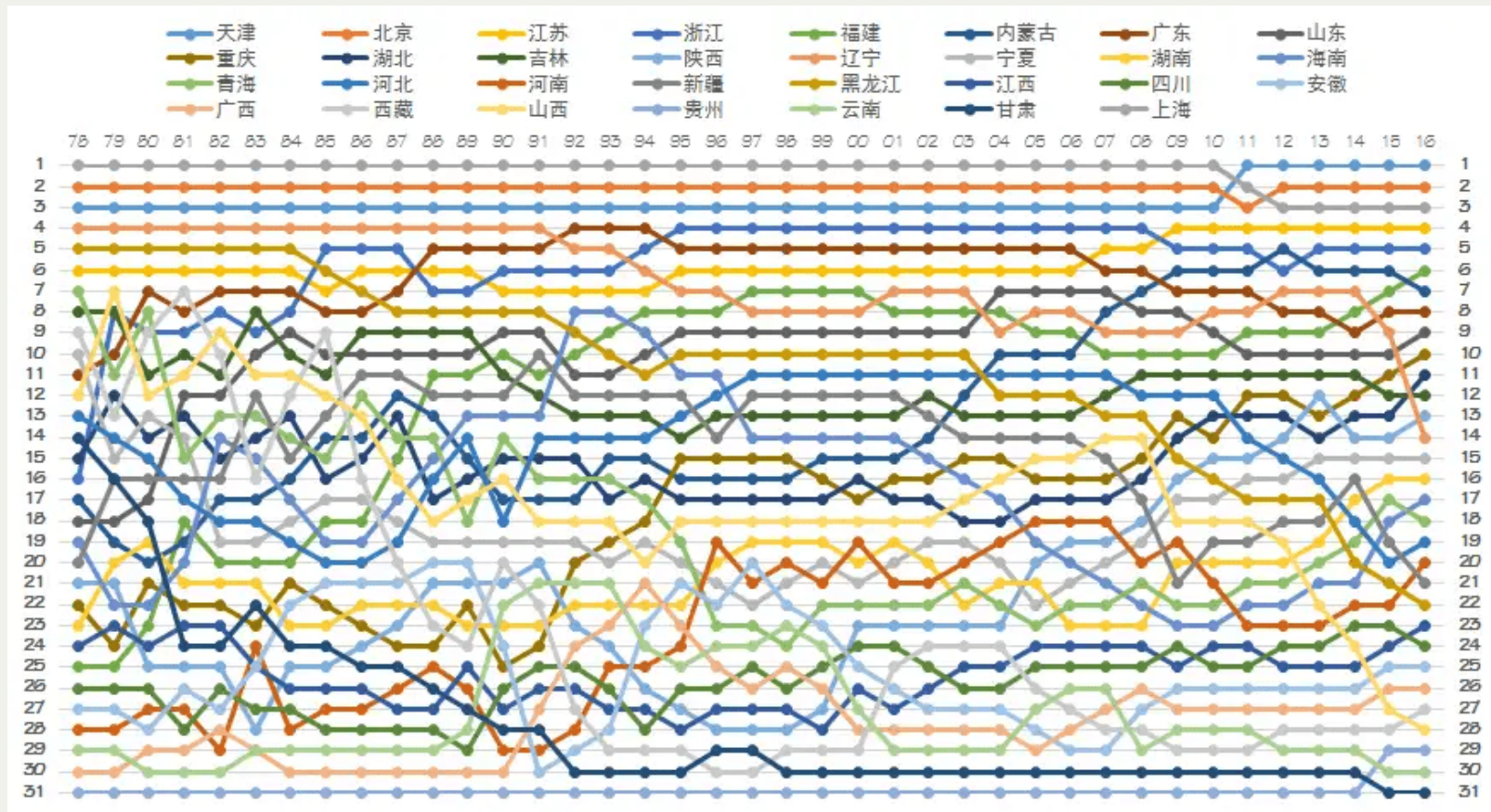
Drag **Region** to **Color**, and you are done!

Bump Map

This is a Bump Map



Bump maps are used in a lot of places... This is a rank of Chinese provinces by GDP per capita.



Bump Map

Start with a new worksheet (e.g., “Bump Map”).

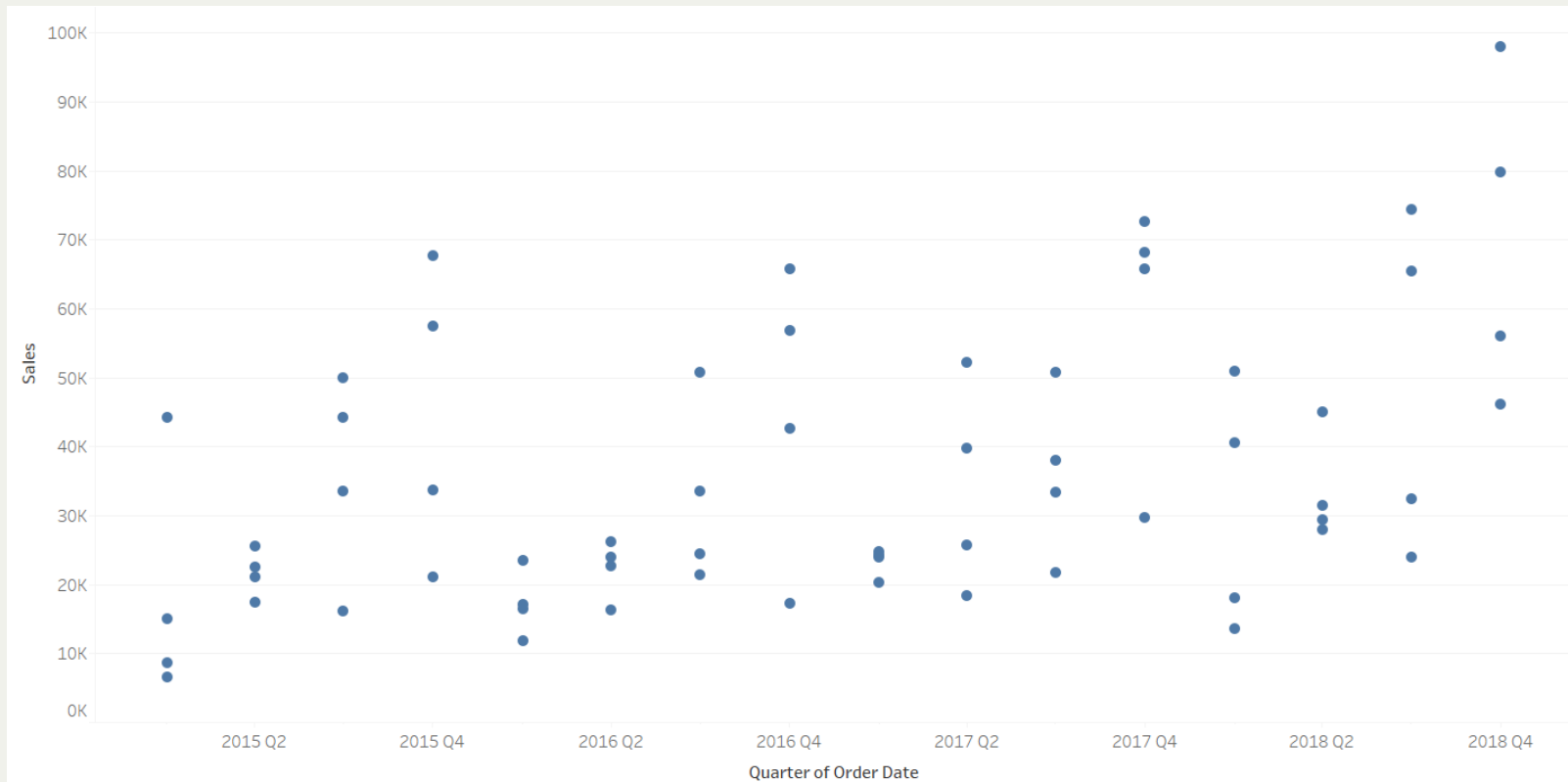
Order Date to Columns and Sales to Rows.

Change Order Date format from Year to Quarter Year.

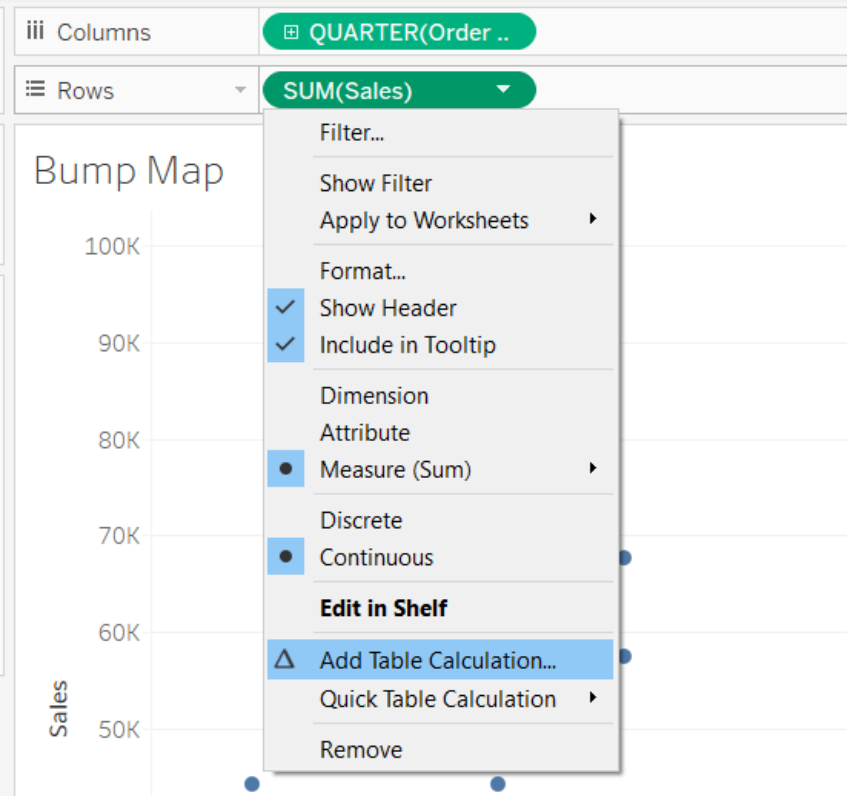
Region to Detail under Marks.

Change Marks from Automatic to Circle.

Bump Map



Bump Map



Right click the triangle next to **Sales**, and select **Add Table Calculation**.

Bump Map

Table Calculation×

Rank of Sales

Calculation Type

Rank

Descending

Unique (1, 2, 3, 4)

Compute Using

Table (across)

Cell

Specific Dimensions

☐ Quarter of Order Date

☒ Region

☒ Show calculation assistance

Specify your **Table Calculation** according to this figure. Here, we rank the sales of each region.

Bump Map

Right-click your *y*-axis, choose **edit axis**, and select reserved scale. Now, we are ranking from the first to the last.

0

Rank of Sales

1

2

3

4

5

Edit Axis [Rank of Sales] ×

General Tick Marks

Range

☒ Automatic ☒ Include zero

☐ Uniform axis range for all rows or columns

☐ Independent axis ranges for each row or column

☐ Custom

Automatic Automatic

0 5

Scale

☒ Reversed ☐ Logarithmic

☒ Positive ☐ Symmetric

Axis Titles

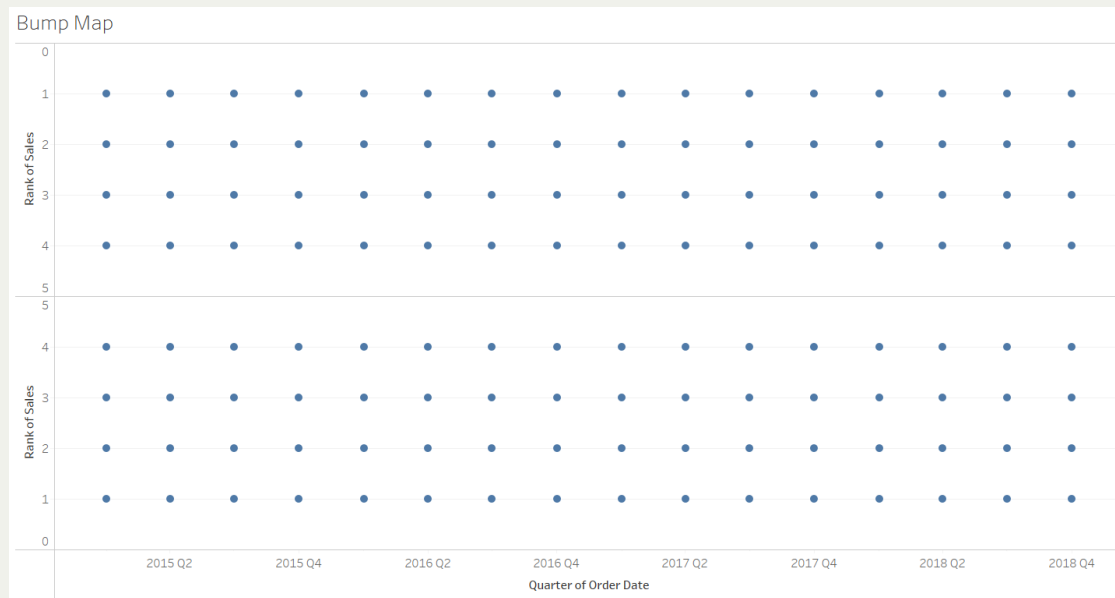
Title

Custom Rank of Sales

Subtitle

Bump Map

Press **Control (Windows)** or **Command (Mac)** on your keyboard, drag **Sales** on **Rows** to **Rows** again to replicate this variable again. You will reach the following figure.



Bump Map

Click the small triangle next to the second **Sales** on **Rows**, and select **Dual Axis**. By doing so, you merge the two figures into one single figure.

Right-click your *y*-axis and click **Synchronize Axis**, you will get the two *y*-axes identical.

Bump Map

Under Marks, change the format your second figure from **Circle** to **Line**.

Drag **Region** to **Color** under Marks for both figures.

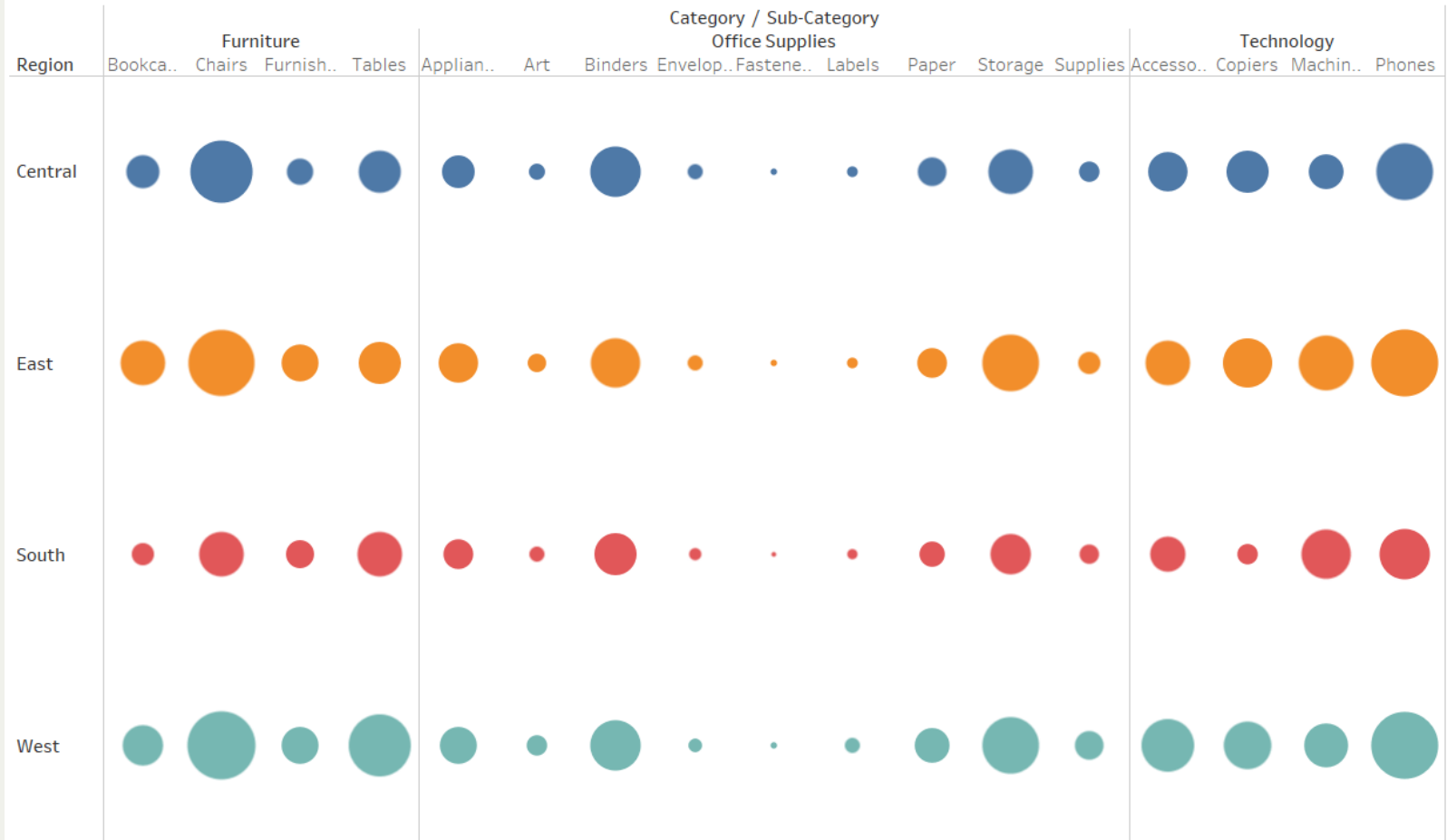
Adjust the size of the your circles to make it look best.

Finally, you are down with your bump map!

Bubble Matrix

This is a bubble matrix.

Bubble



Bubble Matrix

Start with a new worksheet.

Region to Rows; Category and Subcategory to Columns.

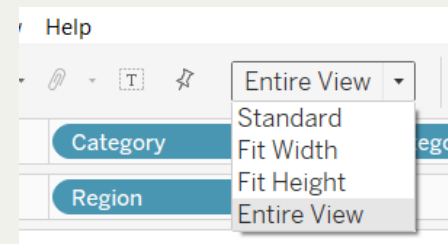
Set the table format to Circle.

Sales to Size (of the circles).

Region to Color (of the circles).

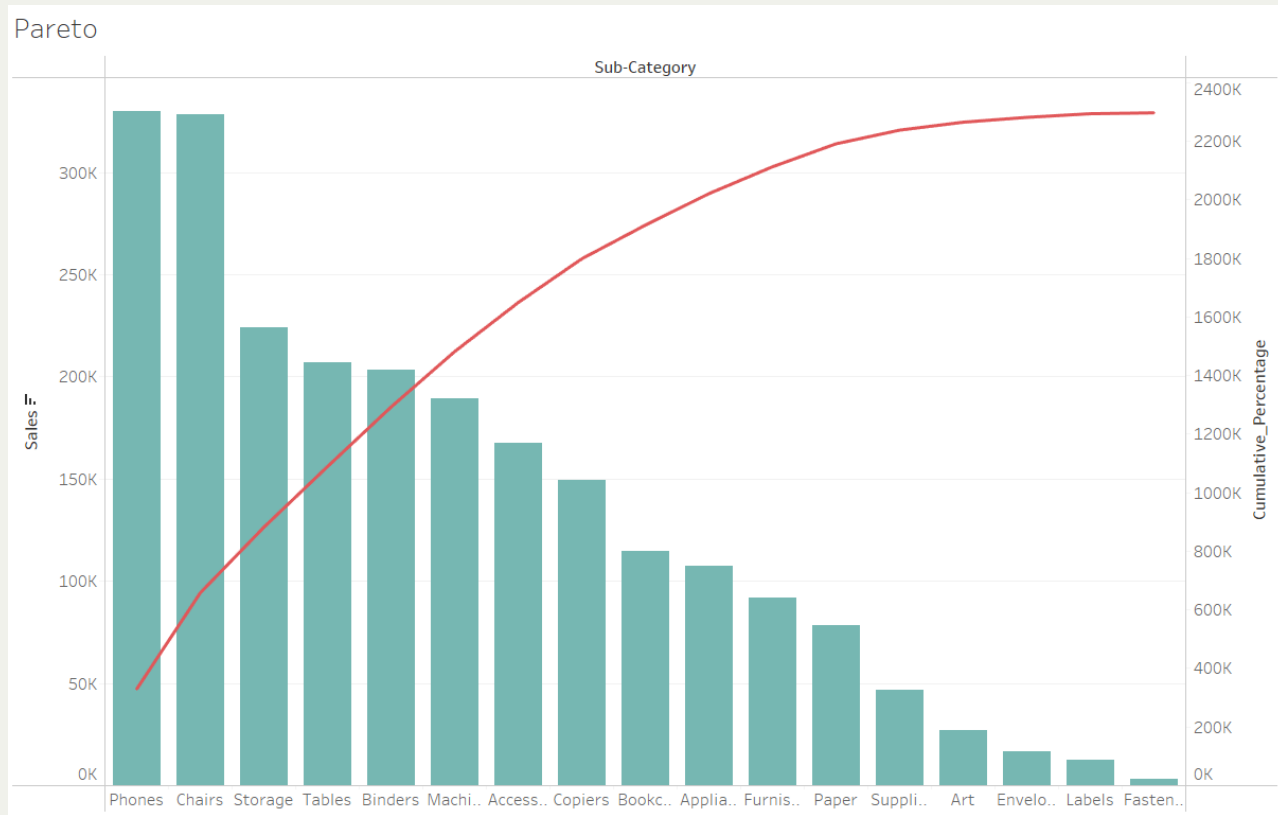
Adjust the size and transparency of your bubbles.

You may also set the table to Entire View to make it looks nicer.



Pareto Chart

This is a Pareto Chart



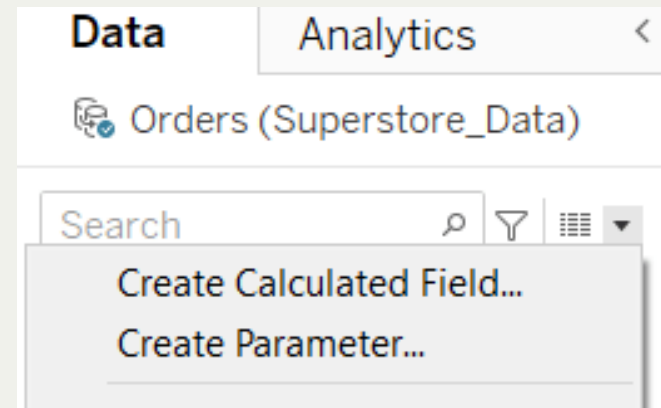
Pareto Chart

Start with a new worksheet.

Subcategory to Columns and Sales to Rows.

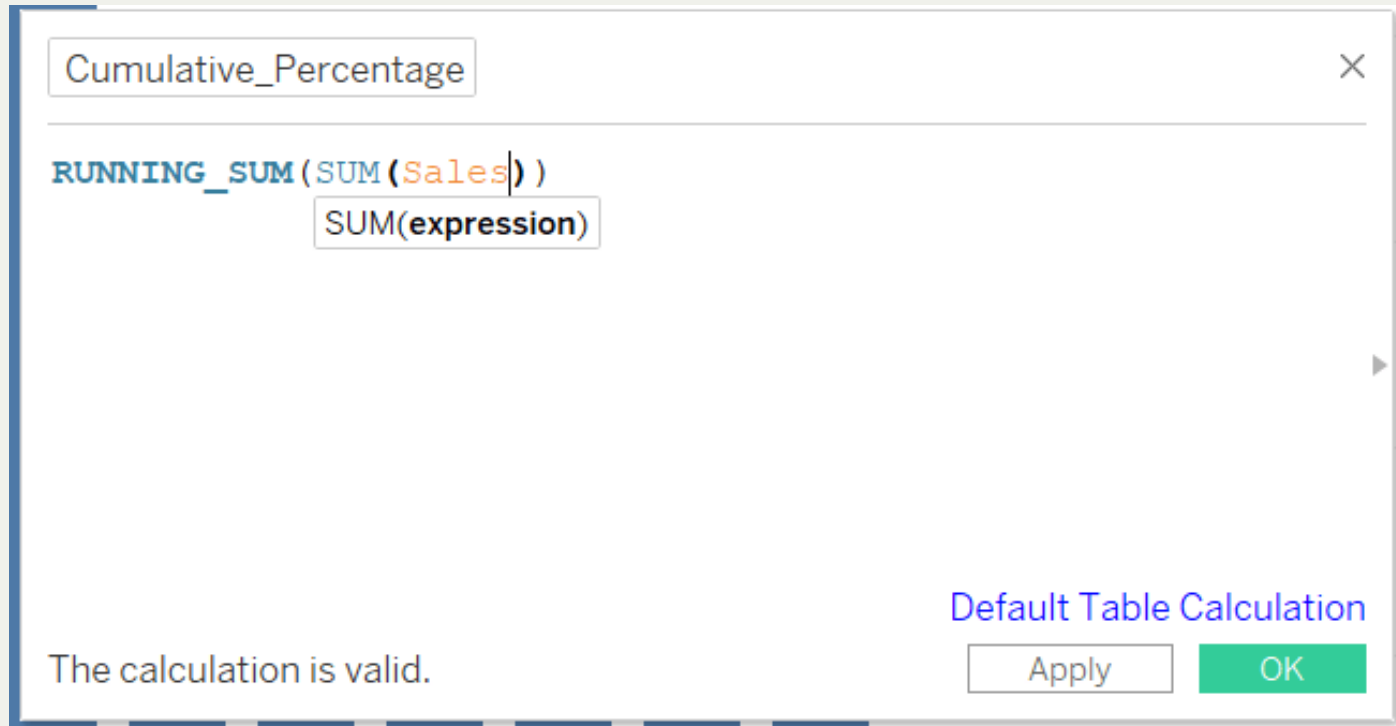
Rank the bars based on sales by clicking on this: 

Click here to create calculated field:



Pareto Chart

Create the following new variable:



A screenshot of a software dialog box for creating a new variable. The title bar at the top contains the text "Cumulative_Percentage" and a close button (X). The main area of the dialog box contains the text `RUNNING_SUM(SUM(Sales))`. Below this, there is a small input field containing the text `SUM(expression)`. At the bottom right of the dialog box, there is a link labeled "Default Table Calculation" in blue text. Below this link, there are two buttons: "Apply" and "OK". At the bottom left of the dialog box, there is a message that says "The calculation is valid."

Cumulative_Percentage

`RUNNING_SUM(SUM(Sales))`

`SUM(expression)`

Default Table Calculation

The calculation is valid.

Apply OK

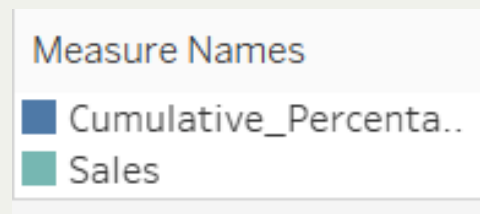
Pareto Chart

Draw the new variable **Cumulative_Percentage** to **Rows**.

Choose “**Dual Axis**” as we illustrated previously.

Set the format of the first figure to be **Bar**, and the second figure to be **Line**.

You can adjust the width of the bars and the line. If you want to edit the colors of the bars and line, double-click the buttons here:



Dumbbell Chart

This is a dumbbell chart showing how sales change from 2017 to 2018.

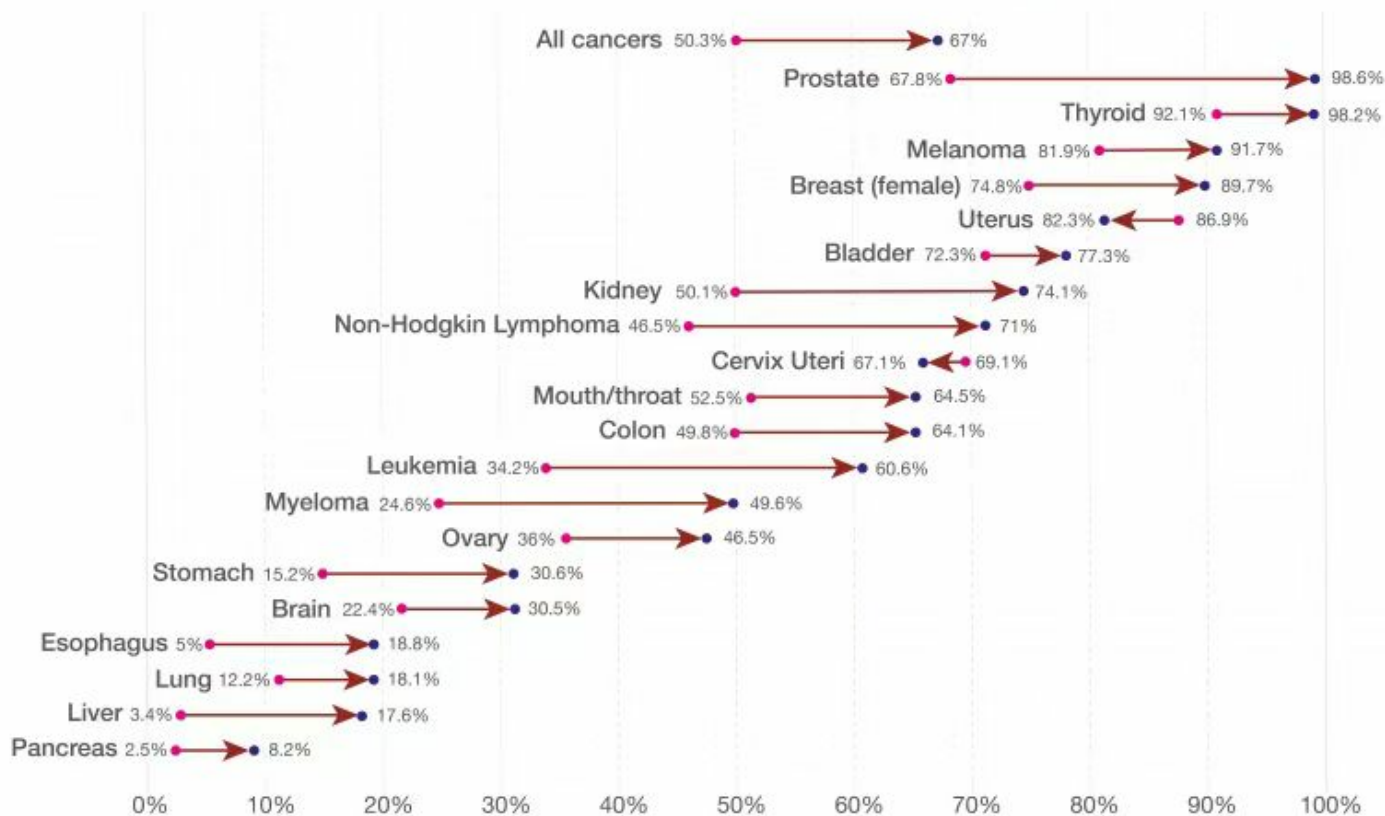


This type of chart is used everywhere...

Five-year cancer survival rates in the USA

Average five-year survival rates from common cancer types in the United States, shown as the rate over the period 1970-77 [●] and over the period 2007-2013 [●]: 1970-77 [●] → 2007-2013 [●]

This five-year interval indicates the percentage of people who live longer than five years following diagnosis.



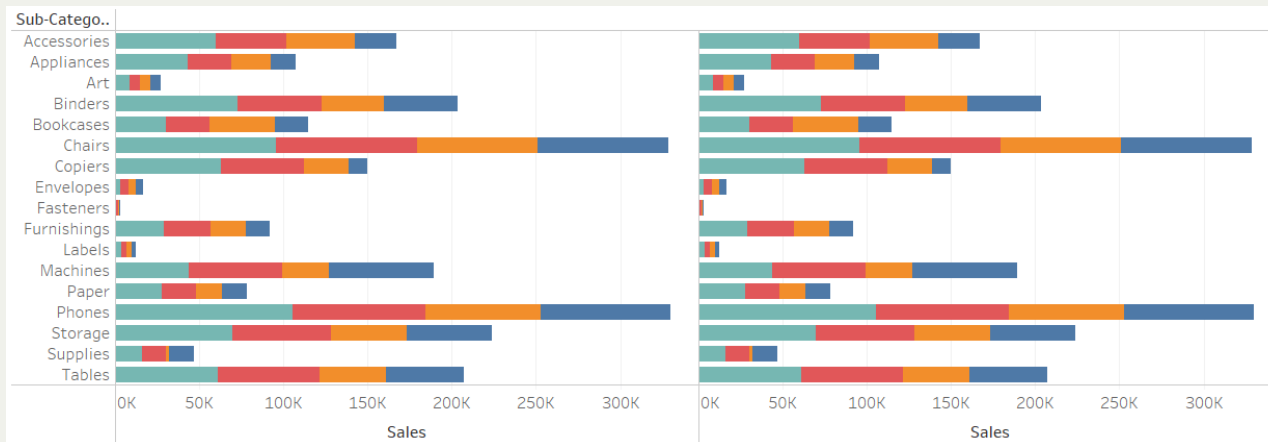
Dumbbell Chart

Start with a new worksheet.

Subcategory to Rows; Sales to Columns.

Order Date (Year) to Color.

Press **Control/Command** tab and drag **Sales** to **Columns** to replicate it.

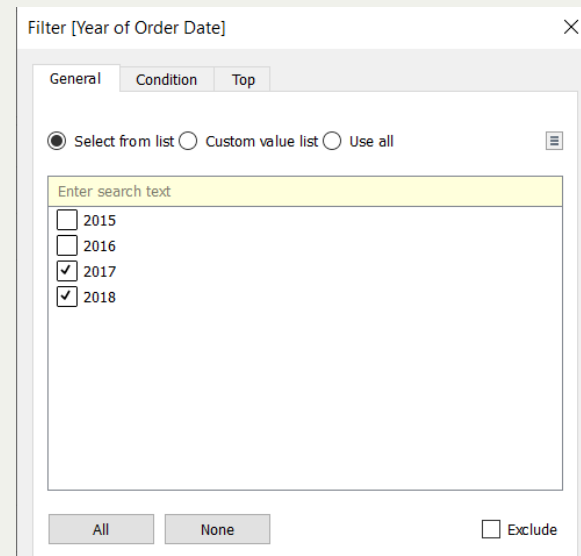
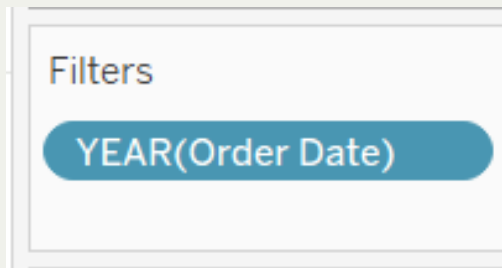


Dumbbell Chart

Choose **Dual Axis** for the second **Sales**; now, you merge the two figures into one single figure.

Right click on your *x*-axis to **Synchronize Axis**.

Drag **Order Date** to **Filters** and only check 2017 and 2018.

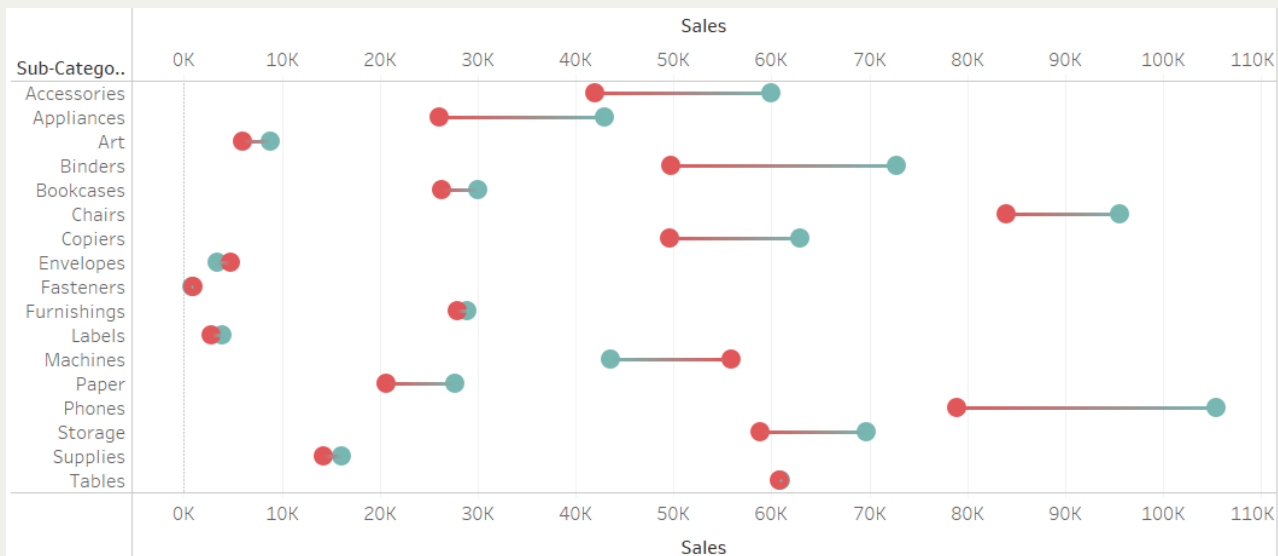


Dumbbell Chart


Choose the format of the second chart to **Line**.

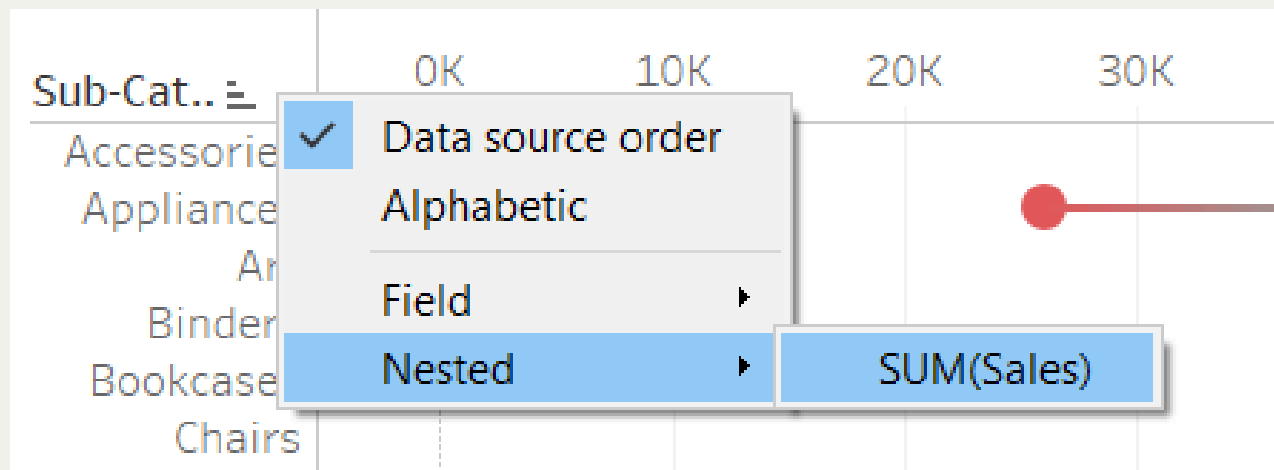
Drag **Order Date** (the first "Year") to **Path**. Note that the default format is **Quarter** so you need to change it to **Year**.

Adjust the size of circles in the first chart.



Dumbbell Chart

Now, the items in *y*-axis are listed in alphabetical order. If you prefer to list the items based on sales, click on the  button in your *y*-axis, select **Nested, SUM(Sales)** as illustrated in the following figure. You are done!



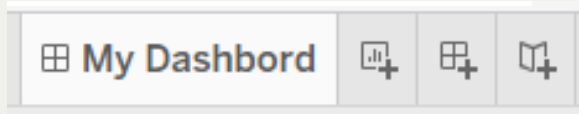
Dashboard

Dashboard

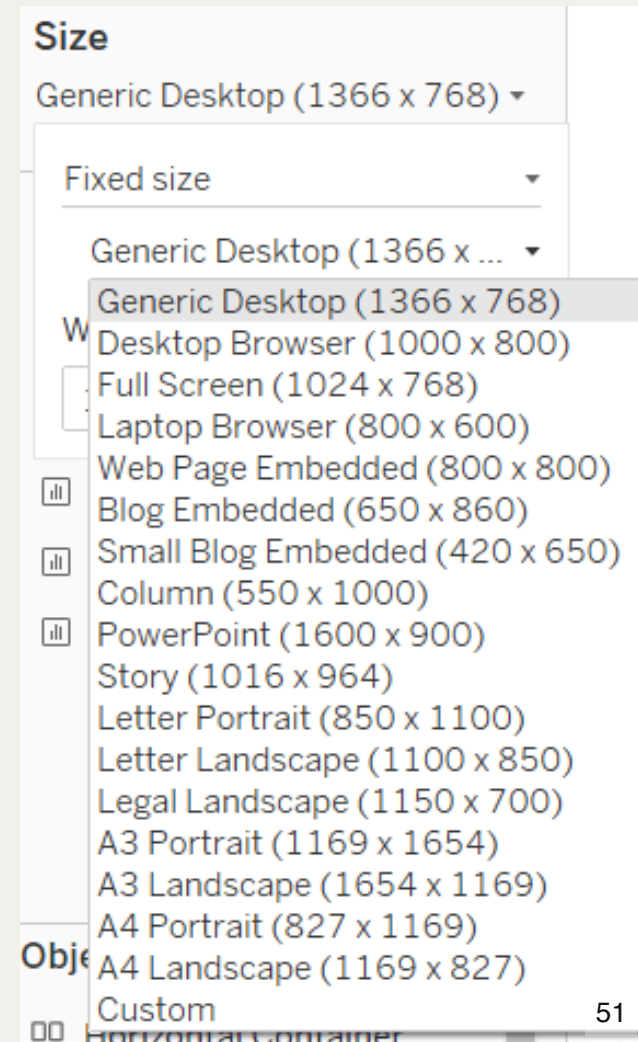
Now, you already have a number of worksheets, and we can organize them (or some of them) in a dashboard, which is more convenient for visualization!

Dashboard

Create a dashboard by clicking on the dashboard button at the bottom of your Tableau, and name your dashboard.



Then, customize the size of your dashboard here:



Dashboard

Press Shift on your keyboard and drag a **Vertical Container** to your dashboard.

Click the **Layout** tab and set the position of the vertical container to be fill your dashboard. **Make sure Floating is checked.**

In my case, I set my container location to be the followings:

Selected item

Vertical Container

- ☐ Show title
- ☒ Floating
- ☐ Control visibility using value

Position

x		y	
0	▲ ▼	0	▲ ▼

Size

w		h	
1,366	▲ ▼	768	▲ ▼

Dashboard

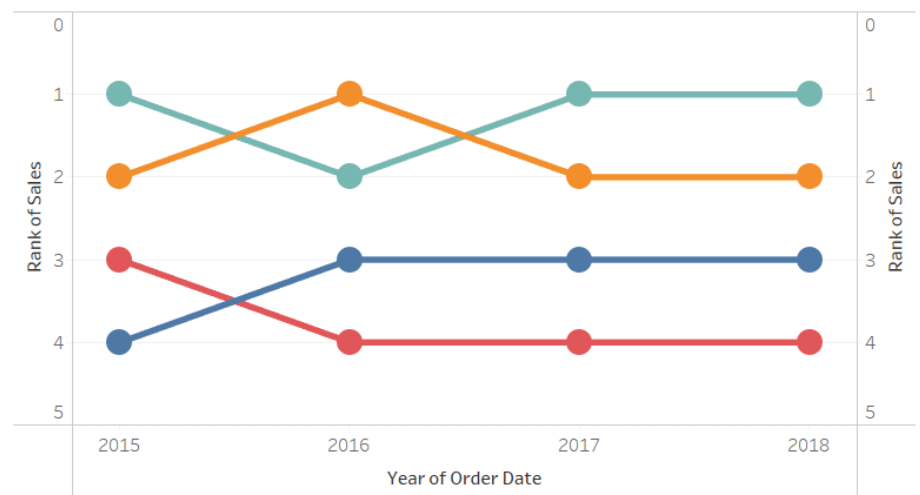
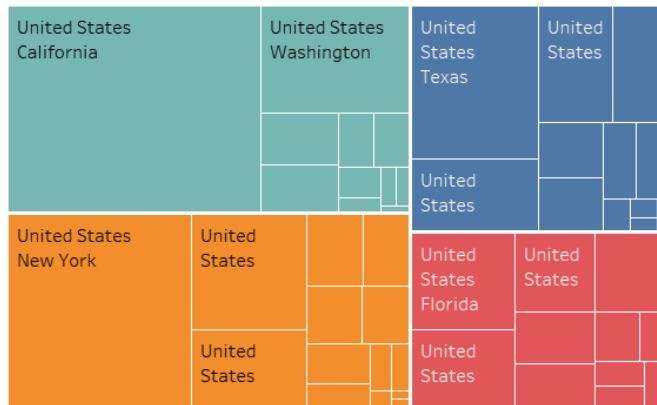
You can **Shift** + drag your worksheet to the dashboard.

If necessary, you can click the X on the top right of a container to delete it, or go to layout to change the position of the container.

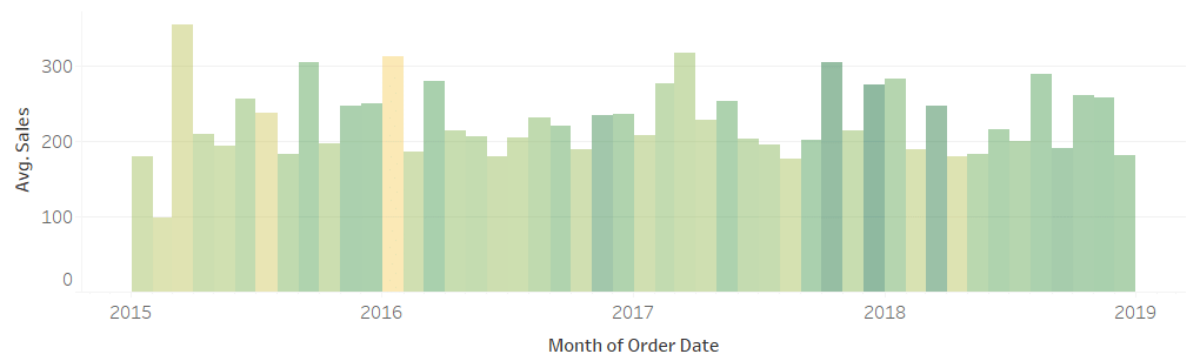
For more details, watch this [YouTube Video](#).

Try to create your own visualization!

My Dashboard



Region	Category / Sub-Category											
	Furnit..				Office Supplies				Techn..			
	C	F	T		E	F	L	P	S		P	
Central	●	●	●	●	●	●	●	●	●	●	●	●
East	●	●	●	●	●	●	●	●	●	●	●	●
South	●	●	●	●	●	●	●	●	●	●	●	●
West	●	●	●	●	●	●	●	●	●	●	●	●



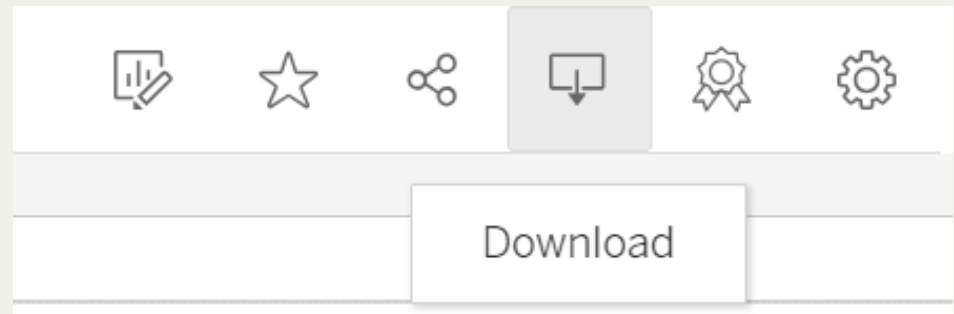
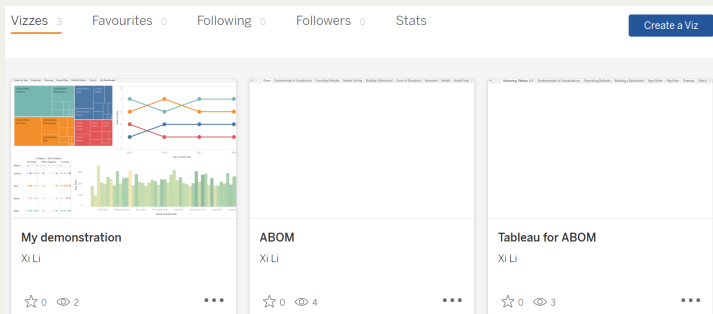
Saving your Tableau

Saving your Tableau

You can only save your Tableau visualization online.

Log in with your Tableau public account.

When you want to access the file, log in to your Tableau public and you can download it by clicking on your file name:



Map

Map

Download map data from course website or [here](#).

Import your data to Tableau; check the variables first.

Start with a new worksheet.

Drag **Country** to the drop field, you will get the following visualization:

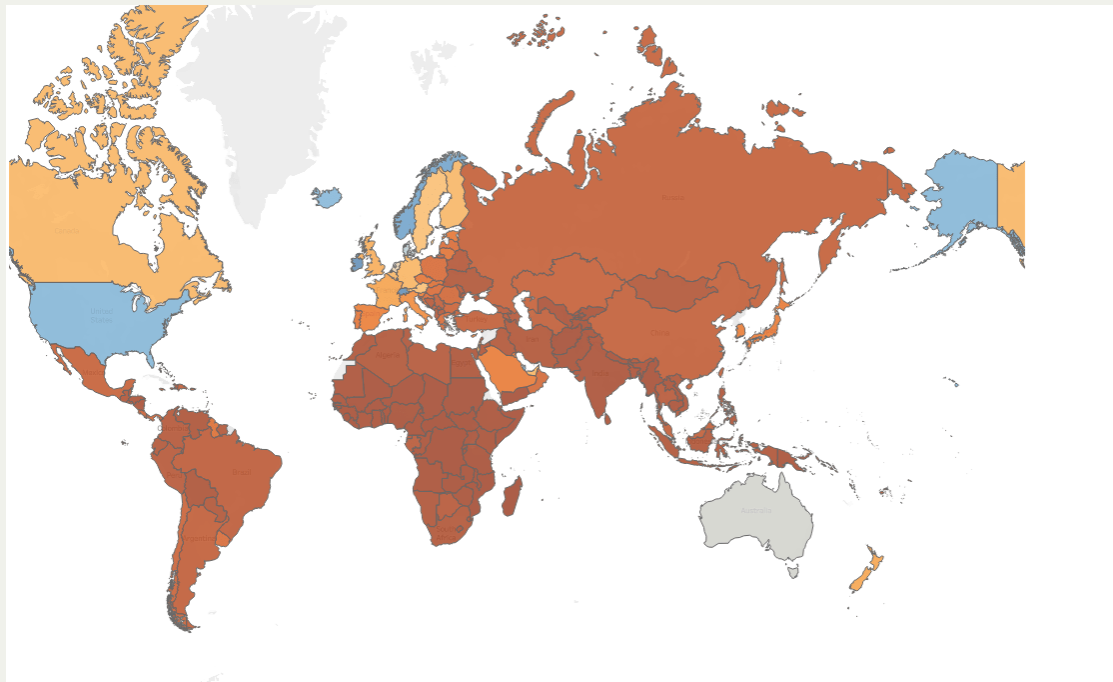


Map

Under Marks, change **Automatic** to **Map**.

Drag **GDP per capita** to **Color**.

Edit your colors if necessary. You get the following figure:



Calendar Chart

This is a calendar chart. It shows your monthly earning from your stock investment. Blue colors denote profit gain whereas red colors denote profit loss.

Date						
Sunday	Monday	Tuesday	Wednes..	Thursday	Friday	Saturday
1 120	2 -45	3 415	4 9	5 108	6 -220	7 -109
8 35	9 213	10 -16	11 21	12 75	13 90	14 66
15 -41	16 298	17 -18	18 25	19 12	20 70	21 34
22 151	23 -29	24 -85	25 102	26 157	27 313	28 34
29 -15	30 -172	31 89				

Calendar Chart

Download calendar data from course website or [here](#).

Import your data to Tableau; check the variables first.

Start with a new worksheet.

Date to **Columns**, and set its format to be **More (Weekday)**.

Date to **Rows**, and set its format to be **More (Week Number)**.

Date to **Text**, and set its format to be (the first) **Day**.

Adjust the size of your table.

Calendar Chart

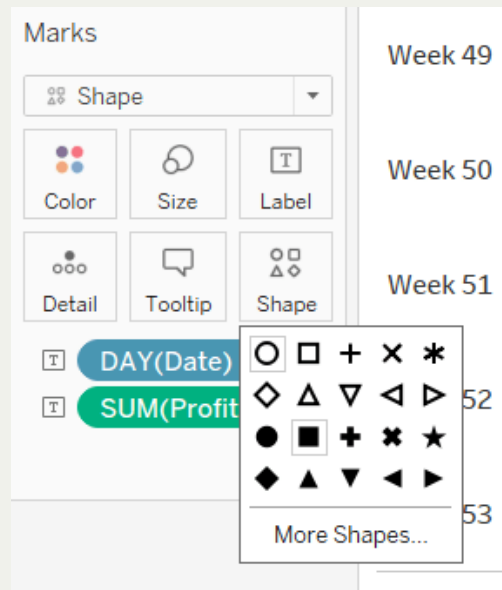
Profit to Text.

Click on **Text**, change Alignment to Center. Adjust the size and font of the text if necessary.

Calendar							
Week of ..	Date						
	Sunday	Monday	Tuesday	Wednes..	Thursday	Friday	Saturday
Week 49	1	2	3	4	5	6	7
	120	-45	415	9	108	-220	-109
Week 50	8	9	10	11	12	13	14
	35	213	-16	21	75	90	66
Week 51	15	16	17	18	19	20	21
	-41	298	-18	25	12	70	34
Week 52	22	23	24	25	26	27	28
	151	-29	-85	102	157	313	34
Week 53	29	30	31				
	-15	-172	89				

Calendar Chart

Under Marks, choose **Shape**. Then click on **Shape** and select **solid square** (see figure below).

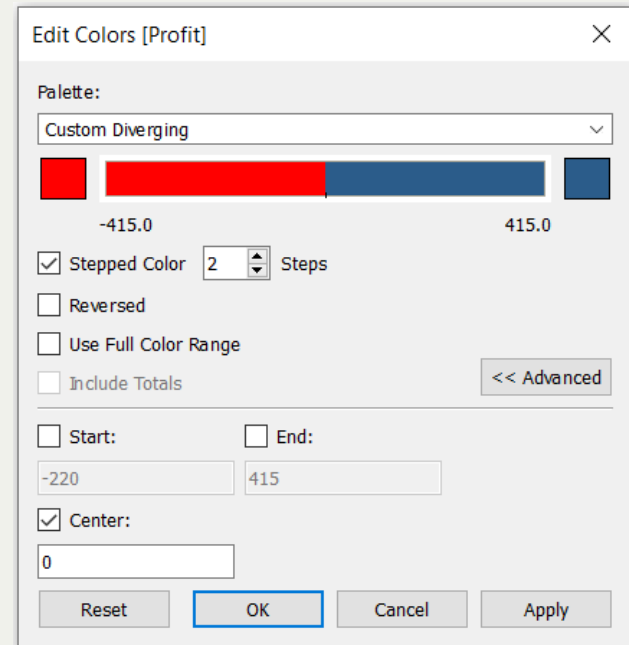


Calendar Chart

Profit to Color.

Edit your colors to only show 2 step colors, click Advanced and edit the color range to make color center to be 0.

Edit your two colors if necessary (see figure below).



Calendar Chart

Right click on **Week 49** and uncheck show **header**.
Adjust the size of your box; you are done!

Donut Chart

Donut Chart

Download car sales data from course website or [here](#).

Import your data to Tableau; check the variables first.

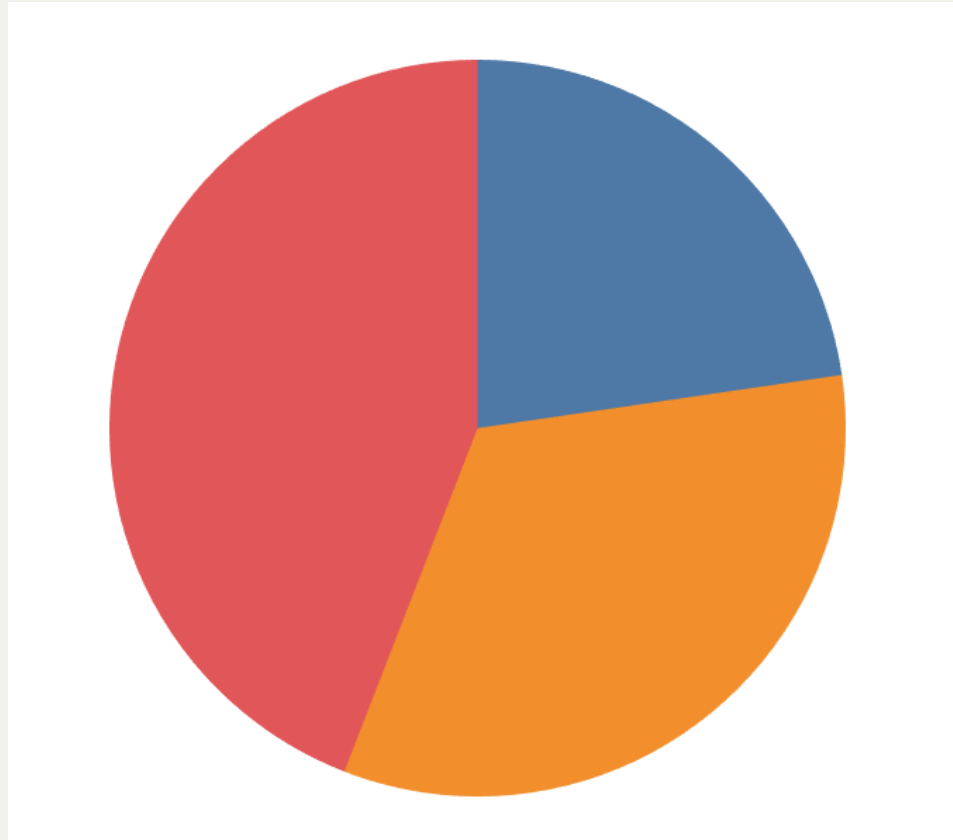
Start with a new worksheet.

Under [Marks](#), Choose [Pie](#).

[Brand](#) to [Color](#), and [Sales](#) to [Angle](#).

Choose Entire View and Adjust Chart Size.

Donut Chart



Donut Chart

Manually type “0” in [Rows](#).

Again, manually type “0” in [Rows](#).

You will get two charts, up and down.

Choose [Dual Axis](#) and [Synchronize Axis](#).

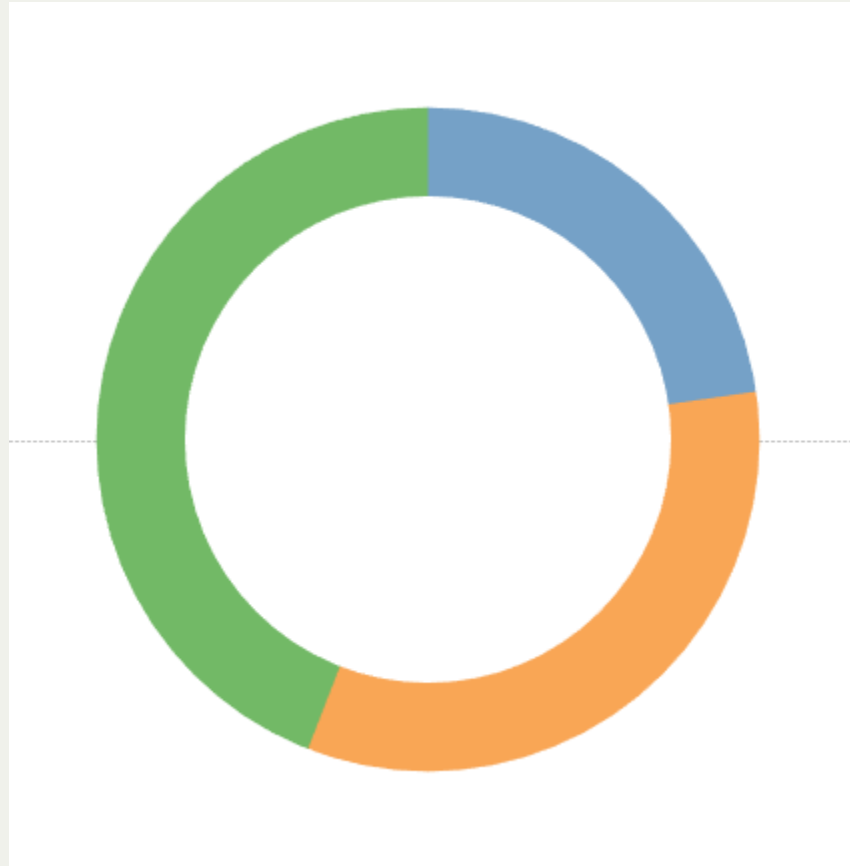
Remove the Color of the second Pie Chart.

Change the Color of the second Pie Chart to White.

Adjust the Size of the second Pie Chart.

Adjust the Size of the first Pie Chart.

Donut Chart



Scatter Plot

Scatter Plot

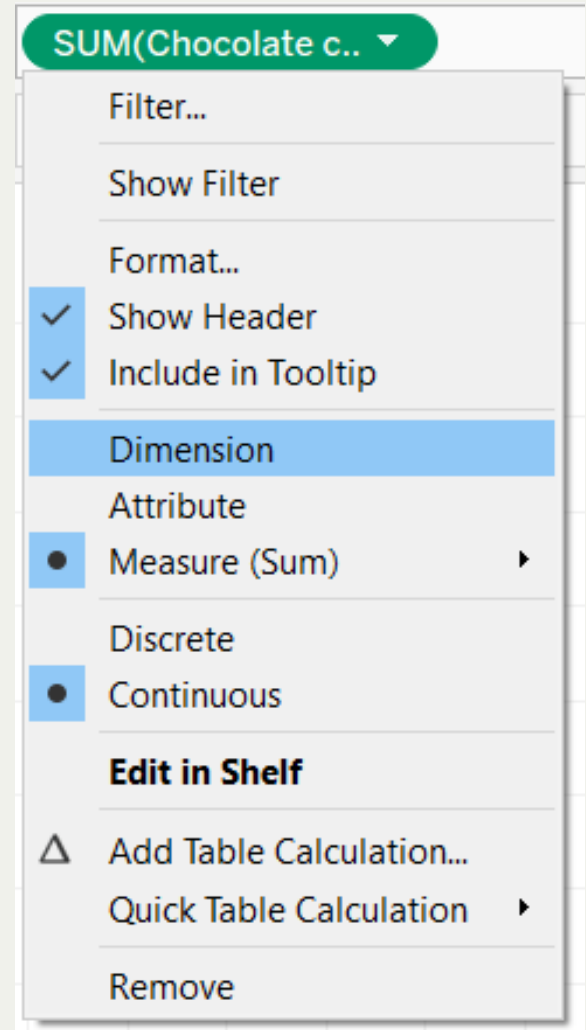
Download chocolate data from course website or [here](#).

Import your data to Tableau; check the variables first.

Start with a new worksheet.

[Chocolate Consumption](#) to [Columns](#),
[Nobel Laureate](#) to [Rows](#).

Change both variables from Measure to Dimension (see right figure).



Scatter Plot

Under Marks, select the format to be **Circle**.

Drag **Nobel Laureate** to **Size**.

Drag **Region** to **Color**.

Drag **Country** to **Detail**.

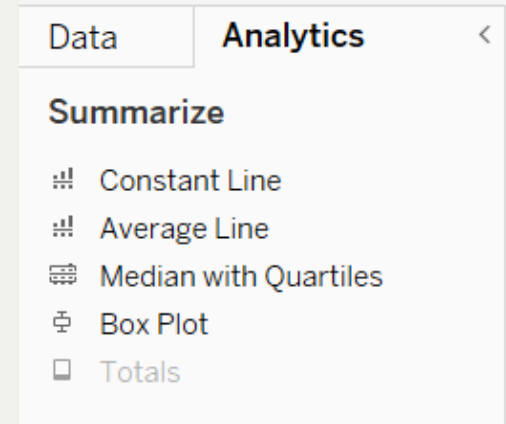
Adjust the size of circles if necessary.

Regression Line

Next, let us add a regression line to the figure!

Select the [Analytics Panel](#) as shown in the right figure.

Drag [Trend Line](#) to the drop field, and select Linear. Now, you have 4 regression lines for the 4 continents.



Regression Line

Click one of the lines, choose [Edit](#), and uncheck [Region](#).

Trend Lines Options

Model Type

- ☒ Linear
- ☐ Logarithmic
- ☐ Exponential
- ☐ Power
- ☐ Polynomial Degree: 3

Factors

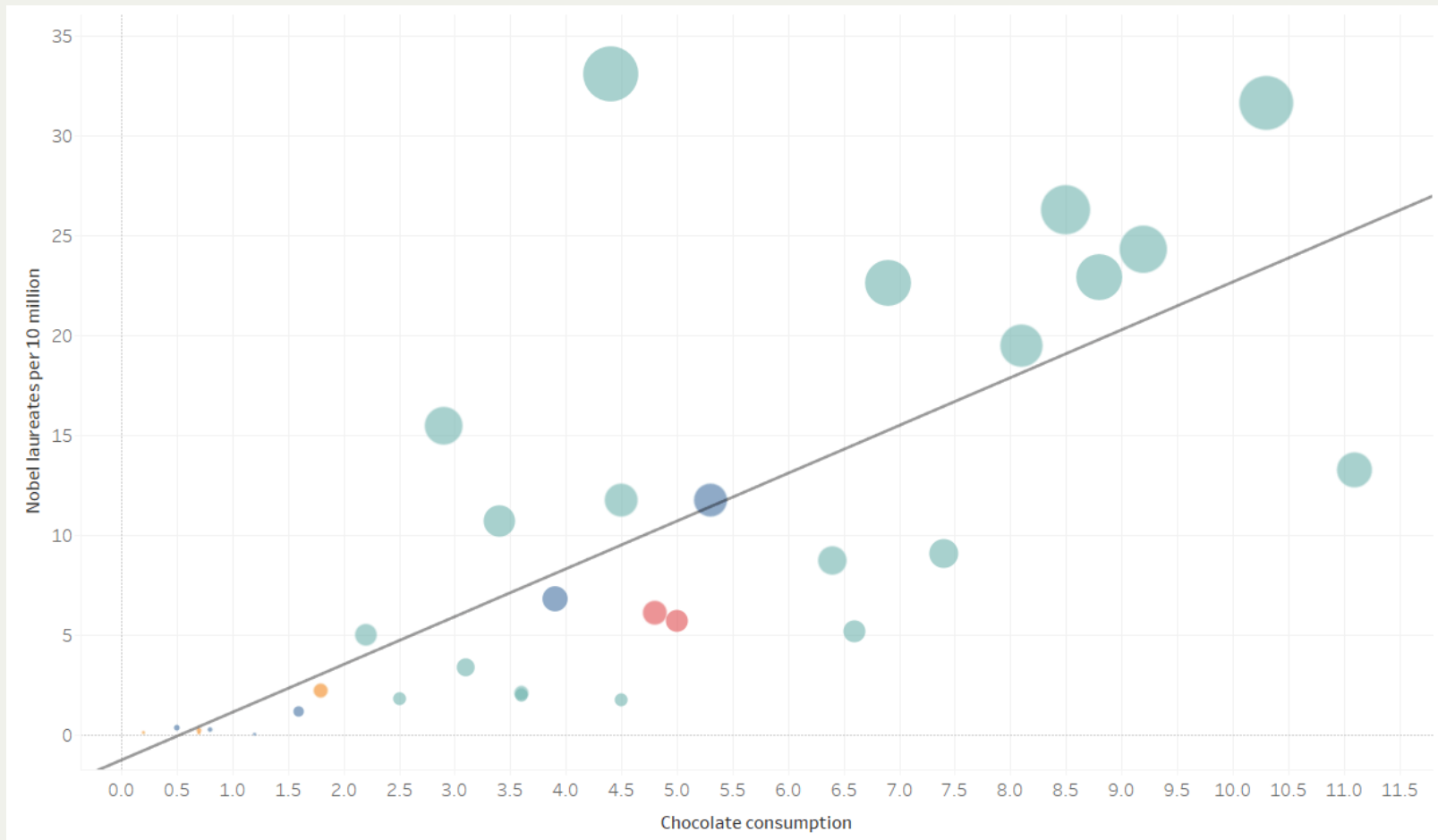
Build separate trend lines based on the following dimensions:

- ☒ Region

Options

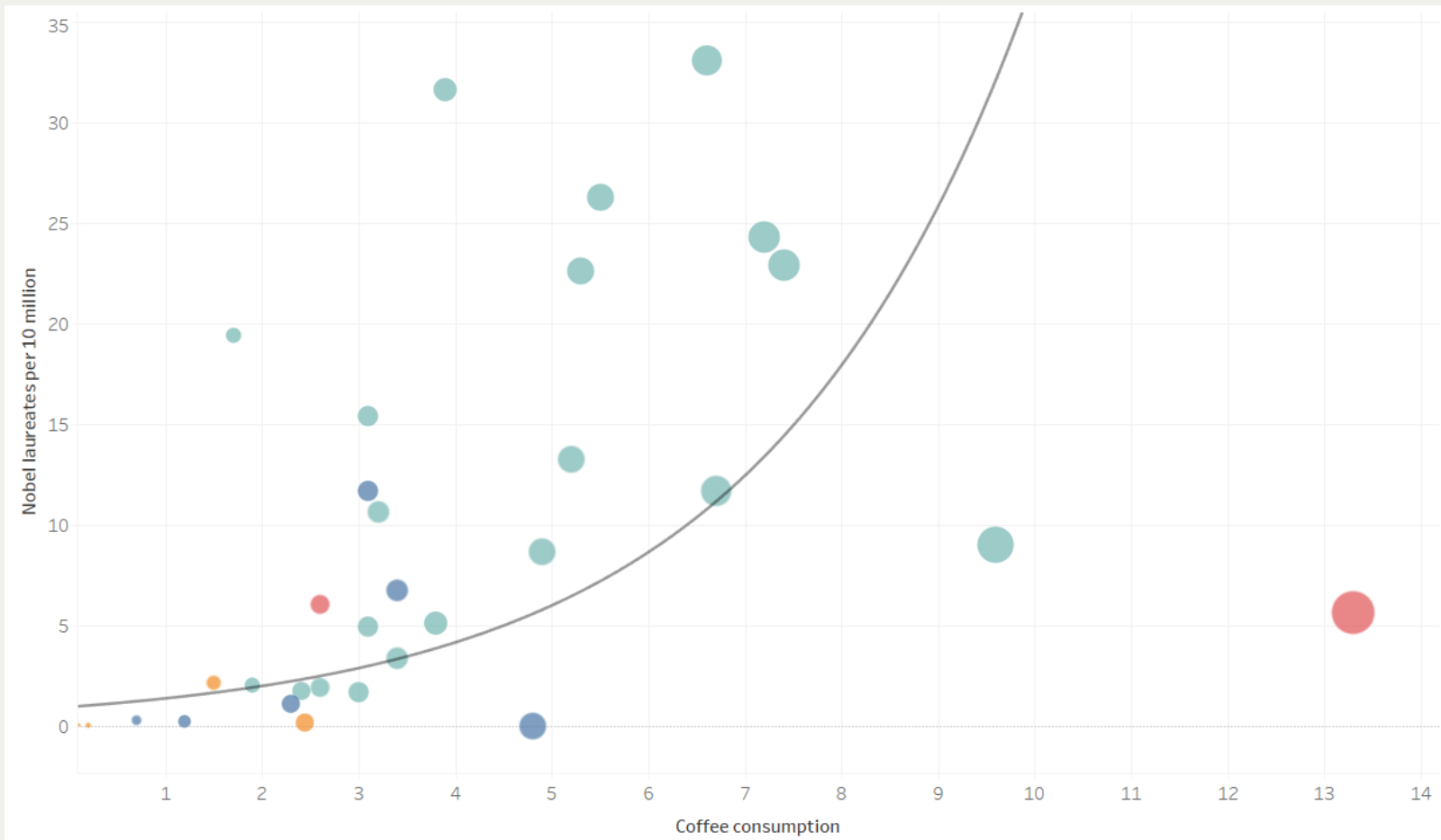
- ☒ Show tooltips
- ☐ Show confidence bands
- ☒ Allow a trend line per color
- ☒ Show recalculated line for highlighted or selected data points
- ☐ Force y-intercept to zero

OK



$$y = -1.30 + 2.39 \times x, \quad p < 0.0001$$

Exercise: Show the relationship between coffee consumption and Nobel laureates



Thank you!