

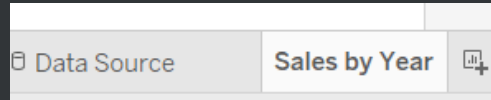
Visualization with Tableau

Importing Data

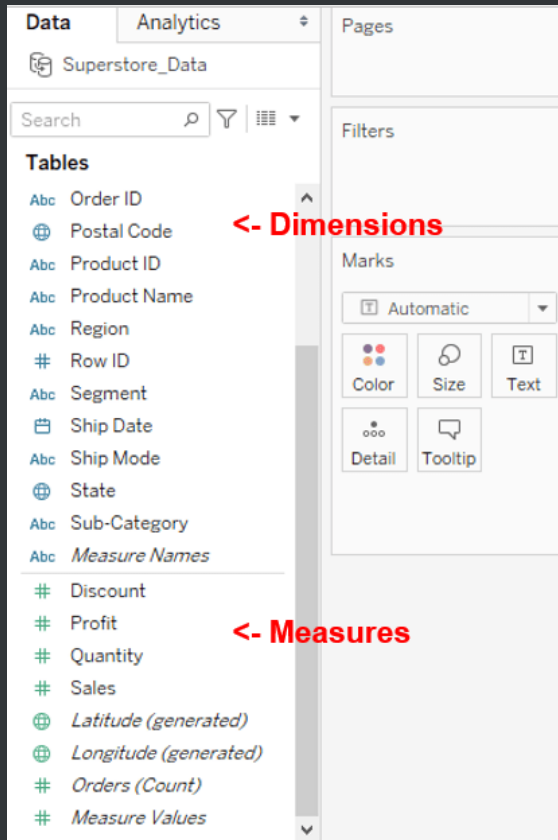
Download “Superstore Data” from course website or [here](#).
You can choose a spreadsheet as your data, e.g., “Orders.”
Once the dataset is available, check the data types first.

Creating a Worksheet

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



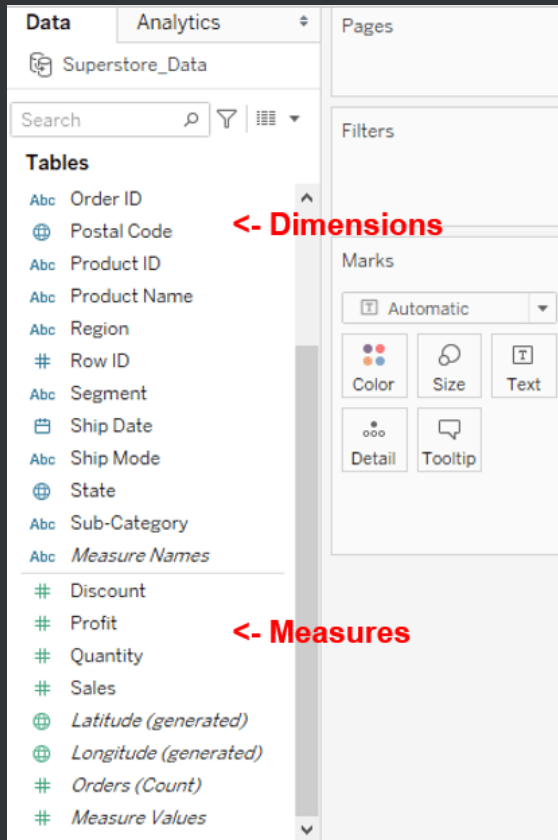
Dimensions vs. Measures



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

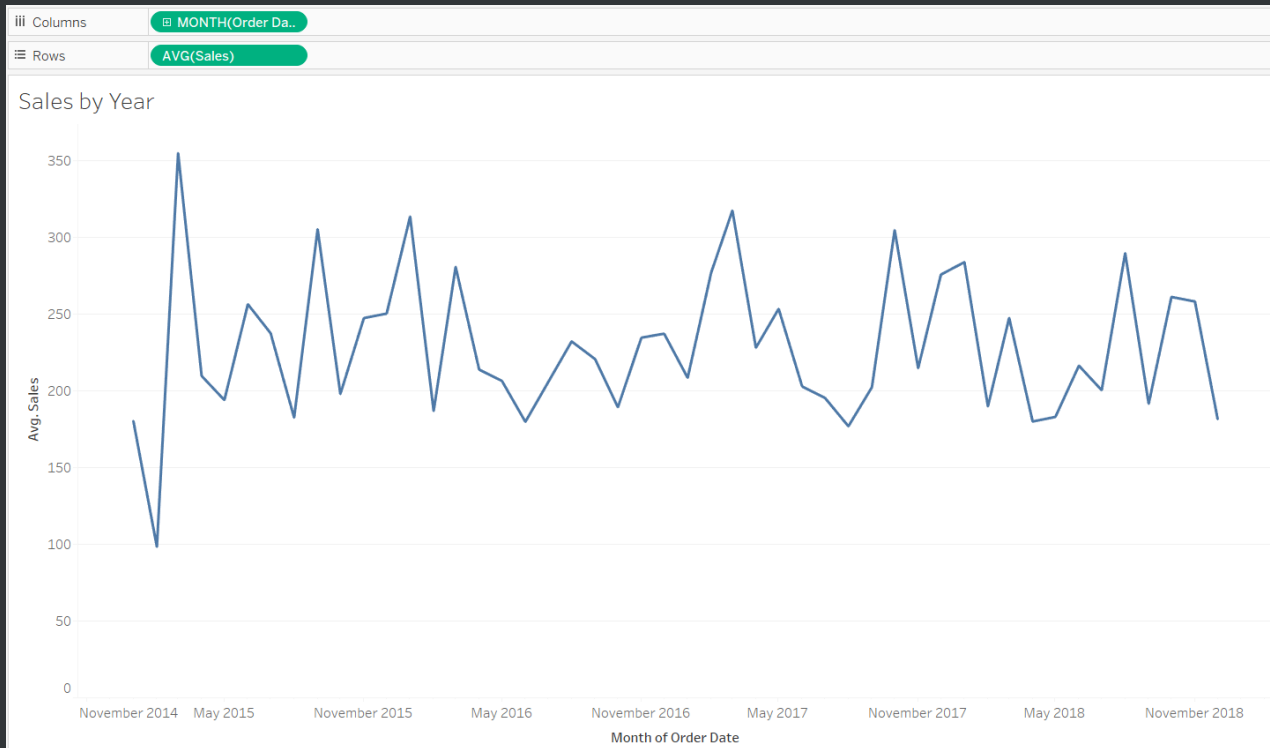
Draw **Order Data** to **Columns** and **Sales** to **Rows**.

You get your first Tableau visualization now!

iii Columns	YEAR(Order Date)
☰ Rows	SUM(Sales)

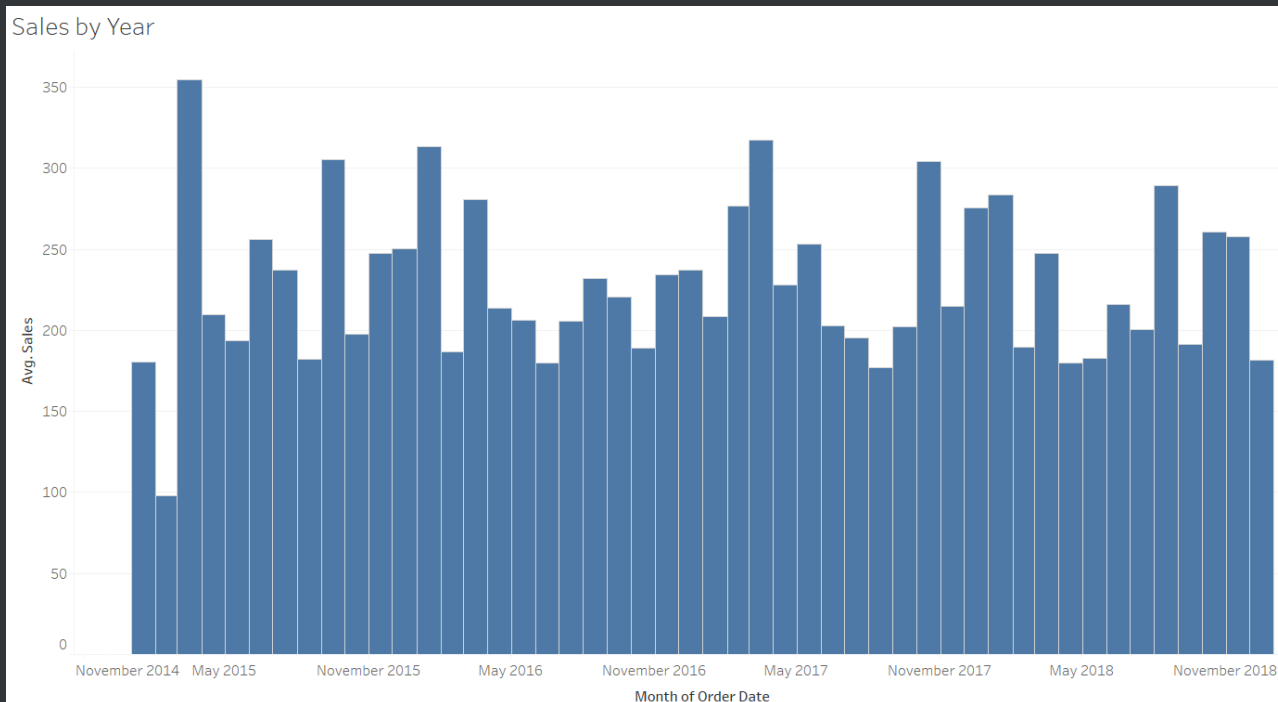
Lines

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



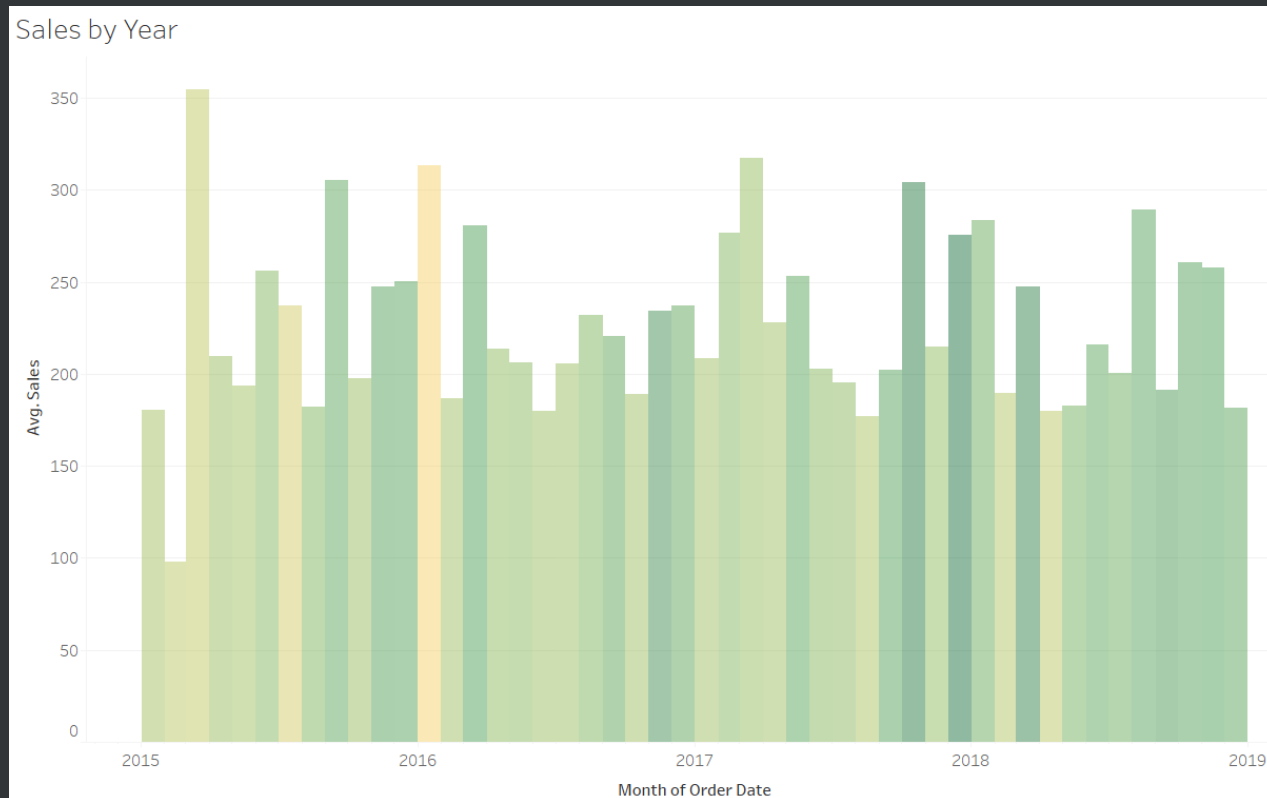
Bars

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

Heatmap

Create a new worksheet called “Heatmap.”

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

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

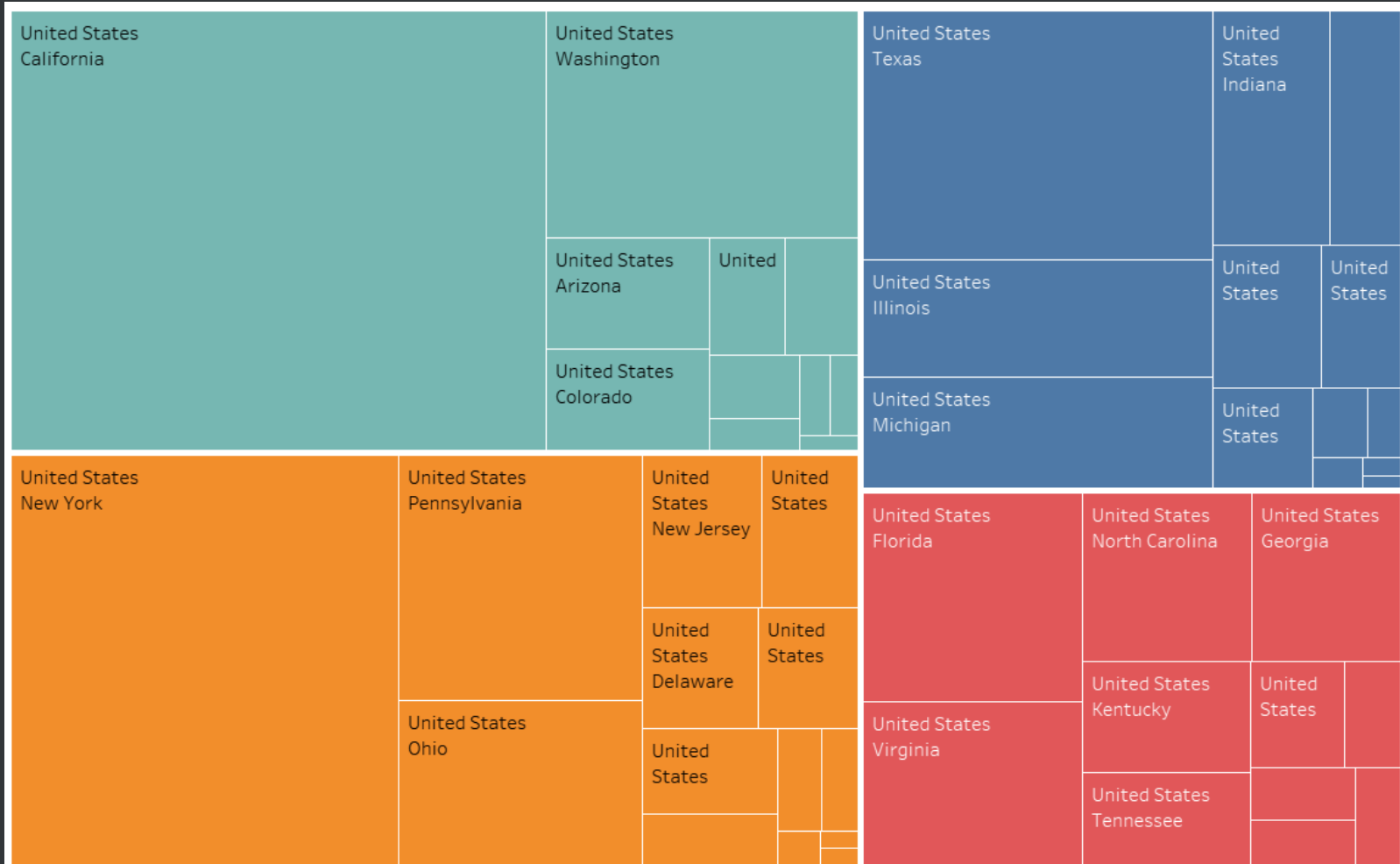
Click the dropdown menu on **Marks** and select **Square**.

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

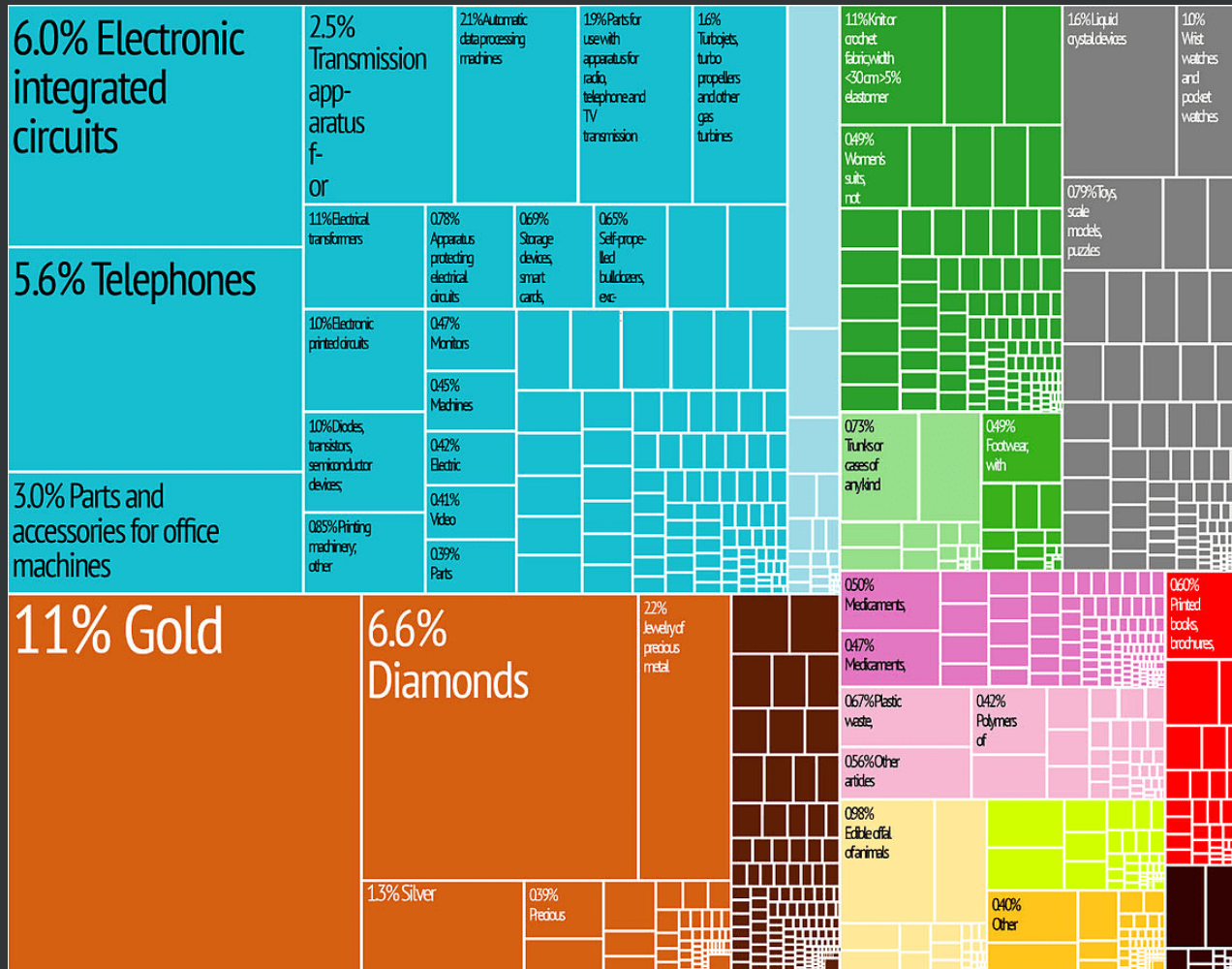
Click on **Size** and **Color** to customize your square size and your color.

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**.

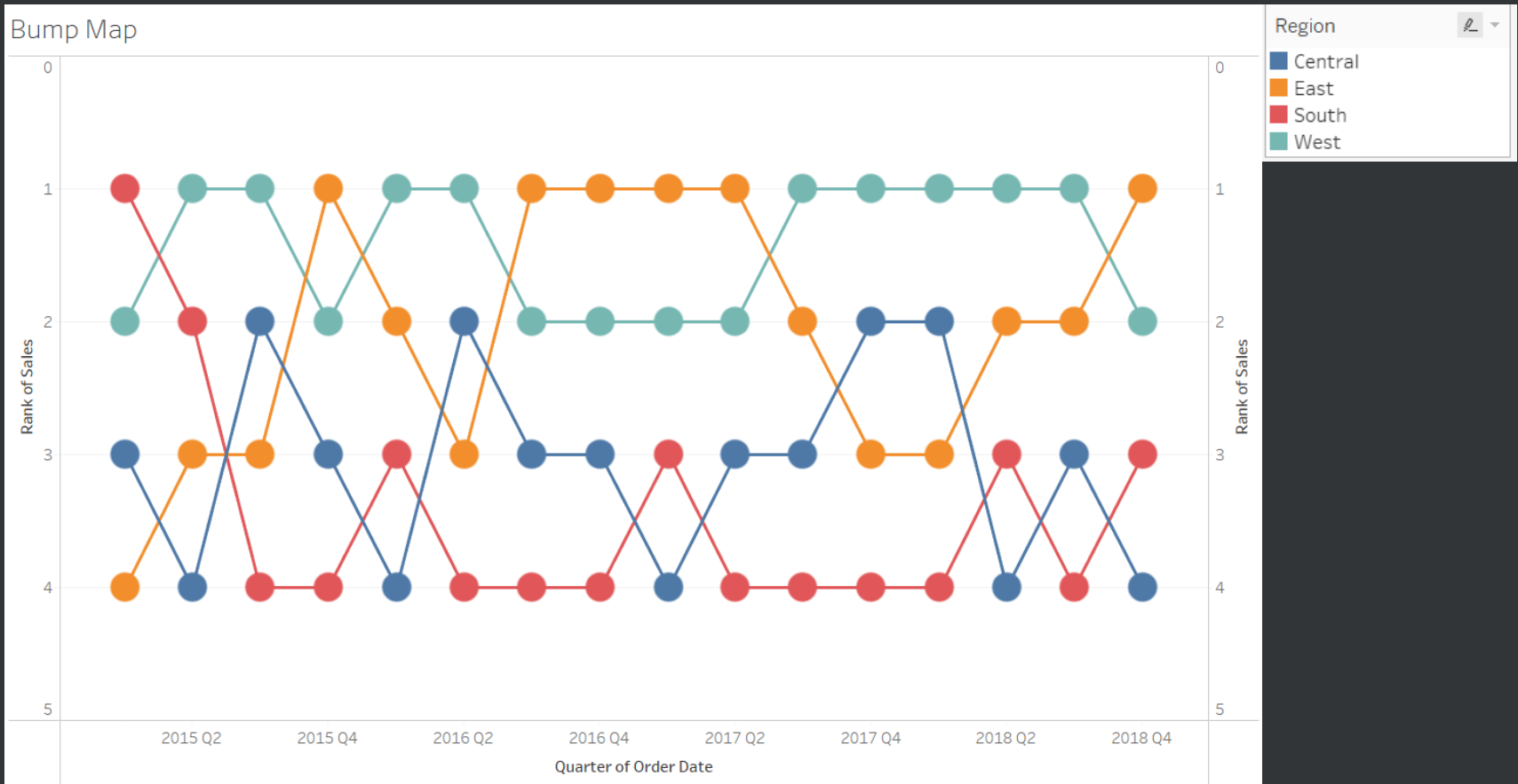
On the right, click **Show Me**, and select the **treemap icon**:



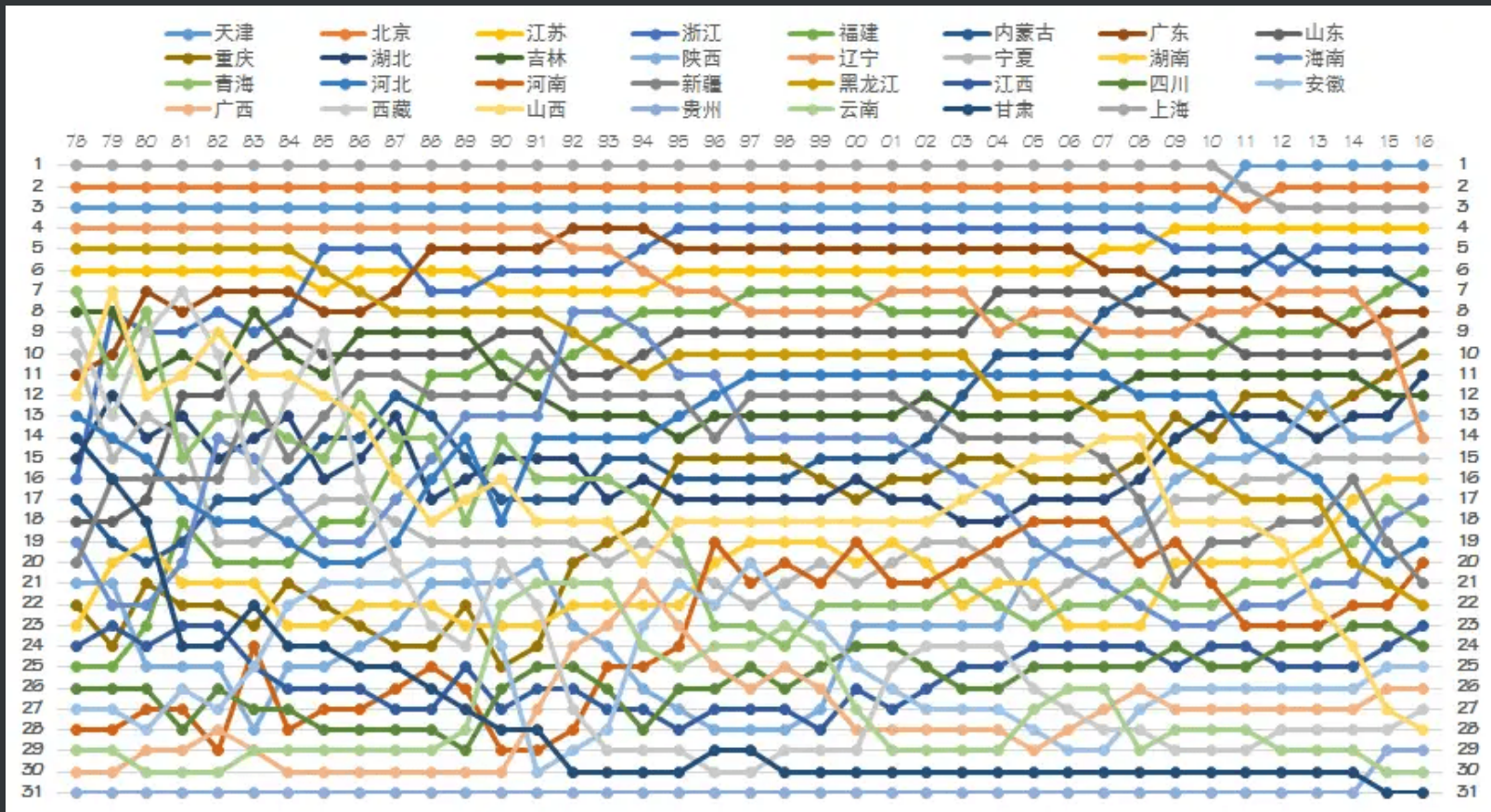
Drag **Region** to **Color**, and you are done!

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”).

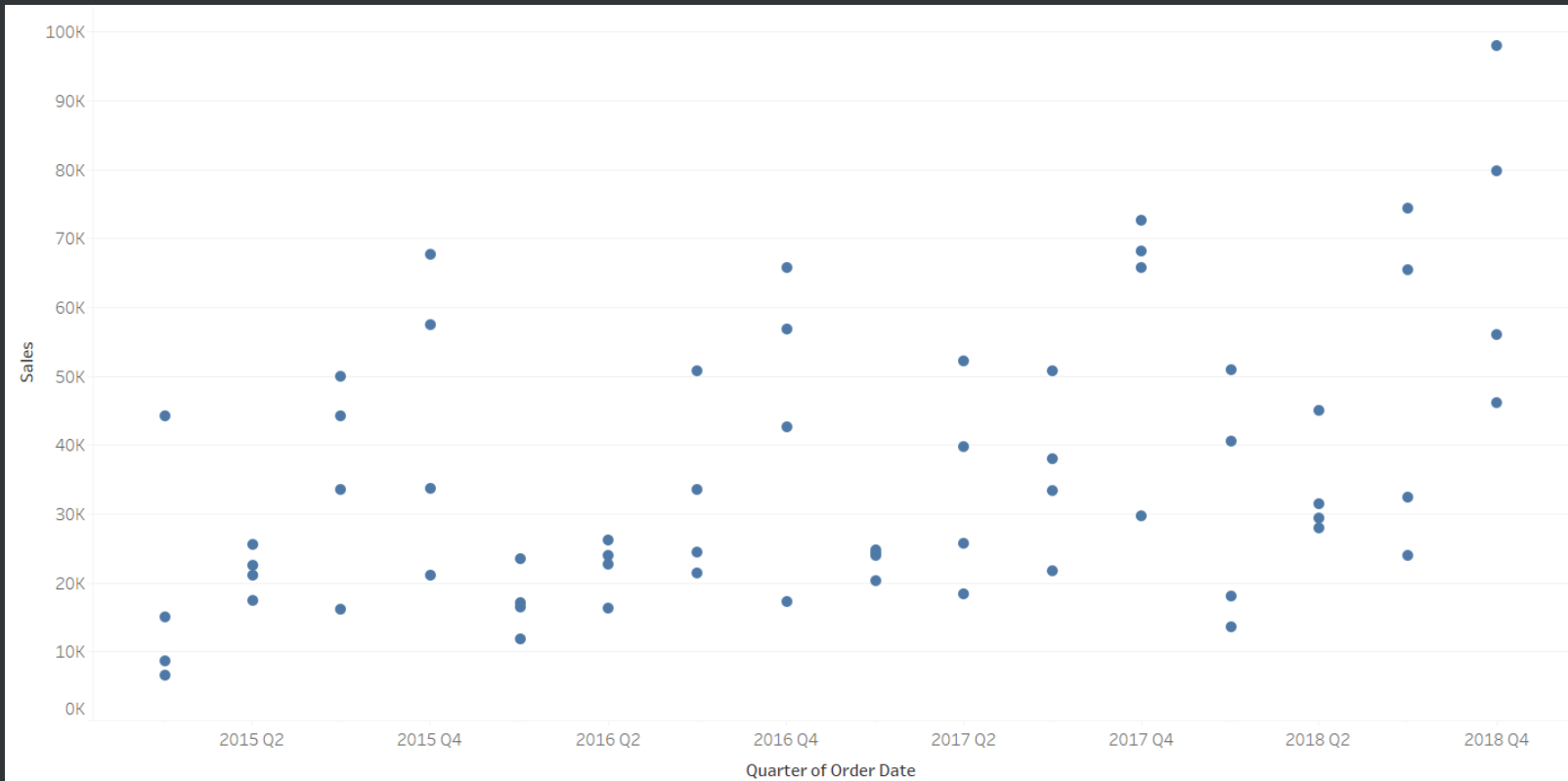
Order Date to Columns and Sales to Rows.

Change Order Date format from Year to Quarter Year.

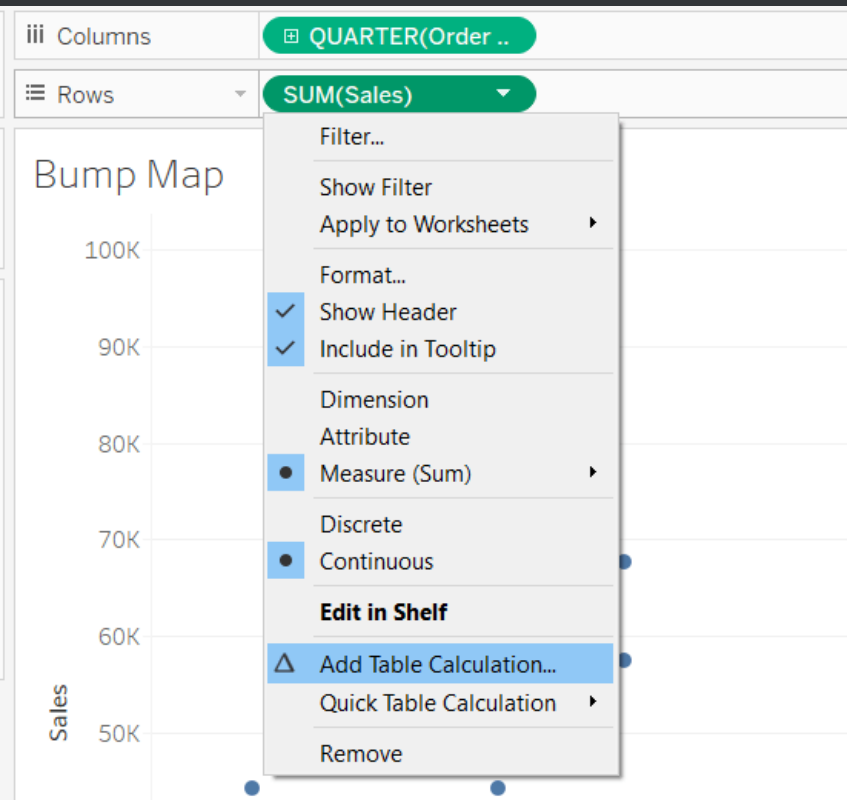
Region to Detail under Marks.

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

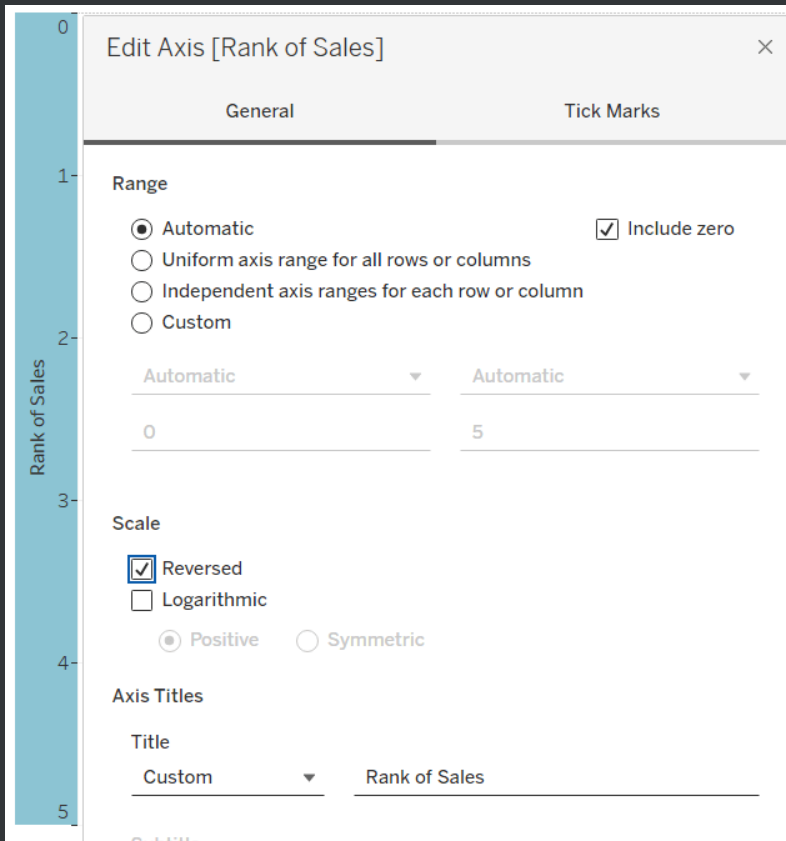
Quarter of Order Date

Region

Show calculation assistance

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

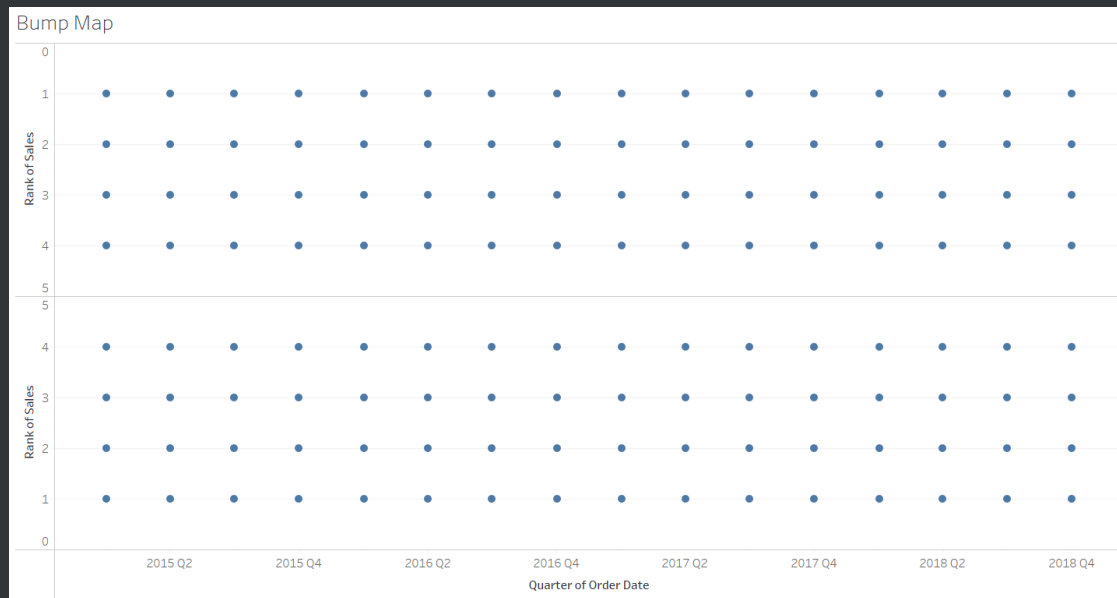
Bump Map



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

Bump Map

Press **Control** 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**.

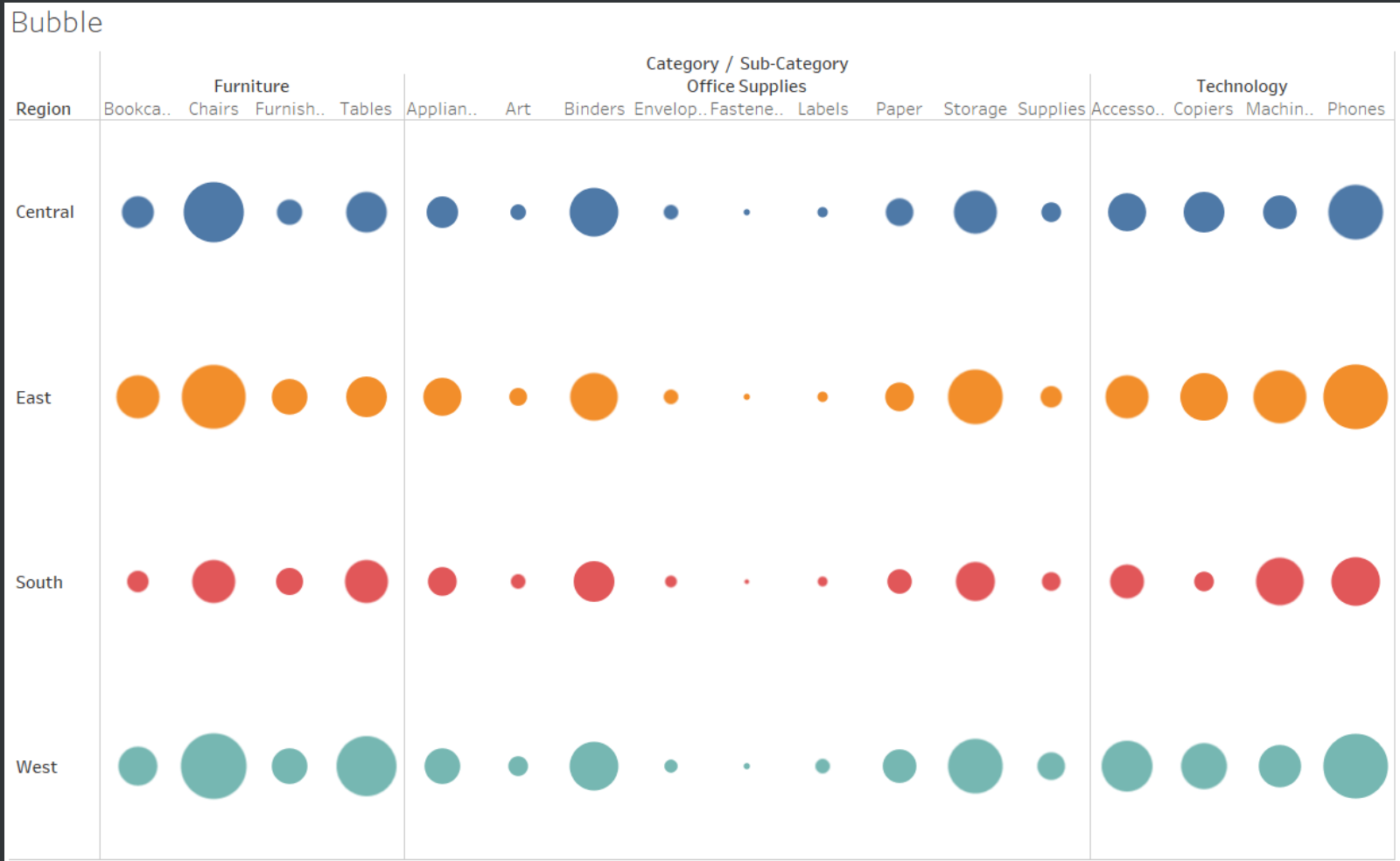
Drag **Region** to **Color** under Marks for both figures.

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 Matrix

Start with a new worksheet.

Region to **Rows**; **Category** and **Subcategory** to **Columns**.

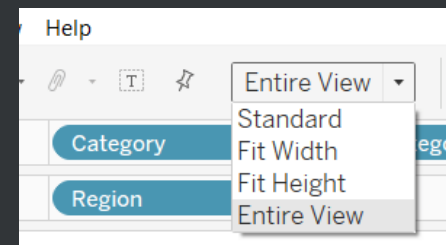
Set the table format to **Circle**.

Sales to **Size** (of the circles).

Region to **Color** (of the circles).

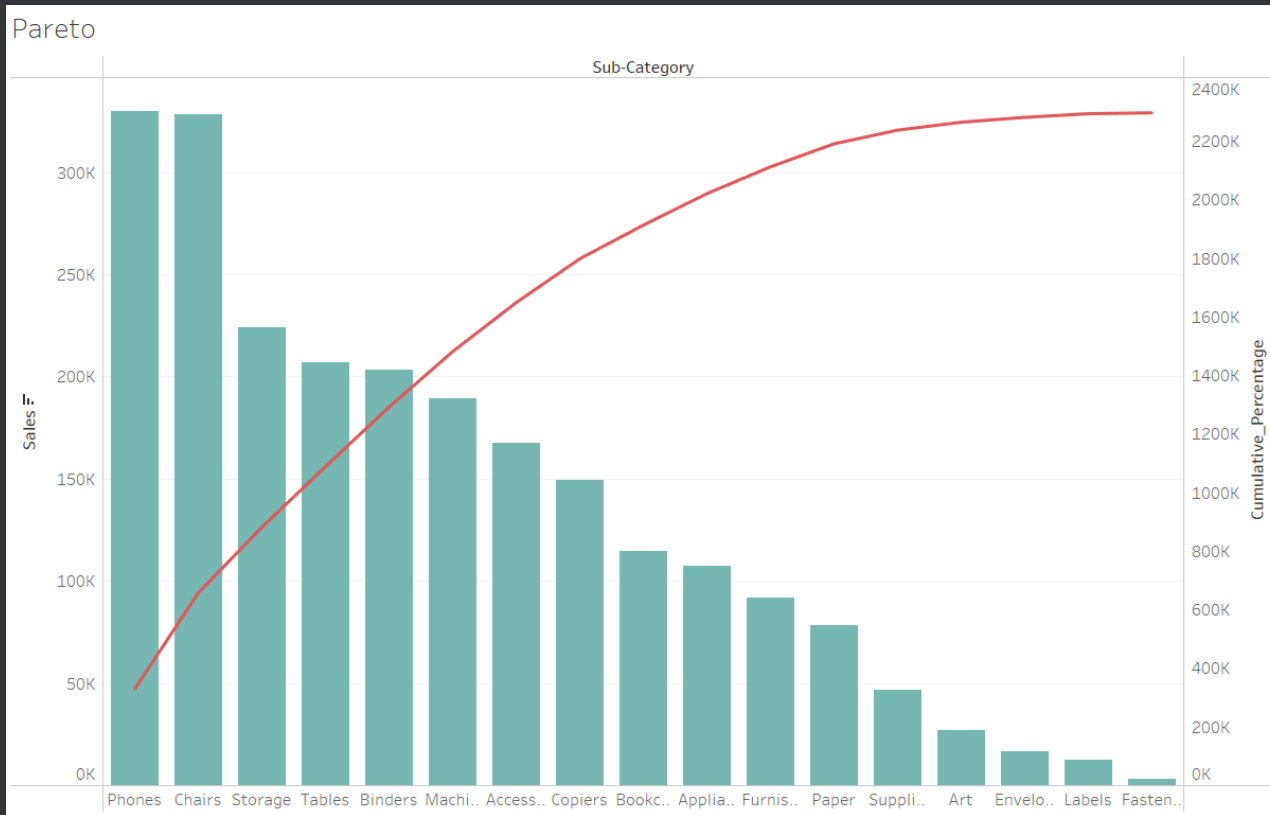
Adjust the size and transparency of your bubbles.

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



Pareto Chart

This is a Pareto Chart



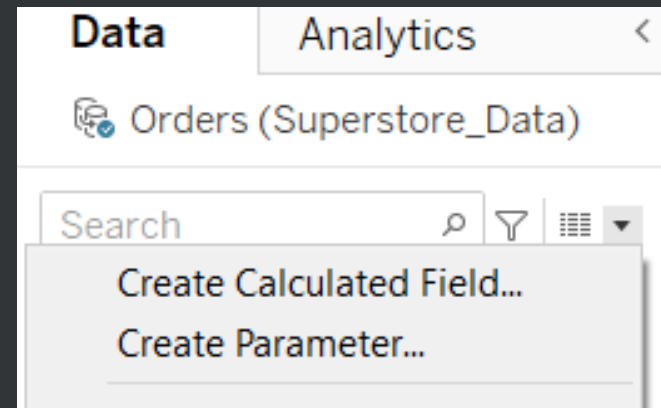
Pareto Chart

Start with a new worksheet.

Subcategory to **Columns** and **Sales** to **Rows**.

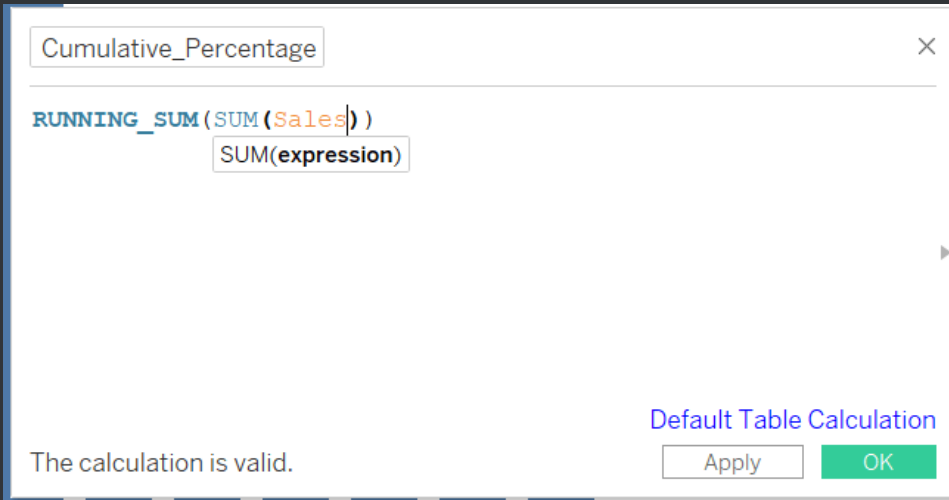
Rank the bars based on sales by clicking on this: 

Click here to create calculated field:



Pareto Chart

Create the following new variable:



The screenshot shows a dialog box titled "Cumulative_Percentage" with a close button (X) in the top right corner. The main text area contains the formula `RUNNING_SUM(SUM(Sales))`. A small tooltip box is positioned over the `SUM(Sales)` part of the formula, displaying `SUM(expression)`. At the bottom left, the text "The calculation is valid." is displayed. At the bottom right, there is a link "Default Table Calculation" and two buttons: "Apply" and "OK".

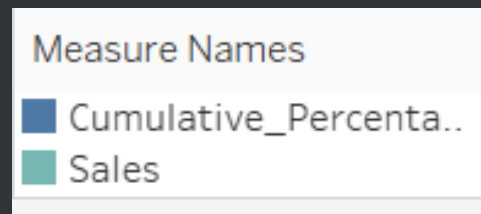
Pareto Chart

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

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

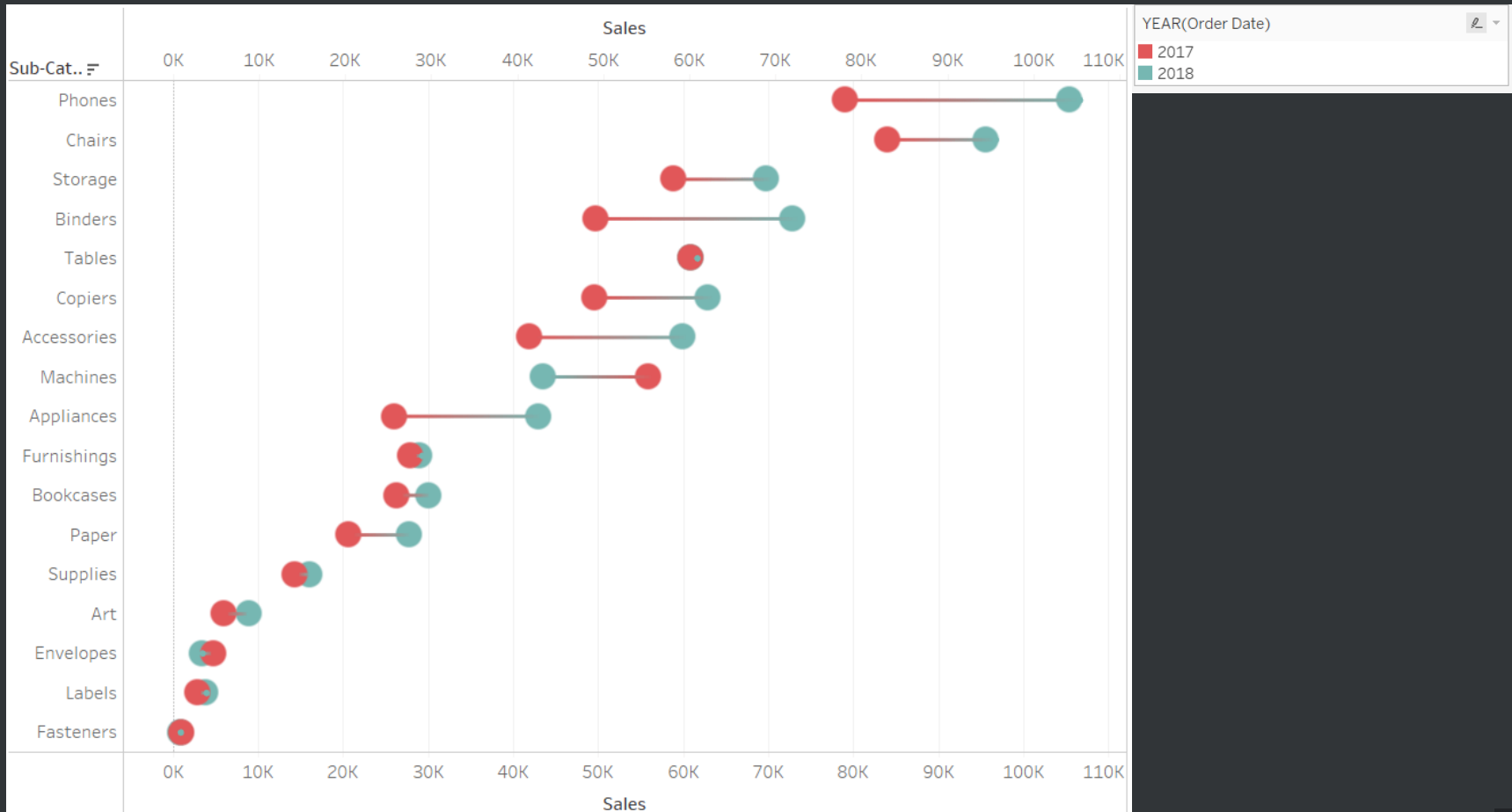
Set the format of the first figure to be **Bar**, and the second figure to be **Line**.

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

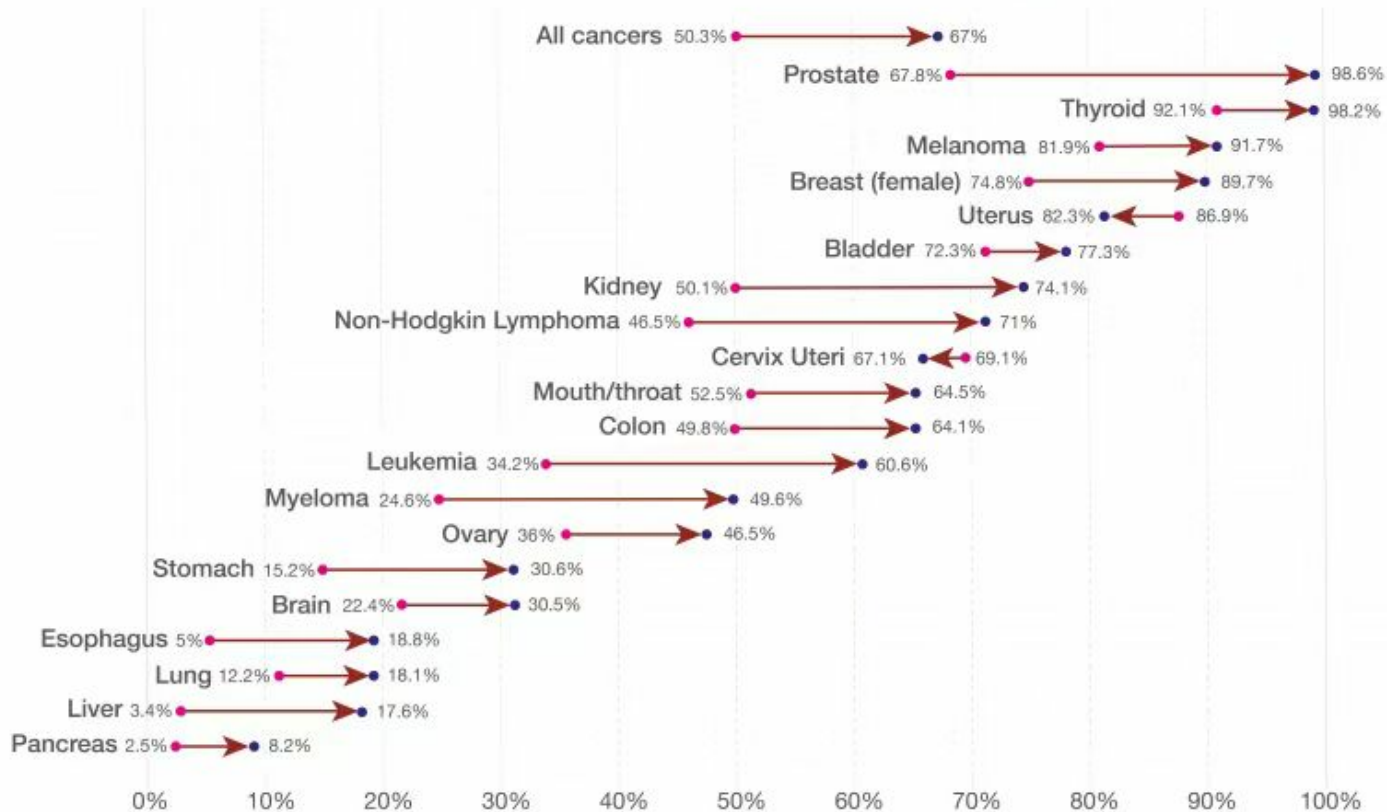
This is a dumbbell chart showing how sales change from 2017 to 2018.



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.



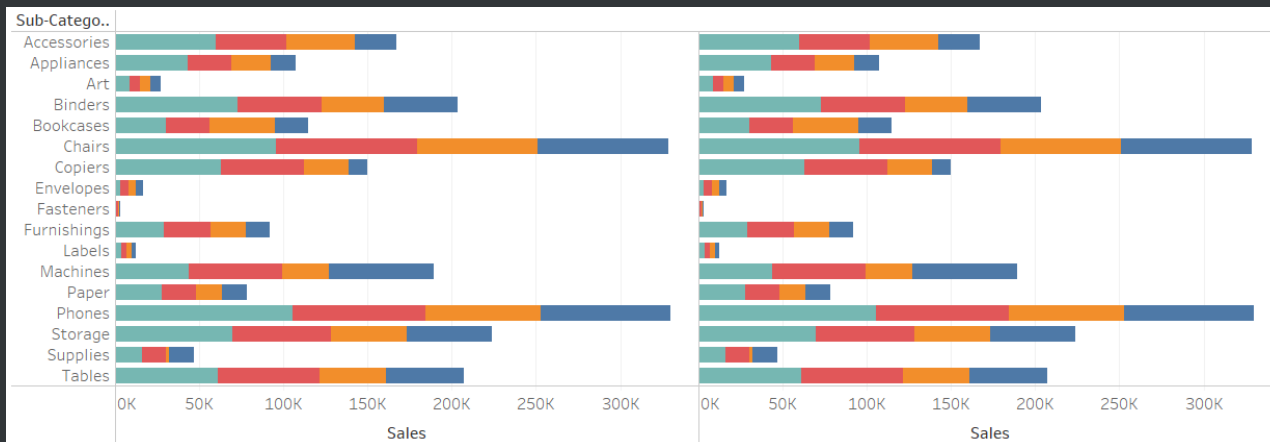
Dumbbell Chart

Start with a new worksheet.

Subcategory to Rows; Sales to Columns.

Order Date (Year) to Color.

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

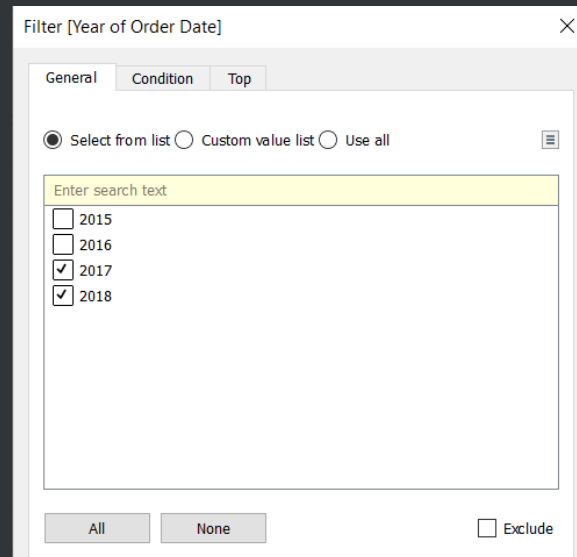
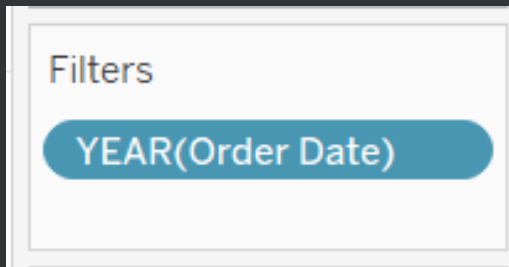


Dumbbell Chart

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.

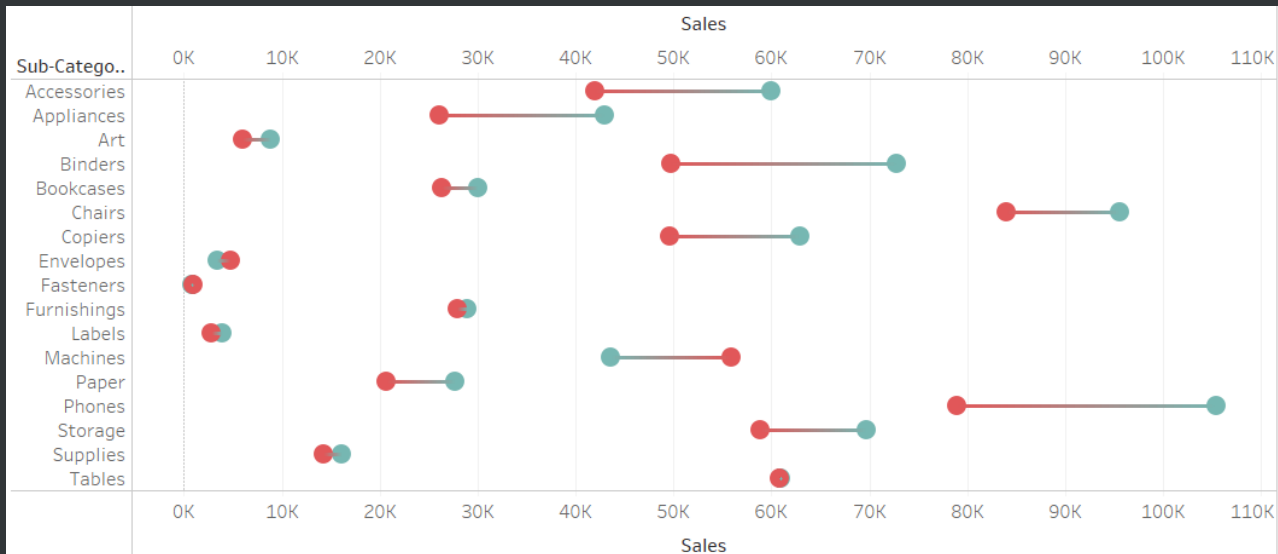


Dumbbell Chart


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

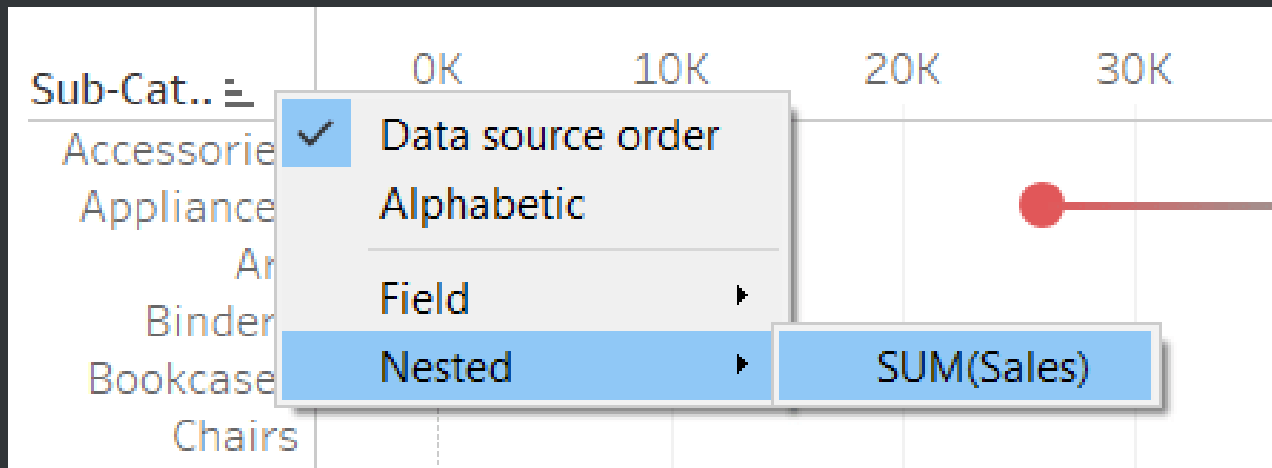
Drag **Order Date (the first "Year")** to **Path**. Note that the default format is Quarter so you need to change it to year.

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!



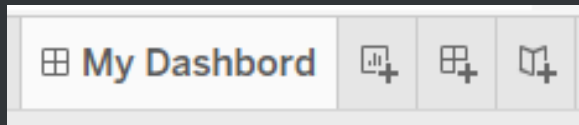
Dashboard

Dashboard

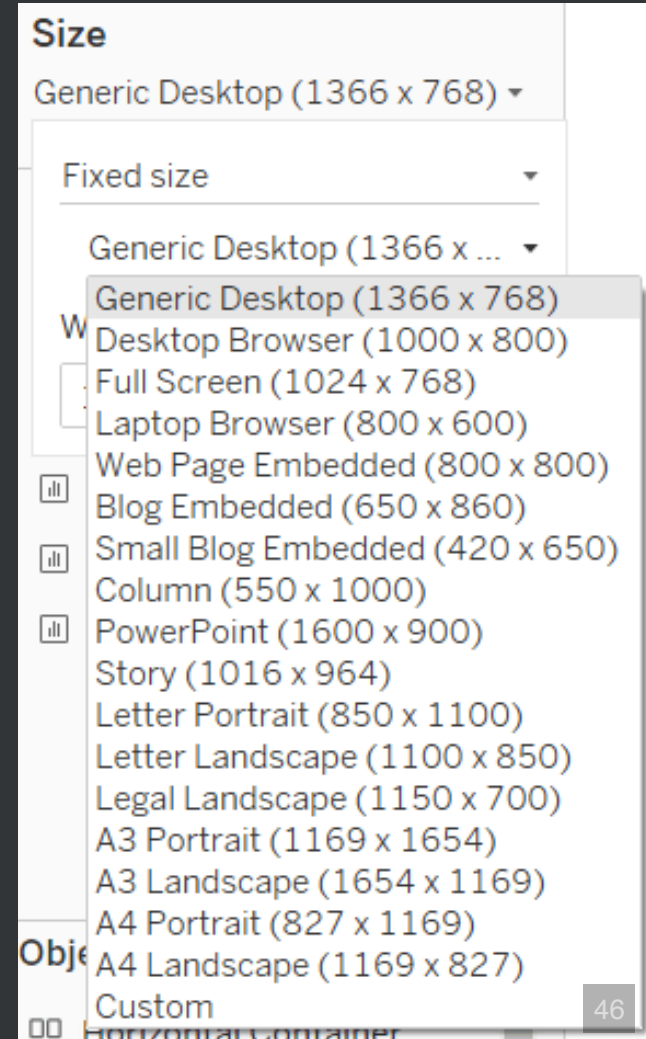
Now, you already have a number of worksheets, and we can organize them (or some of them) in a dashboard, which is more convenient for visualization!

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

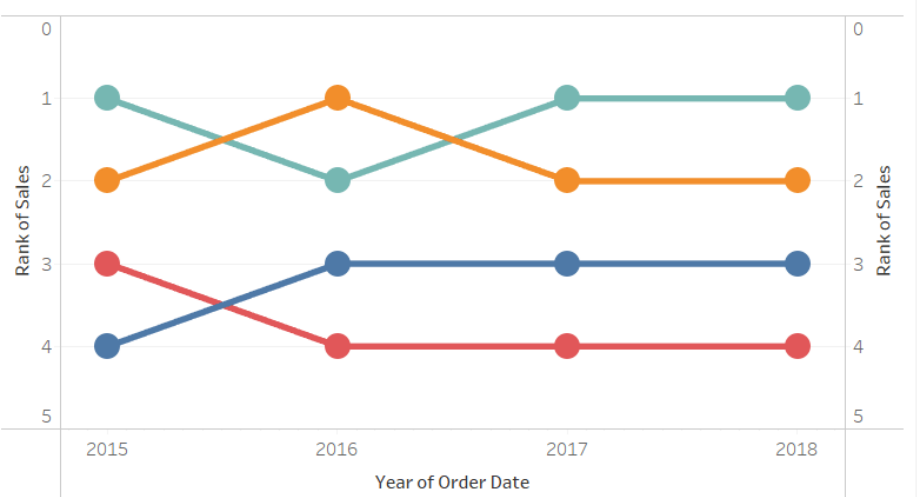
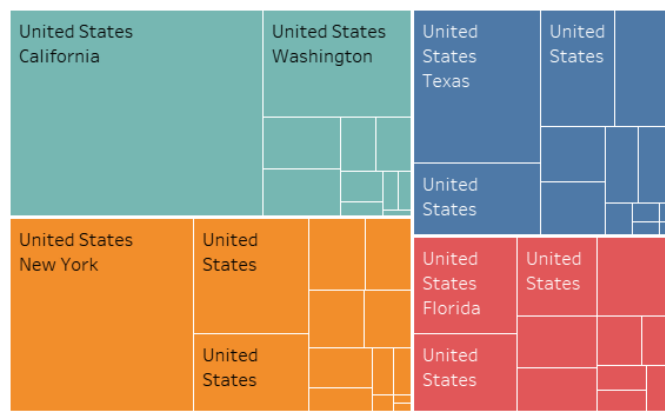
You can **Shift** + drag your worksheet to the dashboard.

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.

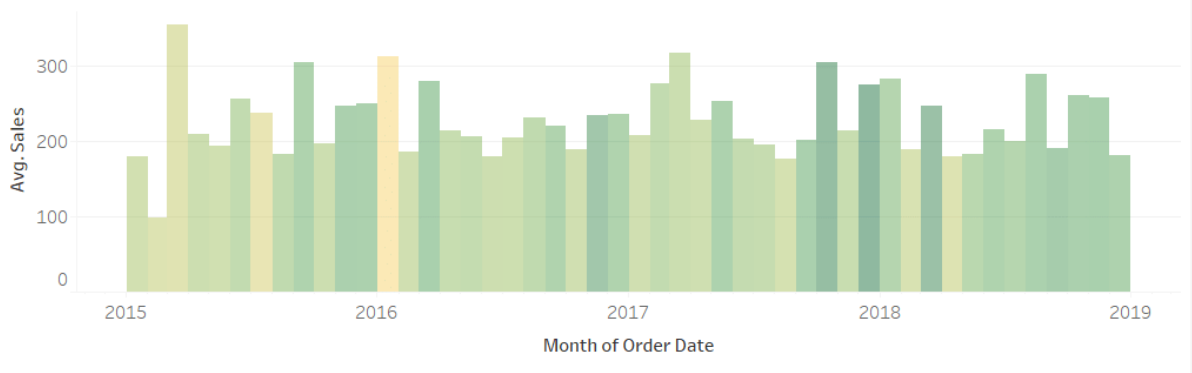
For more details, watch this [YouTube Video](#).

Try to create your own visualization!

My Dashboard



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



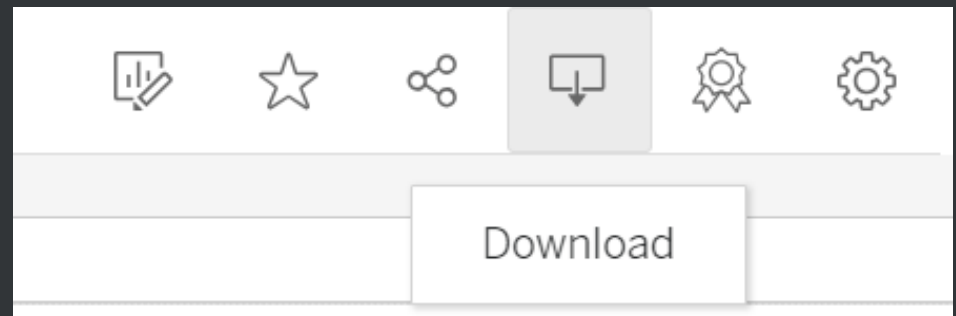
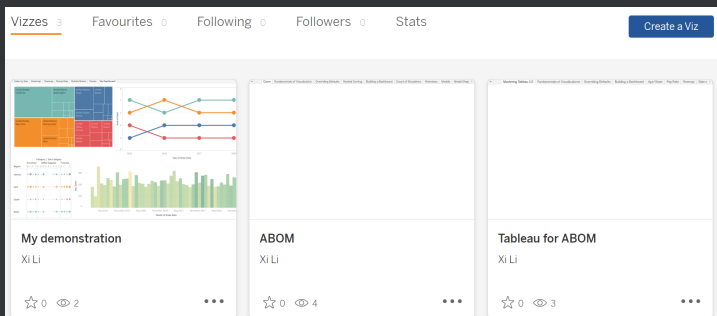
Saving your Tableau

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:

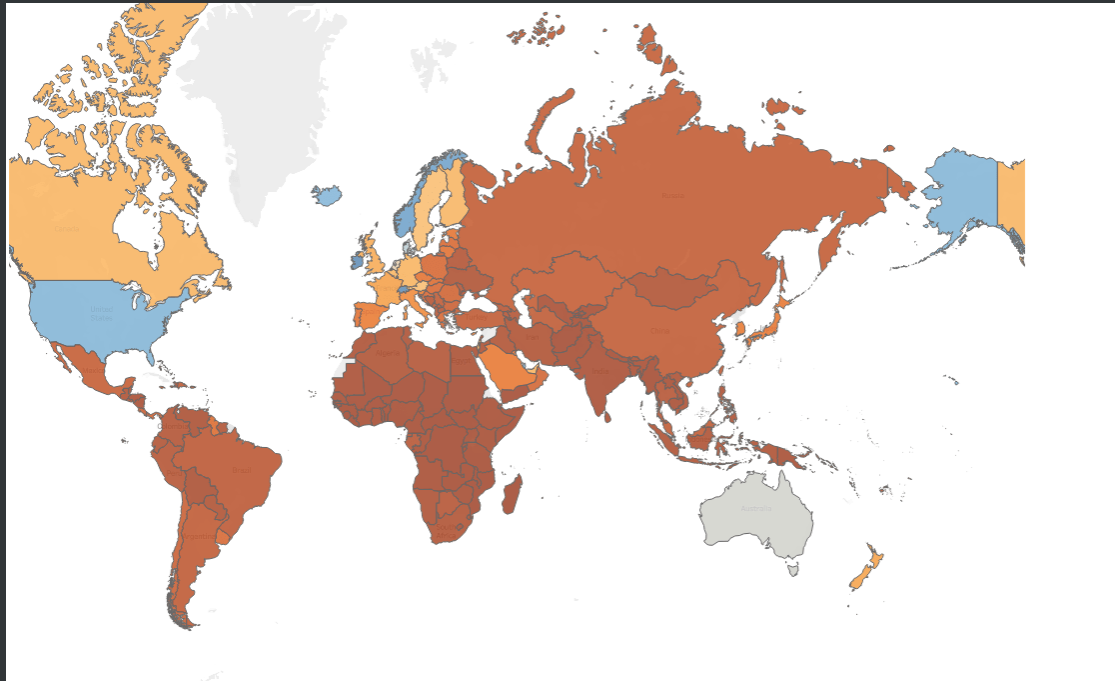


Map

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 (Workday)**.

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

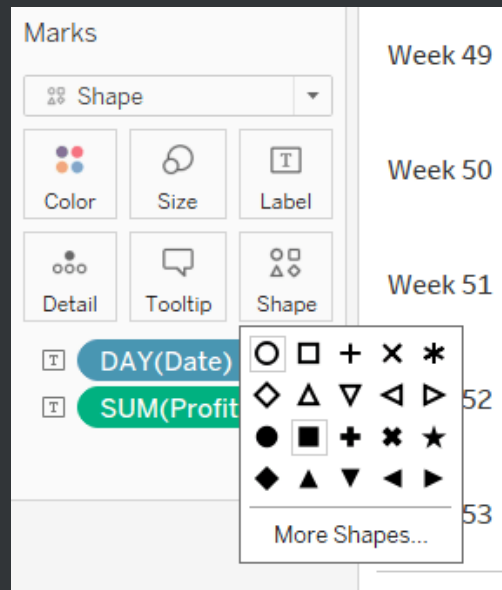
Profit to Text.

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

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

Calendar Chart

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

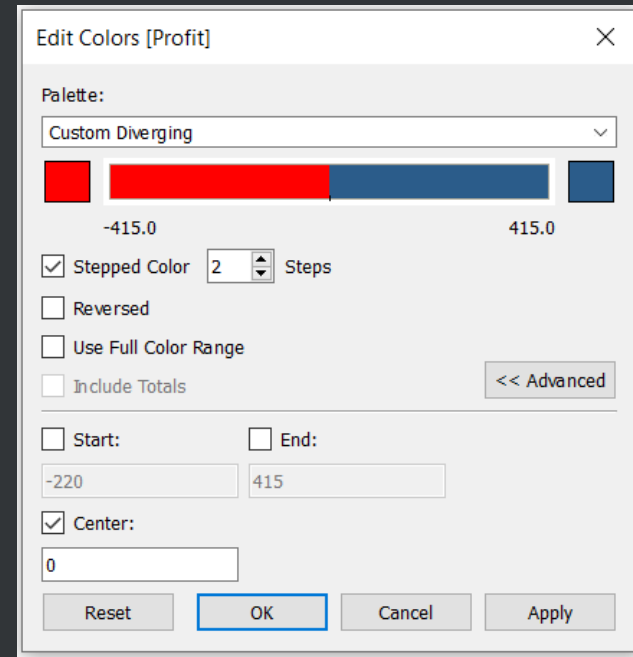


Calendar Chart

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!

Scatter Plot

Scatter Plot

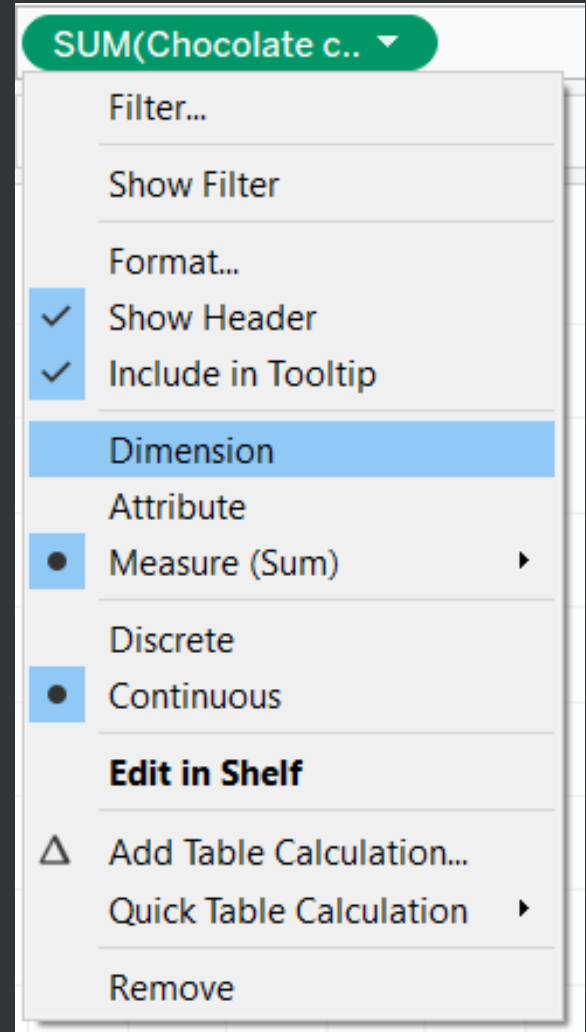
Download chocolate data from course website or [here](#).

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 **Details**.

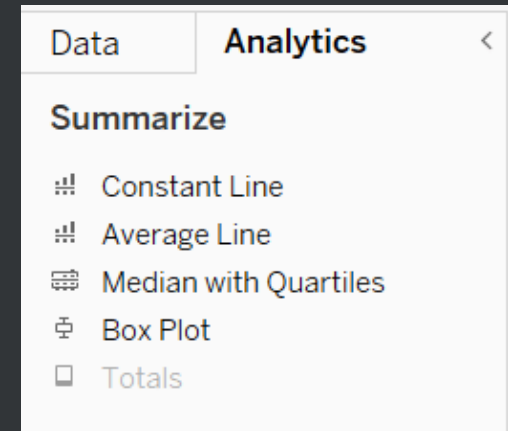
Adjust the size of circles if necessary.

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

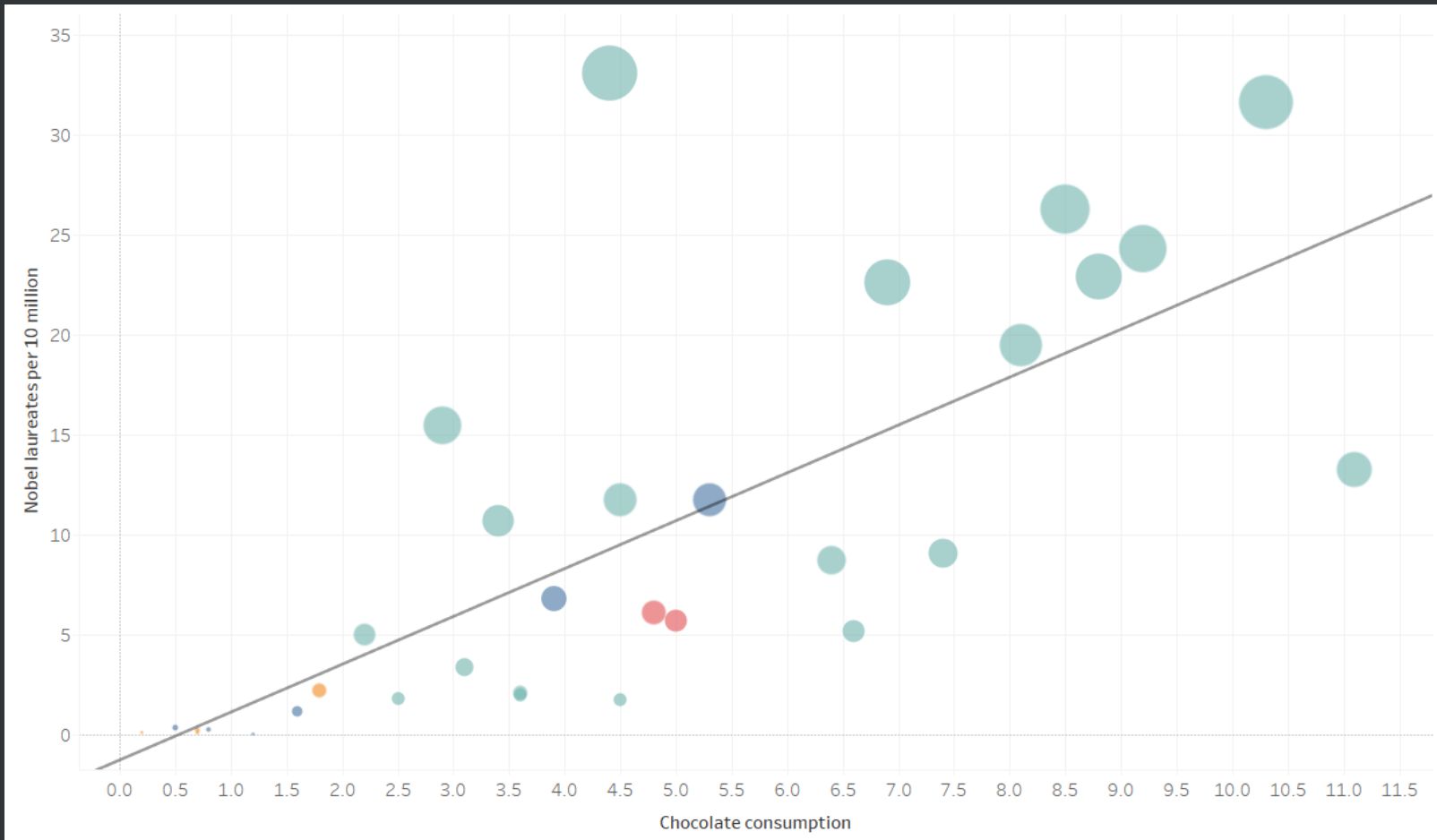
Build separate trend lines based on the following dimensions:

- Region

Options

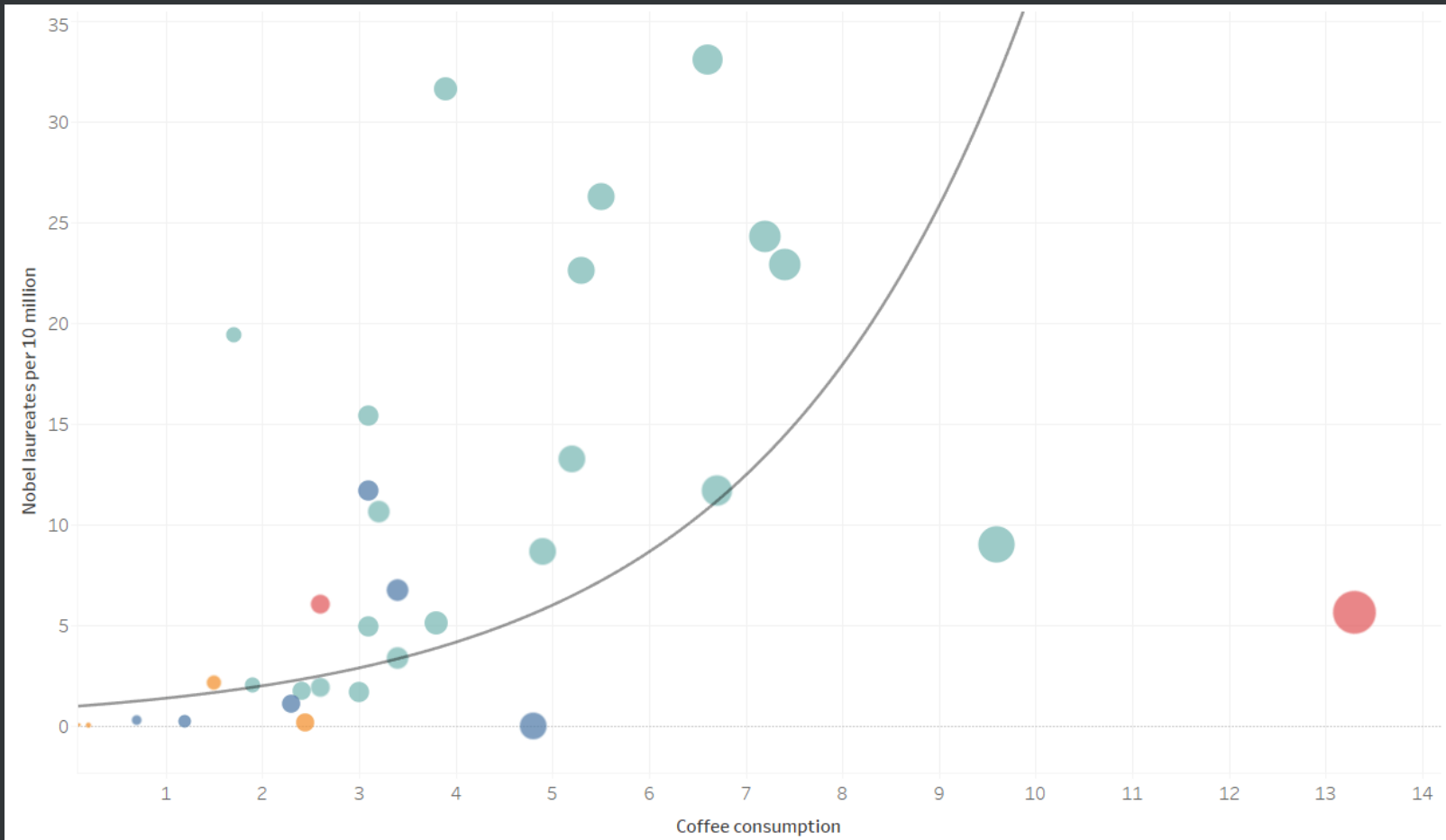
- Show tooltips
- Show confidence bands
- Allow a trend line per color
- Show recalculated line for highlighted or selected data points
- Force y-intercept to zero

OK



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

Exercise: Show the relationship between coffee consumption and Nobel laureates



Thank you!