Visualization with Tableau

What we are going to create...

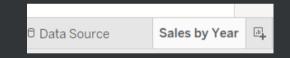


Importing Data

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

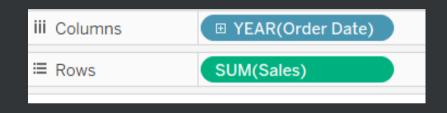
Let's create a new worksheet by clicking on "Sheet 1"! You can customize the name for your worksheet.



Basics

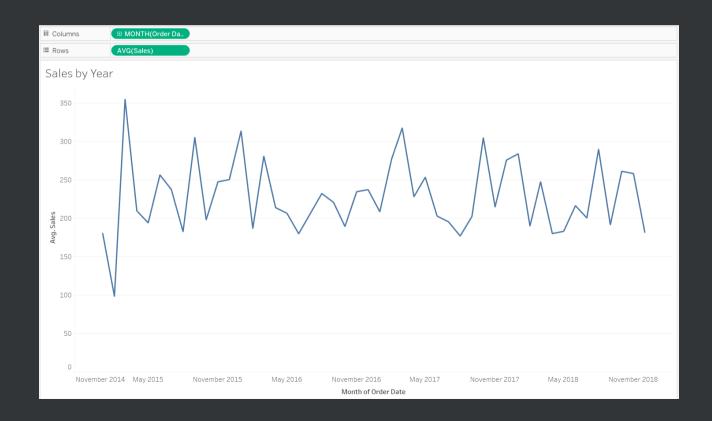
Lines

Draw Order Data to Columns and Sales to Rows. You get your first Tableau visualization now!



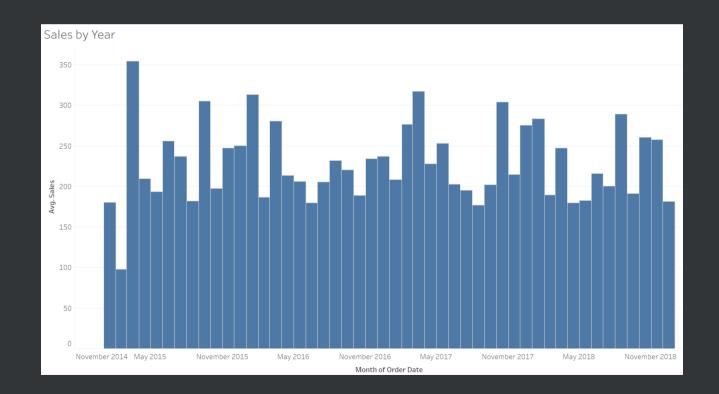
Lines

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



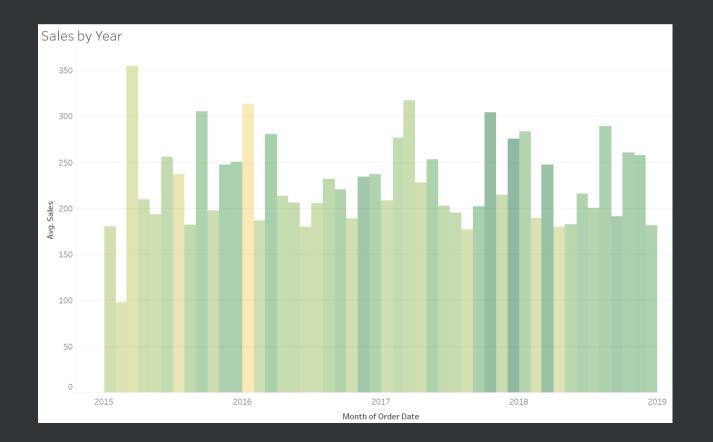
Bars

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



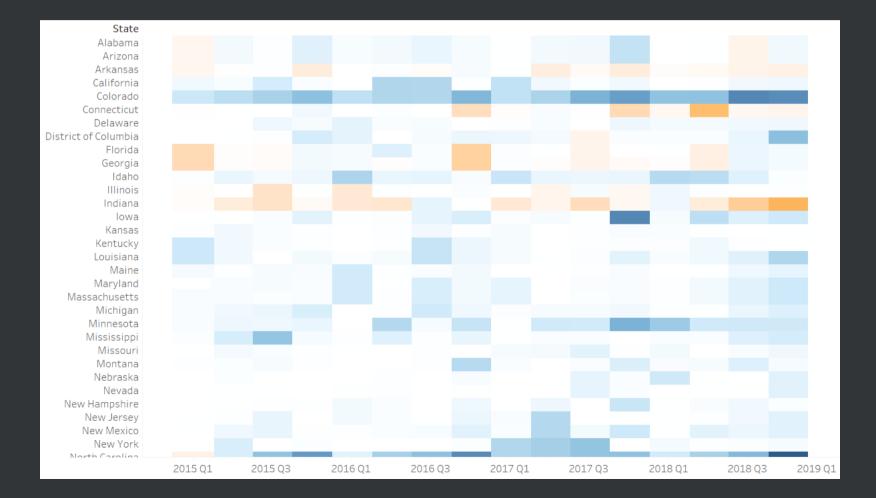
Colors

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!

United States California		United States Washington				United States Texas			United States Indiana	
		United Sta Arizona United Sta Colorado		Unite	ed	United States Illinois United States Michigan		Unit Stat Unit Stat	es :ed	United States
United States New York	United States Pennsylvania United States Ohio		United States New Jersey		United States	United States Florida	United States North Carolin		United Georgia	
			United States Delaware		United States	United States	United States Kentucky	United States		
			United States			Virginia United State Tennessee		5		

This is a Hong Kong export treemap, found on Wikipedia. How is it created?

5.0% Electronic ntegrated circuits 5.0% Electronic app- aratus f- or			21%Autometic dataprozesing ŋ machines		19%Parsfor usewith appactusfor radio, telephoneand TV transmission		16% Tubojets, turbo propellers andother gas turbines				11%Kritor cochet Édric;width 30cm>5% elastomer Q49% Womenis suits, not		16%Liquid oystaldevices 079%Toys,	10% Wist watches and pocket watches
	transformers /		0.78% 0.69% Apparatus Storage		065% Self-prope-							scale models, ouzzles		
5.6% Telephones		el	ectrical	devices, smart cards,	lled bulldaz exc-	ers,								
	printedorcuits M		47% Ionitors									╞╼┟═┧╫╫╫ ┠╼┠═╡╫╫╫╢		
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			42% ectric								073% Tunksor	049% Footwear, with		
3.0% Parts and	devices;	0	41% deo								anykind			
accessories for office machines	085%Printing Vo machinery, 03 other Pa		39%						Ц		₽───────₽			
		6.6%				22% Jewelrych					050% Medicaments,			060% Printed books
11% Gold		Diamonds			predous				0.47% Medicaments,			arachures,		
		Diamonus									0,67%Plastic waste,	0.42% Polymers		
								056%Other articles	đ					
						098% Edibleoffal								
								\square			ofanimals			
	1.3% Silver 039% Recious										040% Other			

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:

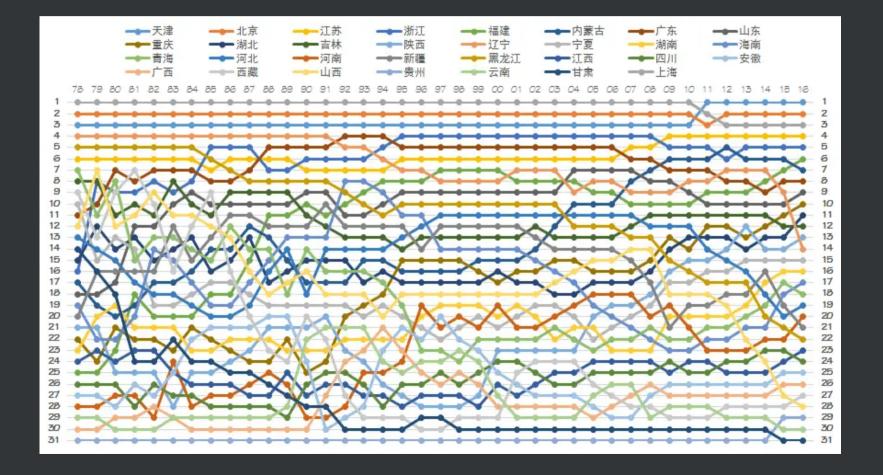


Drag Region to Color, and you are done!

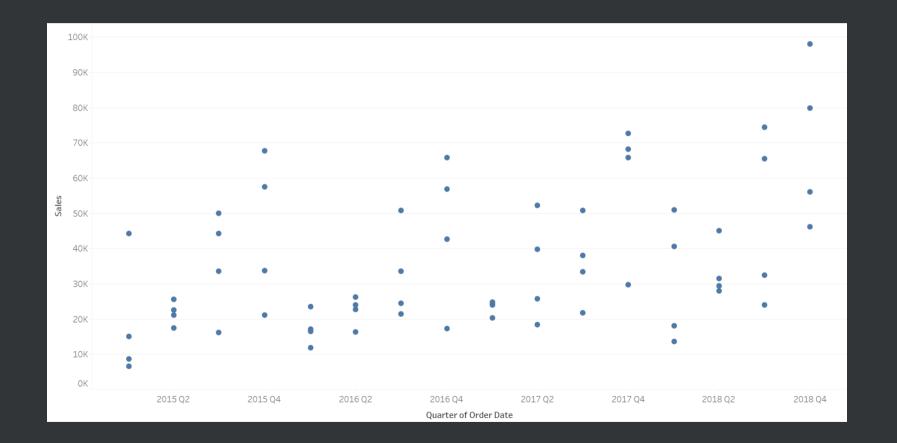
This is a Bump Map

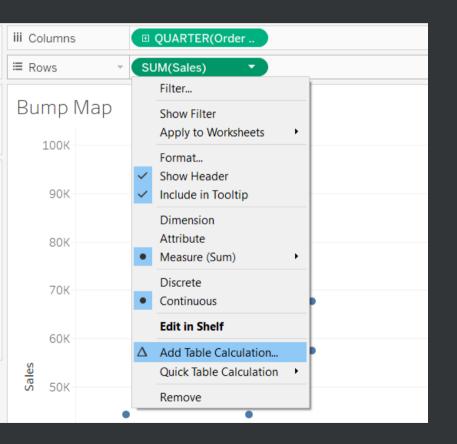


Bump maps are used in a lot of places... This is a rank of Chinese provinces by GDP per capita.



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.





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

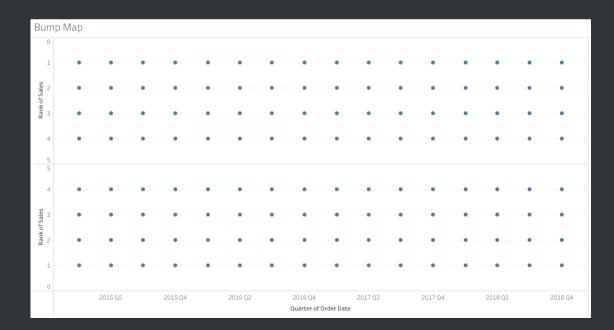
Table Calculation Rank of Sales	×				
Calculation Type					
Rank	Ŧ				
Descending	*				
Unique (1, 2, 3, 4)					
Compute Using					
Table (across)					
Cell					
Specific Dimensions					
Quarter of Order Date✓ Region					
Show calculation assistance					

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

0	Edit Axis [Rank of Sales]		×							
	General	Tick Marks								
1-	Range									
2-	 Automatic Uniform axis range for all rows or columns Independent axis ranges for each row or column Custom 									
Rank of Sales	Automatic 💌	Automatic 5	• -							
3-	Scale Reversed Logarithmic									
4-	 Positive Symmetric Axis Titles Title Custom Rank of Sal 	95								
5		5	-							

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

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



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.

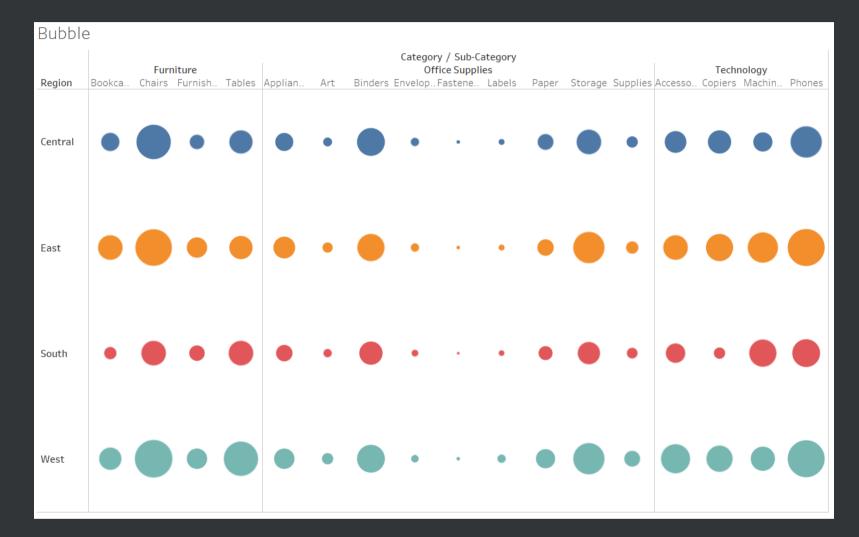
Right-click your *y*-axis and click Synchronize Axis, you will get the two *y*-axes identical.

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!

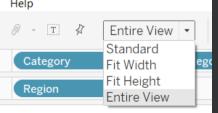
Bubble Matrix

This is a bubble matrix.

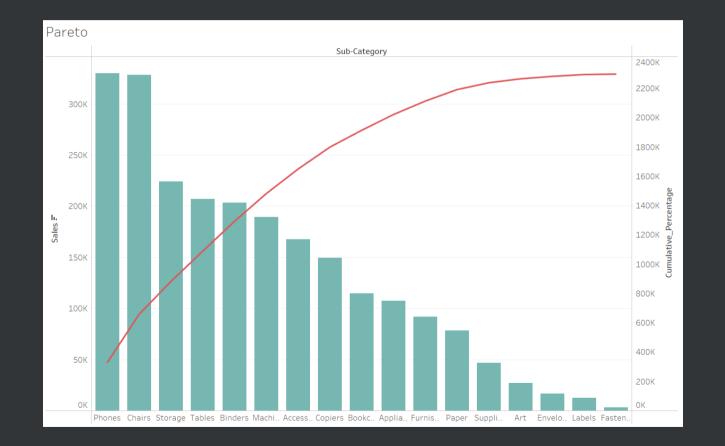


Bubble Matrix

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 Help T 🞝 to make it looks nicer. Standard



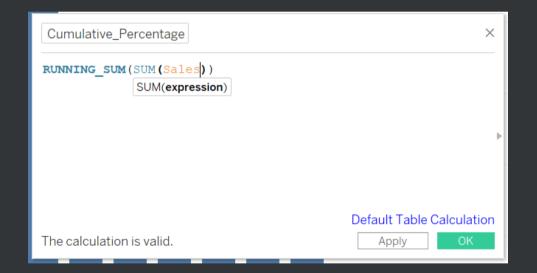
This is a Pareto Chart



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:
Data Analytics

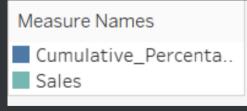
Data	Analytics	<					
🚱 Orders (Superstore_Data)							
Search	≣ \ \	•					
Create Calculated Field							
Create Parameter							

Create the following new variable:



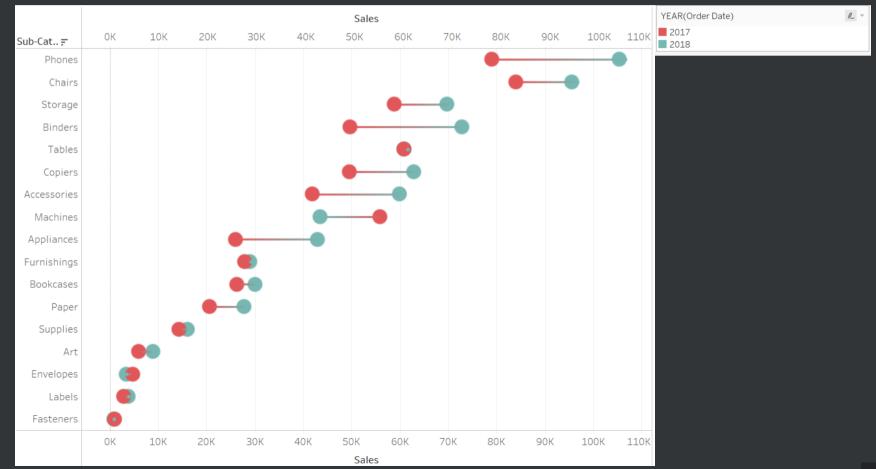
Draw the new variable Cumulative_Percentage to Rows. Choose "Dual Axis" as we illustrated previously. Set the format of the first figure to be Bar, and the second figure to be Line.

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:

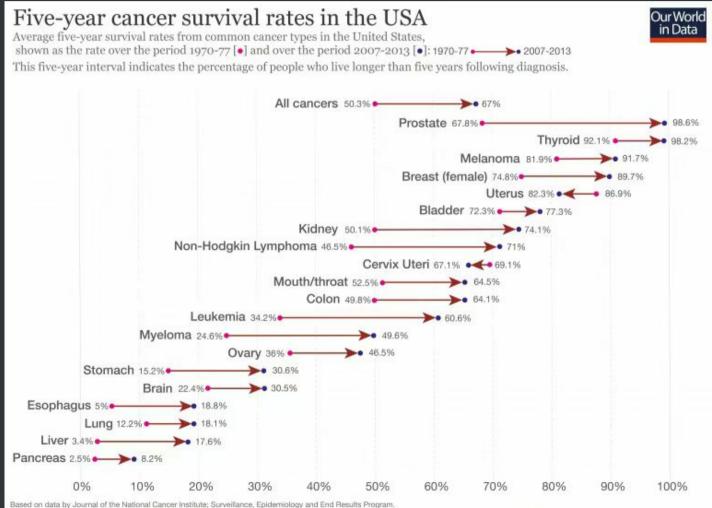


Dumbbell Chart

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



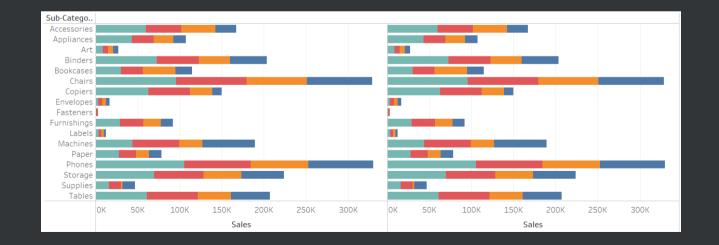
This type of chart is used everywhere...



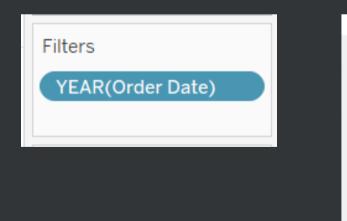
Based on data by Journal of the National Cancer Institute; Surveillance, Epidemiology and End Results Program. The data visualization is available at OurWorldinData.org. There you find research and more visualizations on this topic.

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.

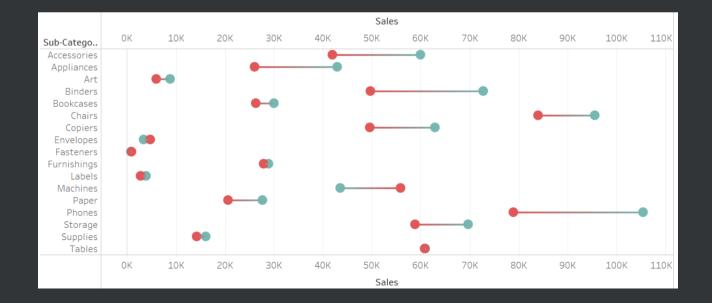


Choose Dual Axis for the second Sales; now, you merge the two figures into one single figure. Right click on your *x*-axis to Synchronize Axis. Drag Order Date to Filters and only check 2017 and 2018.

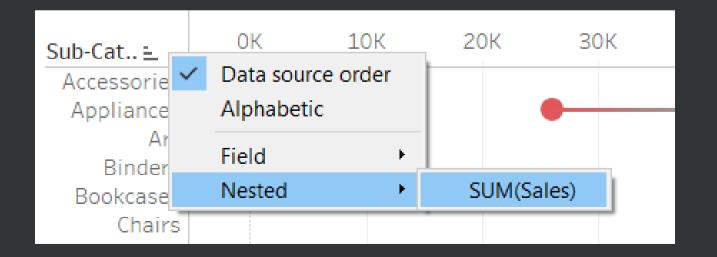




Choose the format of the second chart to Line. Drag Order Date (the first "Year") to Path. Note that the default format is Quarter so you need to change it to year. Adjust the size of circles in the first chart.



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



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!

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:

Siz	e	
Ger	neric Desktop (1366 x 768) 🔻	
Fi	xed size 🔹	
-	0 i D II (1966	
	Generic Desktop (1366 x 🝷	
144	Generic Desktop (1366 x 768)	
vv	Desktop Browser (1000 x 800)	
	Full Screen (1024 x 768)	
14	Laptop Browser (800 x 600)	
II	Web Page Embedded (800 x 80)0)
	Blog Embedded (650 x 860)	
ıll	Small Blog Embedded (420 x 6	50)
_	Column (550 x 1000)	
II	PowerPoint (1600 x 900)	
	Story (1016 x 964)	
	Letter Portrait (850 x 1100)	
	Letter Landscape (1100 x 850))
	Legal Landscape (1150 x 700)	
	A3 Portrait (1169 x 1654)	
	A3 Landscape (1654 x 1169)	
Ohiz	A4 Portrait (827 x 1169)	
ODle	A4 Landscape (1169 x 827)	
	Custom	51

HORIZONIALLONI

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 Ο **1**1 Size h W 1.366768 ÷

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



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:

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Map

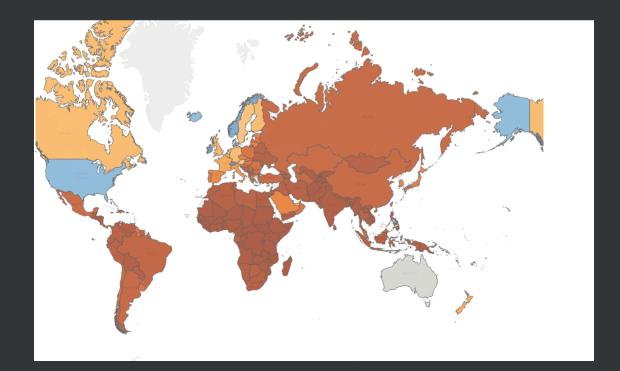
Map

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:



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.

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

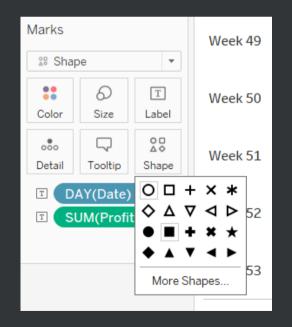
Download calendar data from course website or here. Import your data to Tableau; check the variables first. Start with a new worksheet. Date to Columns, and set its format to be More (Weekday). Date to Rows, and set its format to be More (Week Number). Date to Text, and set its format to be (the first) Day. Adjust the size of your table.

Profit to Text.

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

Calendar							
Week of	Sunday	Monday	Tuesday	Date 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 -15	30 -172	31 89				

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



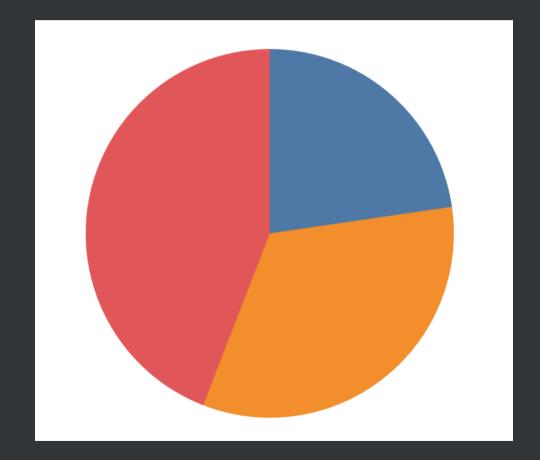
Profit to Color.

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).

Edit Colors [Profit]	×
Palette:	
Custom Diverging	~
-415.0	415.0
Stepped Color 2 🖨 Steps	
Reversed	
Use Full Color Range	
In clude Totals	<< Advanced
Start: End:	
-220 415	
Center:	
0	
Reset OK Cancel	Apply

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

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.



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.



Scatter Plot

Scatter Plot

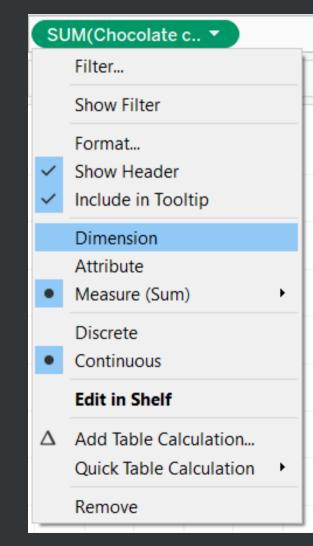
Download chocolate data from course website or here.

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).

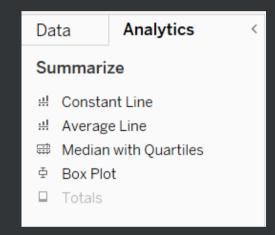


Scatter Plot

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

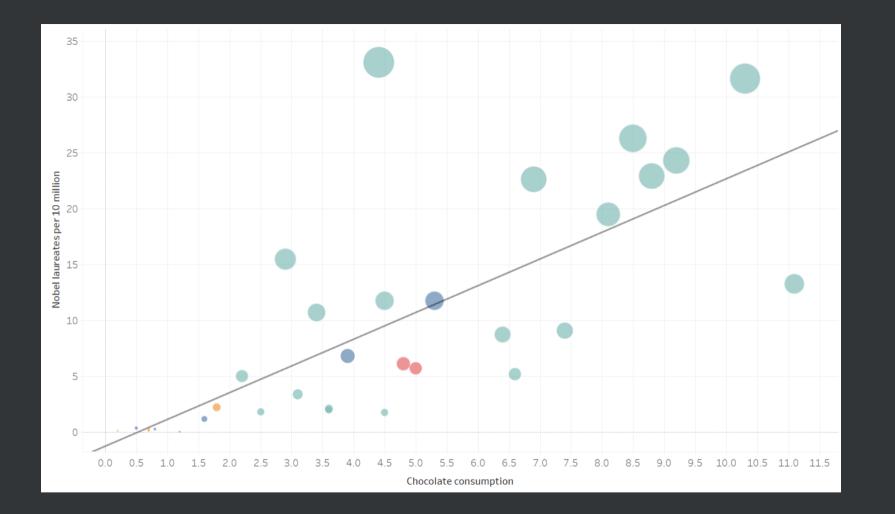
Next, let us add a regression line to the figure! Select the Analytics Panel as shown in the right figure. Drag Trend Line to the drop field, and select Linear. Now, you have 4 regression lines for the 4 continents.



Regression Line

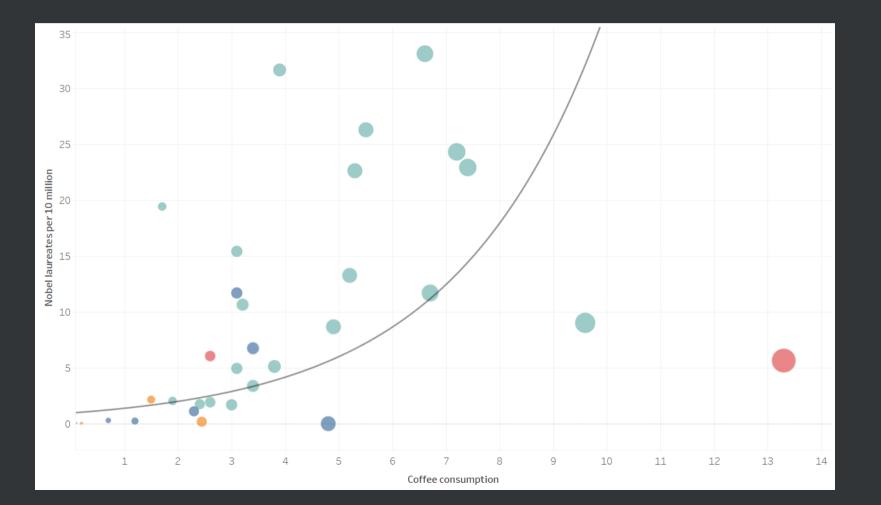
Click one of the lines, choose Edit, and uncheck Region.

Trend Lines Options	×
Model Type Linear Logarithmic Exponential Power Polynomial Degree: 3 + 	
Factors Build separate trend lines based on the following dimensions:	
Region	4
Options	v
 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 	



 $y = -1.30 + 2.39 imes x, \;\; p < 0.0001$

Exercise: Show the relationship between coffee consumption and Nobel laureates



Thank you!