

# Types of Visuals: Hands-on

MIS561 Data Visualization, Semester I, AY2022/2023

## OVERVIEW

In this session, we will go through an explorative exercise to use Tableau and Excel to create various types of visuals: bar chart, line chart, scatterplot, packed bubble chart, treemap, heatmap, slopegraph, and waterfall chart.

Along this exploration process, you will acquire skills in creating various types of visuals with your own data sets.

## TASK 1: Bar Chart

Bar chart is best suited for numerical data that can be divided into distinct categories to compare information and reveal trends at a glance.

### Tableau how-to:

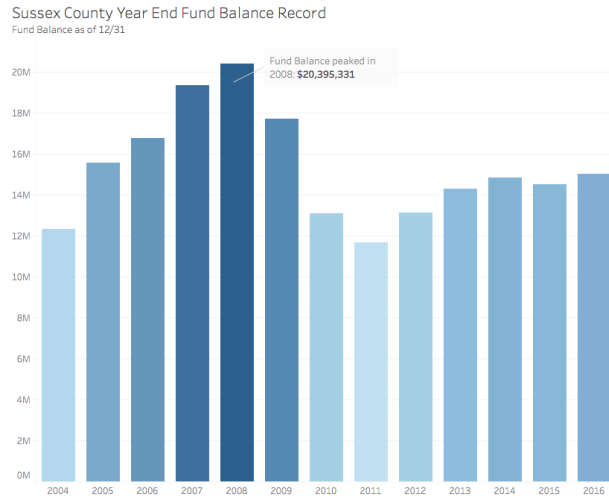
To begin a vertical bar chart in Tableau, place a **dimension** on the rows shelf and a **measure** on the columns shelf (or vice versa to create a horizontal bar chart—place a measure on the rows shelf and a dimension on the columns shelf).

An old classic, there are a few ways to spice up a bar chart.

- Bars can be oriented on the vertical or horizontal axis, which can be helpful for spotting trends.
- Additional layers of information can be added using clustered bars or by stacking related data.
- Color can be added for more impact or to overlay for immediate insight.
- Trend lines and other annotations can be added to highlight important data points.
- Use side-by-side or stacked bars to give depth to your analysis and answer multiple questions at once.
- Bar charts can be combined with maps or line charts to act as filters that correspond to different data points as they are selected.
- Finally, multiple bar charts could be set on a dashboard to help viewers quickly compare information without navigating several charts.

### On your own:

1. Download Tableau file **ex1\_bar.twbx** from D2L, and open the file
2. Create the following bar chart



**Note.** This simple, classic bar chart with color gradient shading and a point annotation compares the year end balance for Sussex County, NJ over a period of 13 years.

3. Use Tableau analytics to estimate the fund balance forecast in 2017

## TASK 2: Line Chart

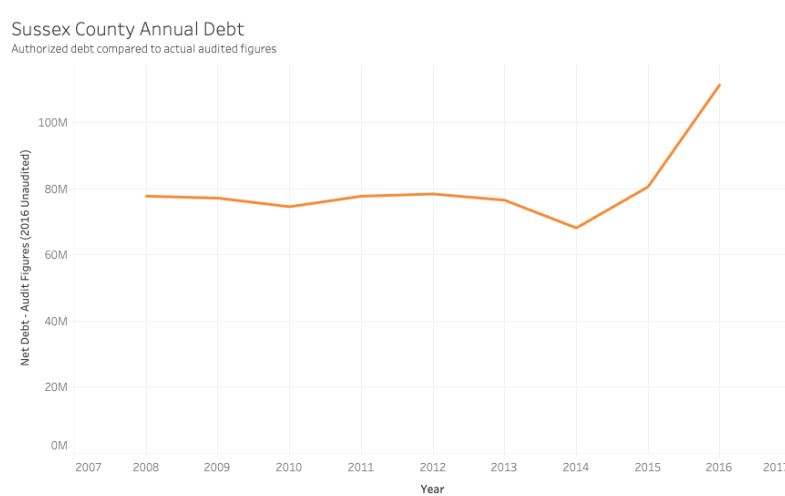
Line chart is most commonly used when an element of time is present. The best use case for line charts involves displaying trends over a period of time.

### Tableau how-to:

You create a line chart in Tableau by placing one or more **measure** on either the columns shelf or the rows shelf, and then plotting the measures against either a date or continuous **dimension**.

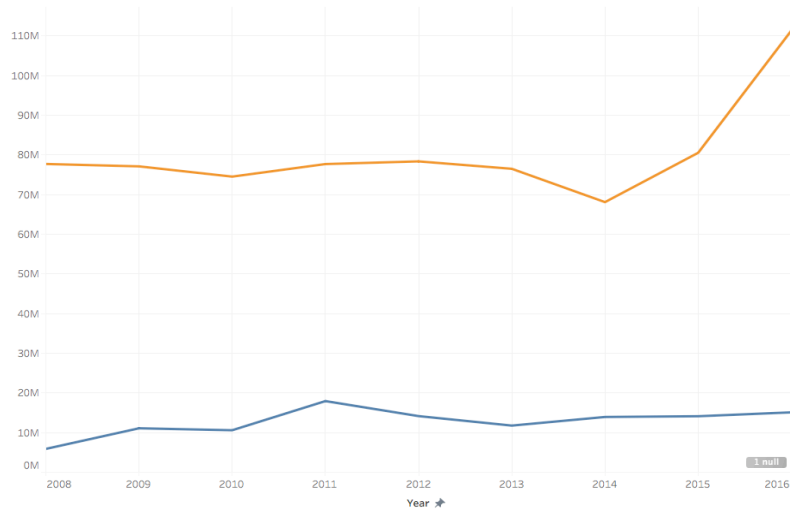
### On your own:

1. Download Tableau file **ex1\_line.twbx** from D2L, and open the file
2. Create the following line charts



**Note.** This line chart shows the audited annual net debt for Sussex County over a period of nearly ten years.

Sussex County Annual Debt  
Authorized debt compared to actual audited figures



**Note.** Create a dual-axis line chart by combining two measures.  
This produces a line chart with multiple lines.

### TASK 3: Scatterplot

Scatterplot is an effective way to visualize numerical variables to compare measures and quickly identify patterns, trends, concentrations (clusters), and outliers. This chart can give viewers a sense of where to focus discovery efforts further and are best used to investigate relationships between variables. Scatterplot is particularly useful when exploring statistical relationships such as linear regression.

#### Tableau how-to:

You can create a scatter plot in Tableau in two ways: as a **simple scatter plot** or a **matrix scatter plot**.

You create simple scatter plots by dragging a **measure** to the Columns shelf and a **measure** to the Rows shelf. To view all of your measures, deselect the Aggregate Measures option from the Analysis menu.

If these shelves contain both **dimensions** and **measures**, Tableau will create a Matrix of Scatter Plots and place the measures as the innermost fields, which means that measures are always to the right of any dimensions that you have also placed on these shelves.

You can add depth and visual richness to a scatterplot by:

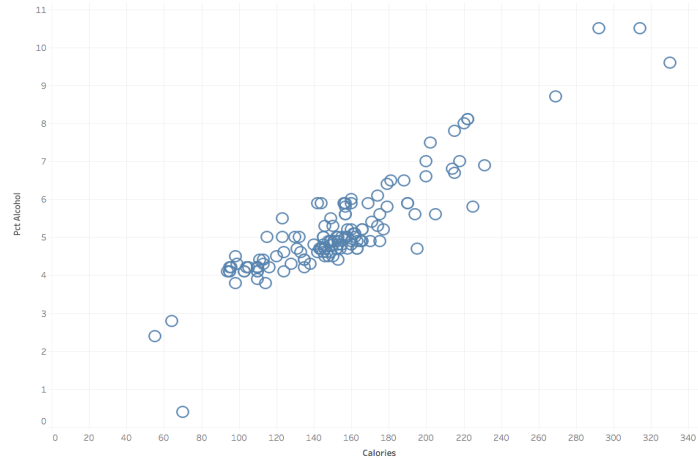
- Bringing over dimensions and using them to add color or additional shapes onto the scatter plot.
- Changing the shape of the data via the Marks card to provide additional relevance and visual cues. You can choose these shapes from a set of sample default shapes as well as a selection of shape palettes included in Tableau.
- Incorporating filters can reduce noise and help limit investigation to the factors that matter most to your analysis.
- Scatter plots are excellent candidates to include statistical information to review trends and other analytics. Via Tableau's Analytics pane, you can add a variety of analytic models to highlight the statistics in your data. Hover the cursor over the trend lines to display statistical information used to create the line(s)

#### On your own:

1. Download Tableau file **ex1\_scatterplot.twbx** from D2L, and open the file
2. Create the following scatterplots and use the analytics tool in Tableau to find relationships and clusters in the data

### Do Calories Affect Alcohol Content in Beer?

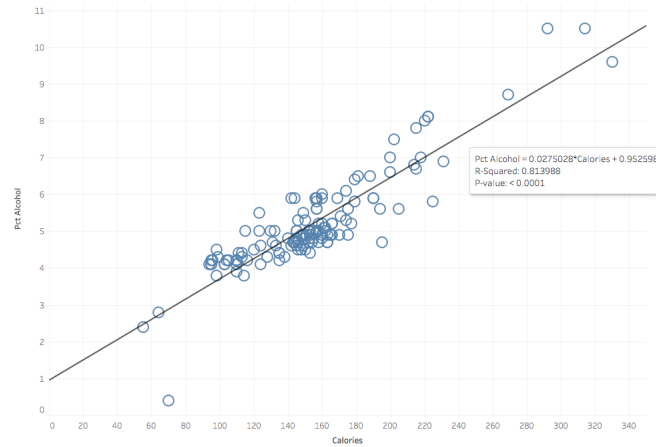
This simple scatterplot shows the linear relationship between calories and percent of alcohol.



**Note.** A simple scatterplot

### Do Calories Affect Alcohol Content in Beer?

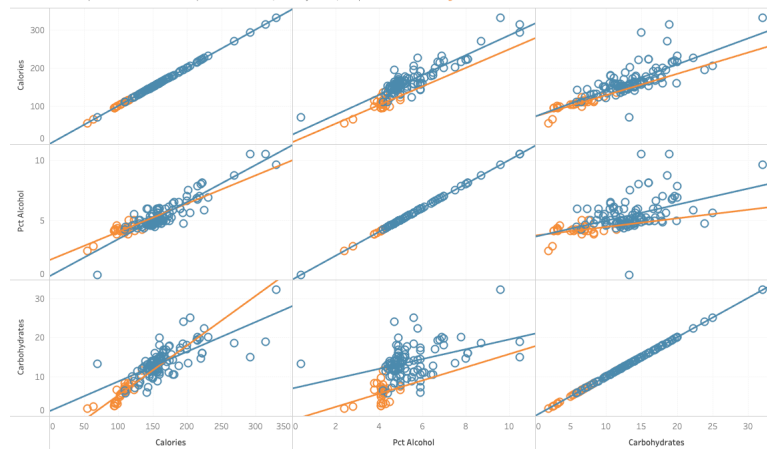
This simple scatterplot shows the linear relationship between calories and percent of alcohol.



**Note.** A scatterplot with a trend line and summary statistics

### Do Calories Affect Alcohol Content in Beer?

This matrix scatterplot shows the relationship between calories, carbohydrates, and percent of alcohol in *light* and *dark* beers.



**Note.** A matrix scatterplot

## TASK 4: Packed Bubble Chart

The bubble chart is a variation of the scatter plot that replaces data points with a cluster of circles (or bubbles), a technique that further emphasizes data that would be rendered on a pie chart, scatter plot, or map. This method shows relational values without regard to axes and is used to display three dimensions of data: two through the bubble's location and another through size.

These charts allow for the comparison of entities in terms of their relative positions with respect to each numeric axis and size. The sizes of the bubbles provide details about the data, and colors can be used as an additional encoding cue to answer many questions about the data at once.

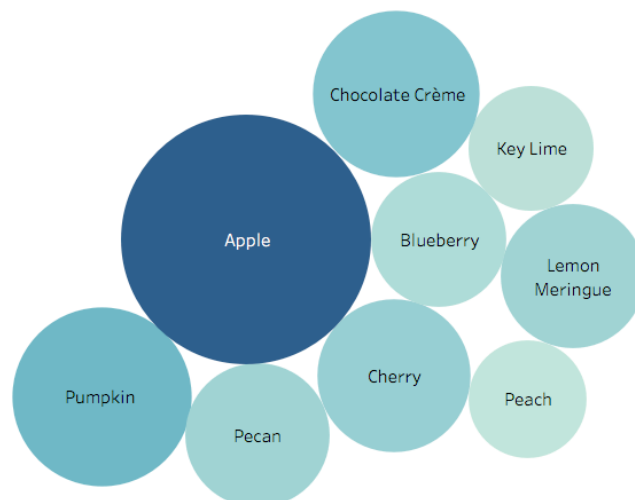
### Tableau how-to:

To create a basic packed bubble chart, drag a **dimension** to the Columns shelf and a **measure** to the Rows shelf. Tableau will aggregate the measure as a sum and create a vertical axis to display a bar chart. This is the default functionality when you select one measure and dimension in this manner. Next, use the Show Me card to select the Packed Bubble chart from the list of options.

### On your own:

1. Download Tableau file **ex1\_bubble.twbx** from D2L, and open the file
2. Create the following packed bubble chart

America's Favorite Pie Flavor  
Your over year, apple takes the cake...erm, pie.



**Note.** A packed bubble chart displays data in a cluster of circles, using size and color saturation to encode the bubbles with meaning.

## TASK 5: Treemap

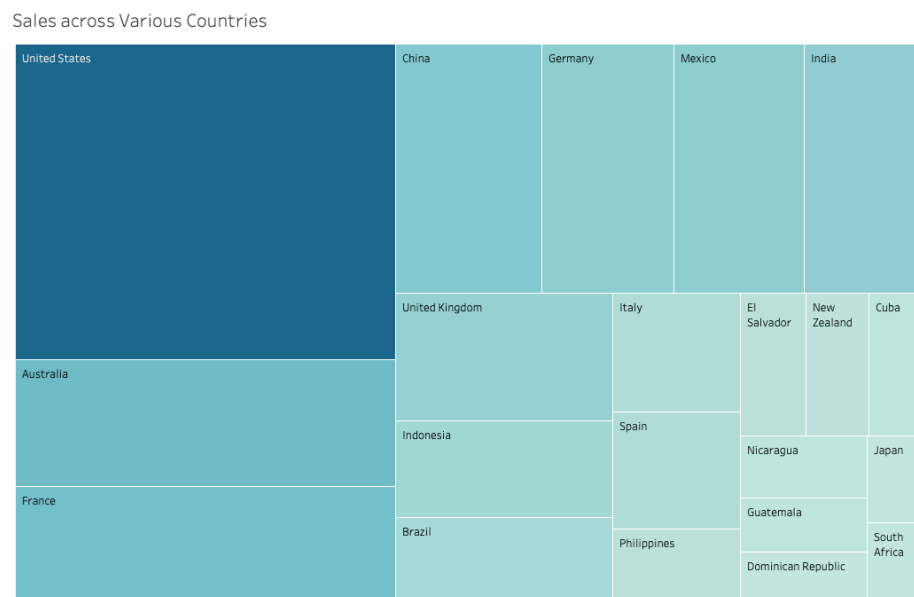
The treemap uses a series of rectangles of various sizes to show relative proportions. It works especially well if the data being visualized has a hierarchical structure (with parent nodes, children, and so on) or when analyzing a parts-to-whole relationship.

### Tableau how-to:

Drag a **dimension** to the Columns shelf and a **measure** to the Rows shelf. Tableau will aggregate the measure as a sum and create a vertical axis to display a bar chart. Then, use the Show Me card to select a treemap from the list of available chart types.

### On your own:

1. Download Tableau file **ex1\_treemap&heatmap.twbx** from D2L, and open the file
2. Create the following treemap



**Note.** Building a treemap in Tableau begins with building a bar chart and changing the chart type



## TASK 6: Heatmap

A heat map graph is a great way to compare categorical data using color. Similar to the tree map, a heat map represents the values by a variable in a hierarchy.

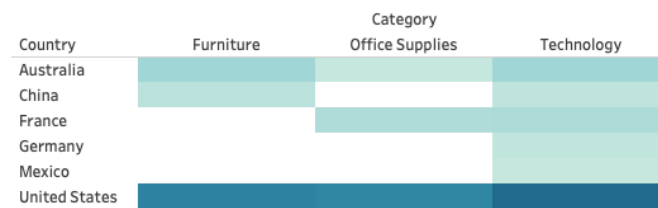
### Tableau how-to:

Place one (or more) **dimensions** onto the Columns shelf *and* one (or more) **dimensions** on the Rows shelf. Select Square as the mark type and place a **measure** on the Color shelf.

### On your own:

Create the following heatmap using **exl\_treemap&heatmap.twbx**

Quantity of Sales in Each Country for Each Product Category



**Note.** Building a heatmap

## TASK 7: Slopegraph

Slopegraphs can be useful when you have two time periods or points of comparison and want to quickly show relative increases and decreases or differences across various categories between the two data points.

### On your own:

1. Download **ex1\_slopegraph.xlsx** from D2L and understand the rationale of creating slopegraph
2. Following the template, organize the data accordingly and create the slopegraph to illustrate the survey data:

#### Summary of Employee Survey Feedback

	2018	2019
Peers	88%	90%
Culture	81%	95%
Environment	74%	76%
Leadership	62%	55%
Career development	53%	30%

## TASK 8: Waterfall Chart

The waterfall chart can be used to pull apart the pieces of a stacked bar chart to focus on one at a time, or to show a starting point, increases and decreases, and the resulting ending point.

### On your own:

1. Download **ex1\_waterfall.xlsx** from D2L and understand the rationale of creating waterfall chart
2. Following the template, organize the data accordingly and create the waterfall chart to illustrate the net cash flow of a company:

**Cash Flow of A Company**

Month	Total
Jan	\$2,500
Feb	\$4,750
Mar	\$3,750
Apr	\$6,050
May	\$6,750
June	\$5,250
July	\$4,450
Aug	\$3,850
Sept	\$2,950
Oct	\$5,200
Nov	\$6,400
Dec	\$3,400

**Hint.** The values in the table represent the absolute cash amount at end of the month. As absolute values of cash amount are shown in the table, you need to calculate the change (cash flow) for each month to create the waterfall chart.

### Upload your visuals

Once you are finished with Task 1-6, upload it to your Tableau Public profile.

You are also welcome to share screenshot(s) of your slopegraph and waterfall chart in Slack 😊