Course 6 - Share Data Through the Art of Visualization

Data visualization is the graphical representation of data. In this part of the course, you'll be introduced to key concepts, including accessibility, design thinking, and other factors that play a role in visualizing the data in your analysis.

Learning Objectives

- Explain the key concepts involved in design thinking as they relate to data visualization
- Describe the use of data visualizations to talk about data and the results of data analysis
- Discuss accessibility issues associated with data visualization
- Explain the importance of data visualization to data analysts
- Describe the key concepts involved in data visualization

Week 1 : visualizing data

Data visualization is a graphic representation that expresses the significance of data. It reveals insights and patterns that are not immediately visible in the raw data. It is an art through which information, numbers, and measurements can be made more understandable.

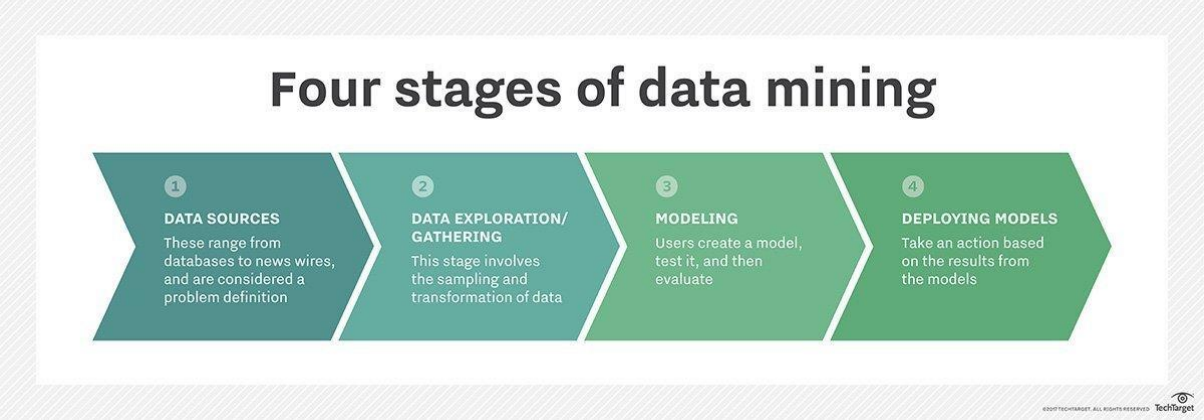
The main goal of data visualization is to communicate information clearly and effectively through graphical means. It doesn't mean that data visualization needs to look boring to be functional or extremely sophisticated to look beautiful. To convey ideas effectively, both aesthetic form and functionality need to go hand in hand, providing insights into a rather sparse and complex data set by communicating its key-aspects in a more intuitive way.

Why data visualization is such a powerful tool:

- Intuitive: Presenting a graph as a node-link structure instantly makes sense, even to people who have never worked with graphs before.
- Fast: It is fast because our brains are great at identifying patterns, but only when data is presented in a tangible format. Armed with visualization, we can spot trends and outliers very effectively.
- Flexible: The world is densely connected, so as long as there is an interesting relationship in your data somewhere, you will find value in graph visualization.
- Insightful: Exploring graph data interactively allows users to gain more in-depth knowledge, understand the context and ask more questions, compared to static visualization or raw data.

Univariate analysis: The analysis of one variable. Bivariate analysis: The analysis of two variables to determine their relationship. Multivariate analysis: The analysis of multiple outcome variables. Principal components analysis: The analysis and conversion of possibly correlated variables into a smaller number of uncorrelated variables. Manual data

exploration methods may include filtering and drilling down into data in Excel spreadsheets or writing scripts to analyze raw data sets.



Part 1: Communicating Data Insights

One part of many aspects of a data analysis is a story telling. In communicating the data insights, we have to organize our thoughts first. Two frameworks that might help us to do this are The McCandless Method and Kaiser Fung's Junk Charts Trifecta Checkup.

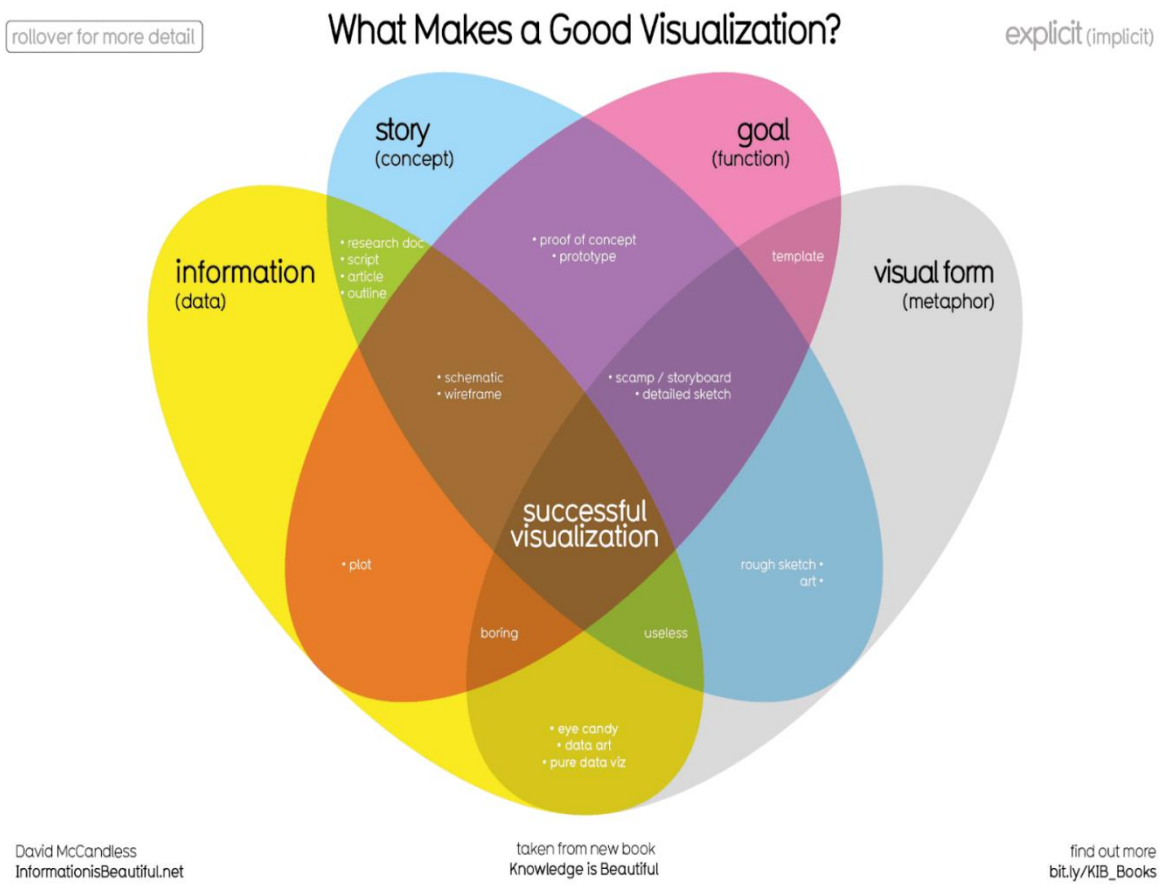
1)The McCandless Method

This method is commonly used in data visualization practice which explains a good data visualization has four elements, they are:

1) **Information**: the data you are working with
2) **Story**: a clear and compelling narrative or concept
3) **Goal**: a specific objective or function for the visual
4) **Visual form**: an effective use of metaphor or visual expression

Note: One useful way of approaching this framework is to notice the parts of the graphic where there is incomplete overlap between all four elements. For example, visual form without a goal, story, or data could be a sketch or even art. Data plus visual form without a goal or function is eye candy. Data with a goal but no story or visual form is boring. All four elements need to be at work to create an effective visual.

- **Information (data):** The information or data that you are trying to convey is a key building block for your data visualization. Without information or data, you cannot communicate your findings successfully.
- **Story (concept):** Story allows you to share your data in meaningful and interesting ways. Without a story, your visualization is informative, but not really inspiring.
- **Goal (function):** The goal of your data visualization makes the data useful and usable. This is what you are trying to achieve with your visualization. Without a goal, your visualization might still be informative, but can't generate actionable insights.
- **Visual form (metaphor):** The visual form element is what gives your data visualization structure and makes it beautiful. Without visual form, your data is not visualized yet.



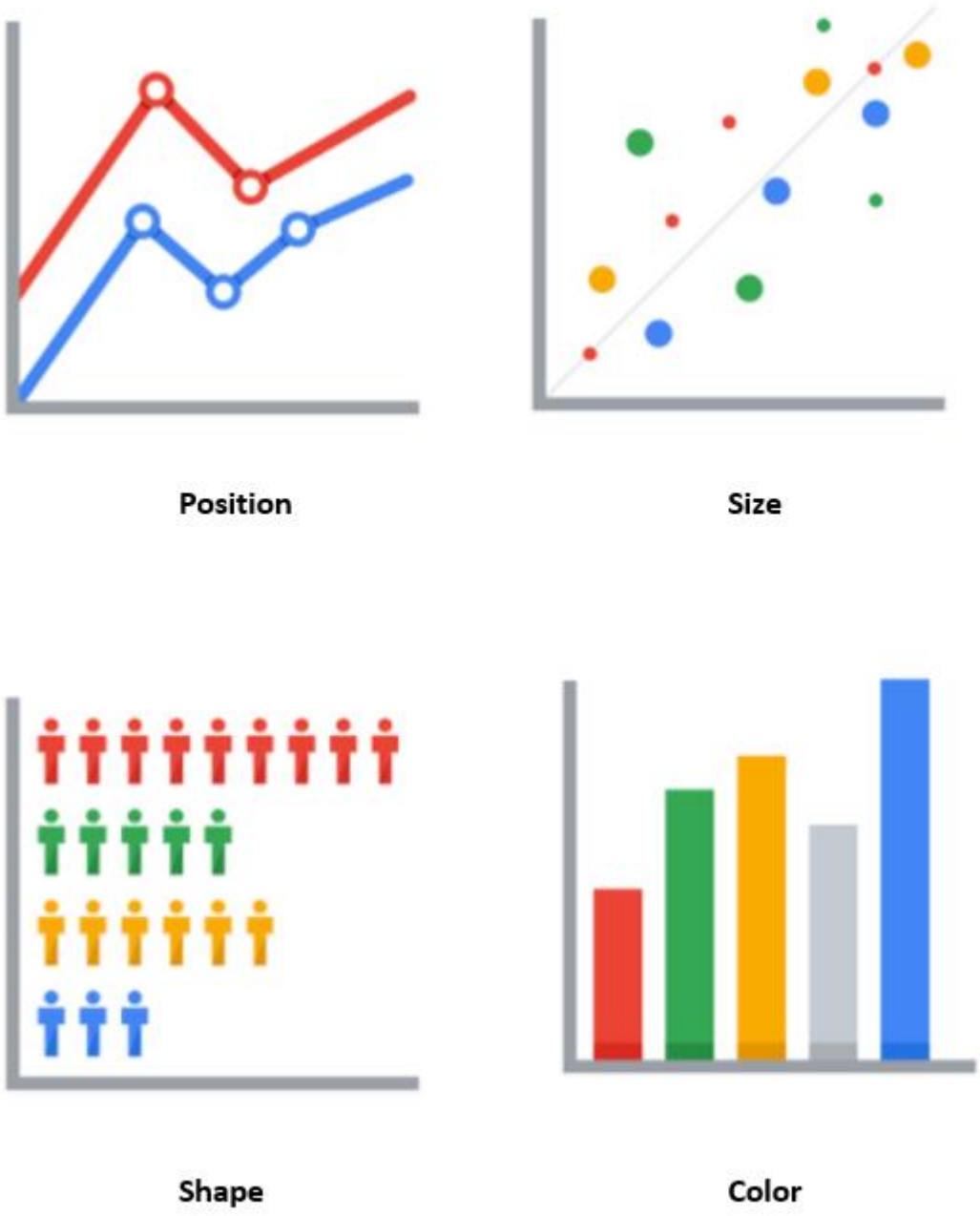
2) [Kaiser Fung's Junk Charts Trifecta Checkup]

This approach is a useful set of questions that can help consumers of data visualization critique what they are consuming and determine how effective it is. The Checkup has three questions:

1. What is the practical question?
2. What does the data say?
3. What does the visual say?

Note: This checklist helps you think about your data viz from the perspective of your audience and decide if your visual is communicating your data effectively to them or not. In addition to these frameworks, there are some other building blocks that can help you construct your data visualizations.

After the acknowledging the important elements, in conveying message to audience we need pre-attentive attributes. It makes data visualization immediately understandable. It is called Marks.



Picture 1: Four types of Marks

We can go to design principles for data visualization after we understand the pre-attentive attributes.

Principle	Description
Choose the right visual	One of the first things you have to decide is which visual will be the most effective for your audience. Sometimes, a simple table is the best visualization. Other times, you need a more complex visualization to illustrate your point.
Optimize the data-ink ratio	The data-ink entails focusing on the part of the visual that is essential to understanding the point of the chart. Try to minimize non-data ink like boxes around legends or shadows to optimize the data-ink ratio.
Use orientation effectively	Make sure the written components of the visual, like the labels on a bar chart, are easy to read. You can change the orientation of your visual to make it easier to read and understand.
Color	There are a lot of important considerations when thinking about using color in your visuals. These include using color consciously and meaningfully, staying consistent throughout your visuals, being considerate of what colors mean to different people, and using inclusive color scales that make sense for everyone viewing them.
Numbers of things	Think about how many elements you include in any visual. If your visualization uses lines, try to plot five or fewer. If that isn't possible, use color or hue to emphasize important lines. Also, when using visuals like pie charts, try to keep the number of segments to less than seven since too many elements can be distracting.

Table 1: Design principles

In coming to a conclusion, we have to be careful in differentiating correlation and causation. Correlation measures the degree of which two variables move in relationship to each other. While causation is the idea that an event leading to a specific result. So, in analyzing the data, we have to remember:

- Analyze any correlations critically
- Examine the data's context in determining about the causation
- Understanding the limitations of tools and data in our analysis

Next part is about type of data visualization. They are:

Picture 2: Line Chart

Picture 3: Bar Chart

Picture 4: Heatmap

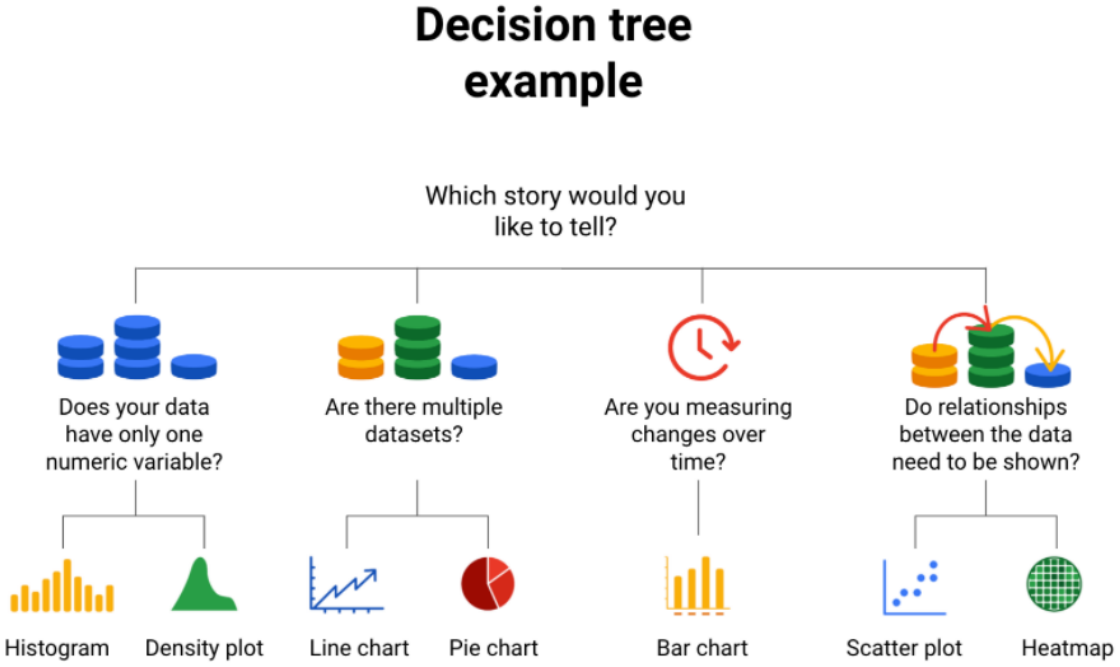
Picture 5:Pie Chart

Picture 6: Scatter Plots

Picture 7: Distribution Graph

Considering many types of data visualization, we need to decide which story would we tell using each of the type. So, we need a decision tree map to help us choosing the right one.

Please click here for Tableau data visualization collection based on the public data.



Picture 8: Data Visualization Decision Tree

Decision trees allow you to break problems that can seem big or overwhelming into smaller, more manageable decisions. By framing the decision as a flowchart of various conditions, constraints, and goals, you can approach it systematically. When selecting a data visualization, this tool can help you find the most appropriate visualization to clearly communicate a message about the data to your audience.

Different general principles mentioned above, following are the principles specifically for the design.

Balance: The design of a data visualization is balanced when the key visual elements, like color and shape, are distributed evenly.

Emphasis: Your data visualization should have a focal point, so that your audience knows where to concentrate.

Movement: Movement can refer to the path the viewer's eye travels as they look at a data visualization, or literal movement created by animations.

Pattern: You can use similar shapes and colors to create patterns in your data visualization.

This can be useful in a lot of different ways.

Repetition: Repeating chart types, shapes, or colors adds to the effectiveness of your visualization.

Proportion: Proportion is another way that you can demonstrate the importance of certain data.

Rhythm: This refers to creating a sense of movement or flow in your visualization.

Variety: Your visualizations should have some variety in the chart types, lines, shapes, colors, and values you use.

Unity: This means that your final data visualization should be cohesive.

Picture 9: Design Principles

For improving the visualization, we need to involve five phases of design thinking:

1. **Empathize:** Thinking about the emotions and needs of the target audience for the data visualization
2. **Define:** Figuring out exactly what your audience needs from the data
3. **Ideate:** Generating ideas for data visualization
4. **Prototype:** Putting visualizations together for testing and feedback

5. **Test:** Showing prototype visualizations to people before stakeholders see them

Following table is a guidelines and pro tips for highlighting key information and the perfect example in fulfilling the tips.

A **headline** is a line of words printed in large letters at the top of a visualization to communicate what data is being presented. It is the attention grabber that makes your audience want to read more.

A **subtitle** supports the headline by adding more context and description. Adding a subtitle will help the audience better understand the details associated with your chart. Typically, the text for subtitles has a smaller font size than the headline.

Labels that identify

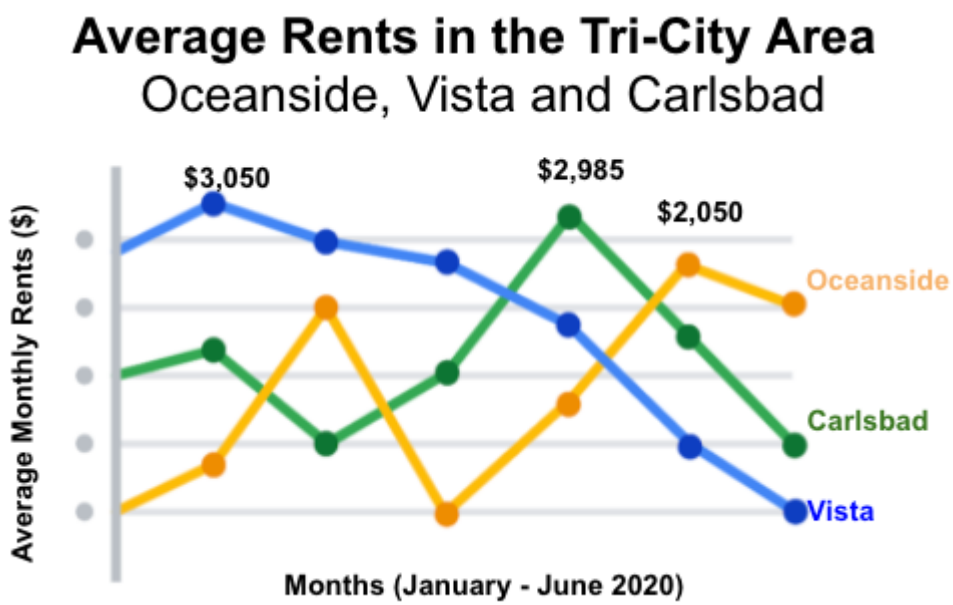
A **label** in a visualization identifies data in relation to other data. Most commonly, labels in a chart identify what the x-axis and y-axis show. Always make sure you label your axes. We can add "**Months (January - June 2020)**" for the x-axis and "**Average Monthly Rents ($)**" for the y-axis in the average rents chart.

Annotations that focus

An **annotation** briefly explains data or helps focus the audience on a particular aspect of the data in a visualization.

Visualization components	Guidelines	Style checks
Headlines	- **Content**: Briefly describe the data - **Length**: Usually the width of the data frame - **Position**: Above the data	- Use brief language - Don't use all caps - Don't use italic - Don't use acronyms - Don't use abbreviations - Don't use humor or sarcasm
Subtitles	- **Content**: Clarify context for the data - **Length**: Same as or shorter than headline - **Position**: Directly below the headline	- Use smaller font size than headline - Don't use undefined words - Don't use all caps, bold, or italic - Don't use acronyms - Don't use abbreviations
Labels	- **Content**: Replace the need for legends - **Length**: Usually fewer than 30 characters - **Position**: Next to data or below or beside axes	- Use a few words only - Use thoughtful color-coding - Use callouts to point to the data - Don't use all caps, bold, or italic
Annotations	- **Content**: Draw attention to certain data - **Length**: Varies, limited by open space - **Position**: Immediately next to data annotated	- Don't use all caps, bold, or italic - Don't use rotated text - Don't distract viewers from the data

Table 2: Pro Tips for Data Visualization



Picture 10: Example of perfect key information highlights

Moving from understanding the tips for highlighting the key information. We now are able to design a chart within 60 minutes with most time allocation of 20 minutes each for sketch & design, prototype & improve.

Correlation and causation

In this reading, you will examine correlation and causation in more detail. Let's review the definitions of these terms:

- **Correlation** in statistics is the measure of the degree to which two variables move in relationship to each other. An example of correlation is the idea that "As the temperature goes up, ice cream sales also go up." It is important to remember that correlation doesn't mean that one event causes another. But, it does indicate that they have a pattern with or a relationship to each other. If one variable goes up and the other variable also goes up, it is a positive correlation. If one variable goes up and the other variable goes down, it is a negative or inverse correlation. If one variable goes up and the other variable stays about the same, there is no correlation.
- **Causation** refers to the idea that an event leads to a specific outcome. For example, when lightning strikes, we hear the thunder (sound wave) caused by the air heating and cooling from the lightning strike. Lightning causes thunder.

What to avoid	Why
Cutting off the y-axis	Changing the scale on the y-axis can make the differences between different groups in your data seem more dramatic, even if the difference is actually quite small.
Misleading use of a dual y-axis	Using a dual y-axis without clearly labeling it in your data visualization can create extremely misleading charts.
Artificially limiting the scope of the data	If you only consider the part of the data that confirms your analysis, your visualizations will be misleading because they don't take all of the data into account.
Problematic choices in how data is binned or grouped	It is important to make sure that the way you are grouping data isn't misleading or misrepresenting your data and disguising important trends and insights.
Using part-to-whole visuals when the totals do not sum up appropriately	If you are using a part-to-whole visual like a pie chart to explain your data, the individual parts should add up to equal 100%. If they don't, your data visualization will be misleading.
Hiding trends in cumulative charts	Creating a cumulative chart can disguise more insightful trends by making the scale of the visualization too large to track any changes over time.
Artificially smoothing trends	Adding smooth trend lines between points in a scatter plot can make it easier to read that plot, but replacing the points with just the line can actually make it appear that the point is more connected over time than it actually was.

The wonderful world of visualizations

As a data analyst, you will often be tasked with relaying information and data that your audience might not readily understand. Presenting your data visually is an effective way to communicate complex information and engage your stakeholders. One question to ask yourself is: "what is the best way to tell the story within my data?" This reading includes several options for you to choose from (although there are many more).

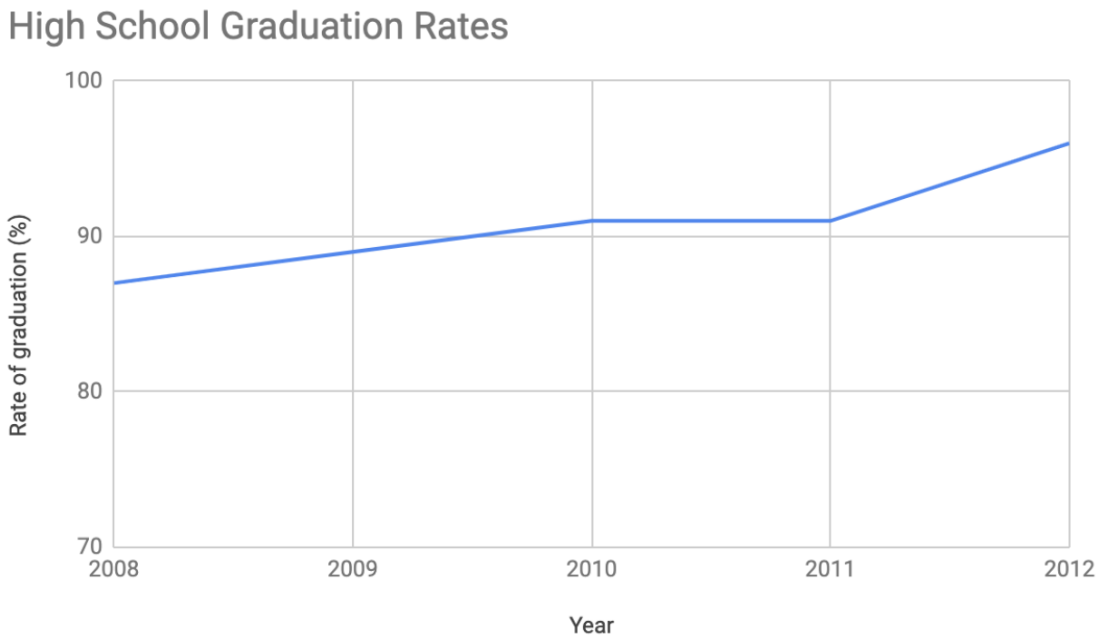
Line chart

A **line chart** is used to track changes over short and long periods of time. When smaller changes exist, line charts are better to use than bar graphs. Line charts can also be used to compare changes over the same period of time for more than one group.

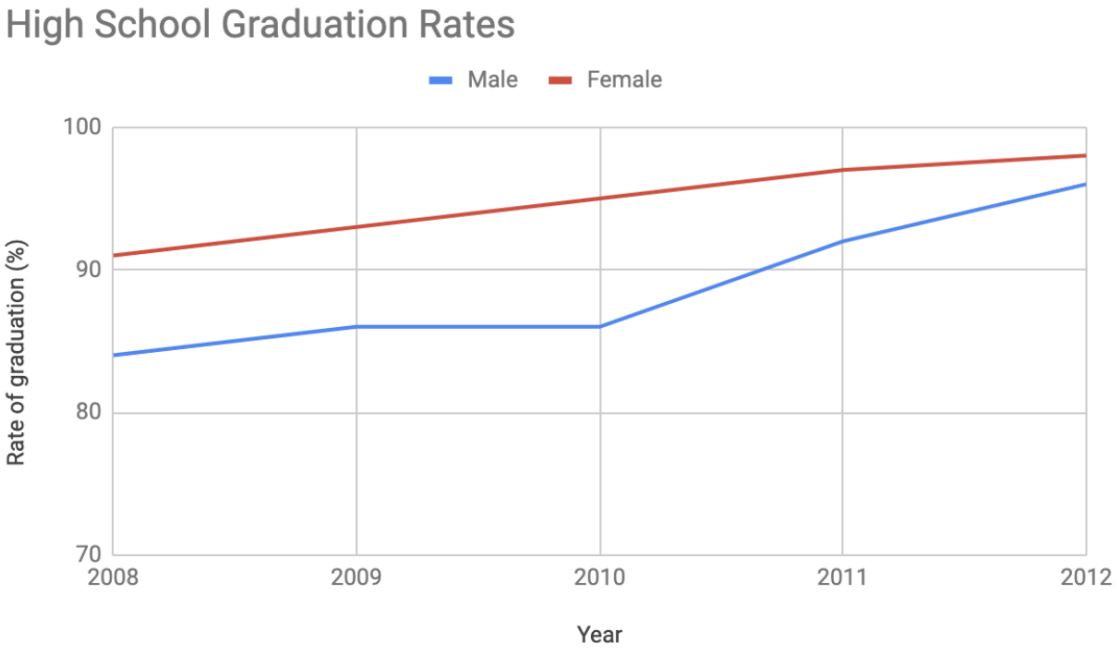
Let's say you want to present the graduation frequency for a particular high school between the years 2008-2012. You would input your data in a table like this:

Year	Graduation rate
2008	87
2009	89
2010	92
2011	92
2012	96

From this table, you are able to present your data in a line chart like this:



Maybe your data is more specific than above. For example, let's say you are tasked with presenting the difference of graduation rates between male and female students. Then your chart would resemble something like this:



Column chart

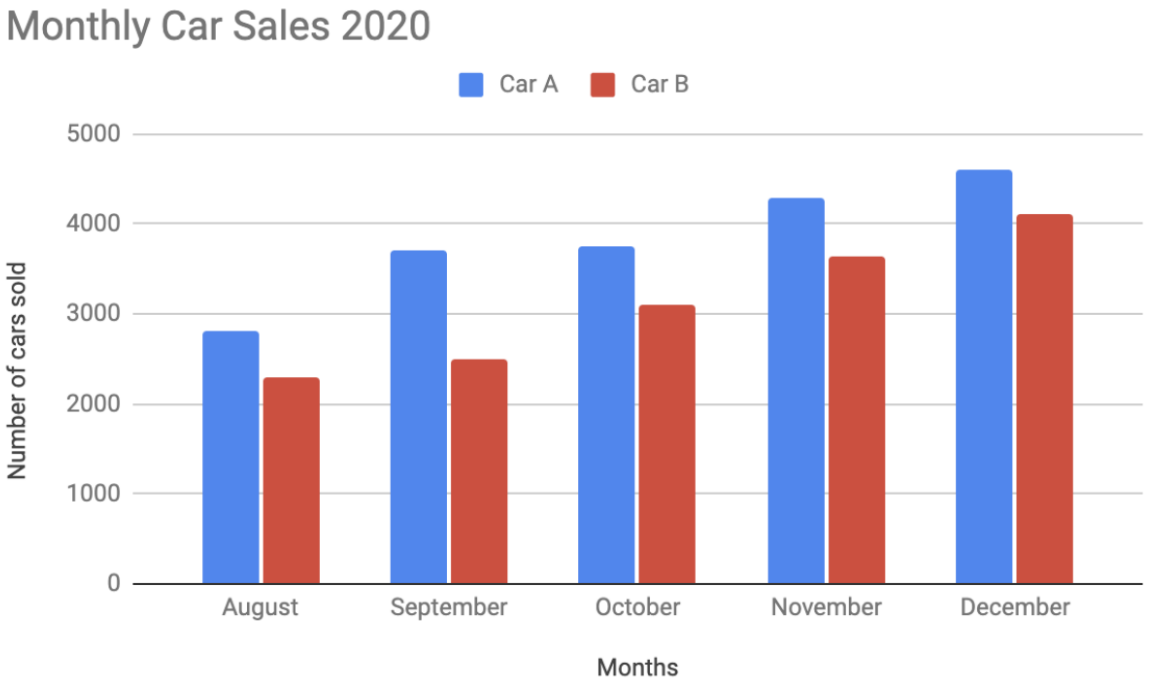
Column charts use size to contrast and compare two or more values, using height or lengths to represent the specific values.

The below is example data concerning sales of vehicles over the course of 5 months:

Month	Vehicles sold
August	2,800
September	3,700
October	3,750
November	4,300
December	4,600

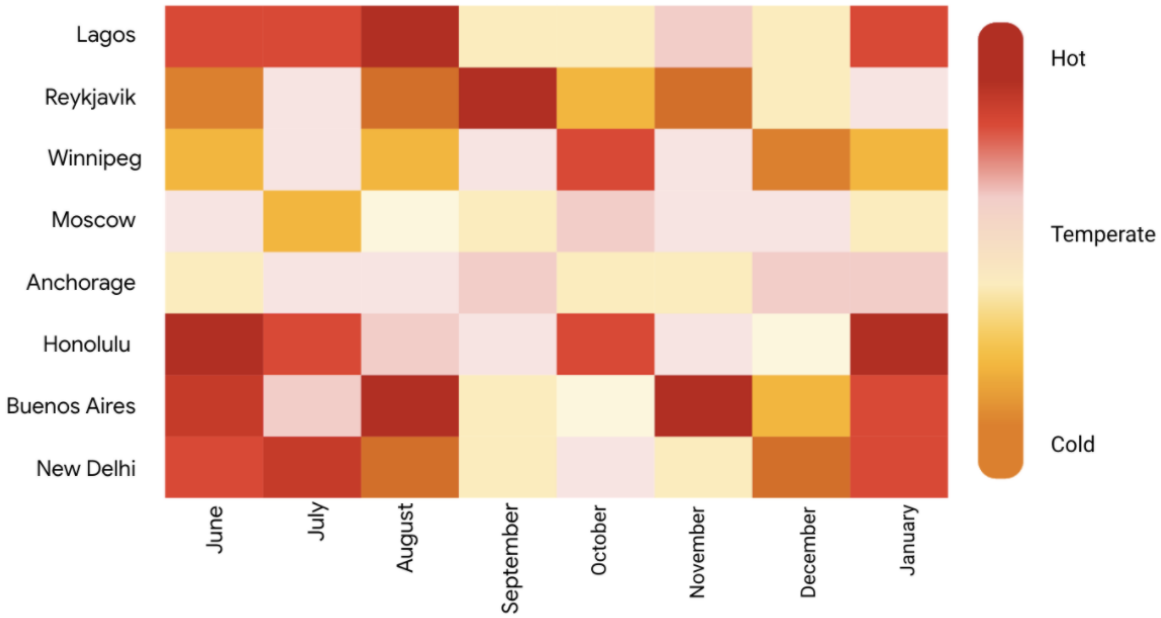
Visually, it would resemble something like this:

What would this column chart entail if we wanted to add the sales data for a competing car brand?



Heatmap

Similar to bar charts, **heatmaps** also use color to compare categories in a data set. They are mainly used to show relationships between two variables and use a system of color-coding to represent different values. The following heatmap plots temperature changes for each city during the hottest and coldest months of the year.



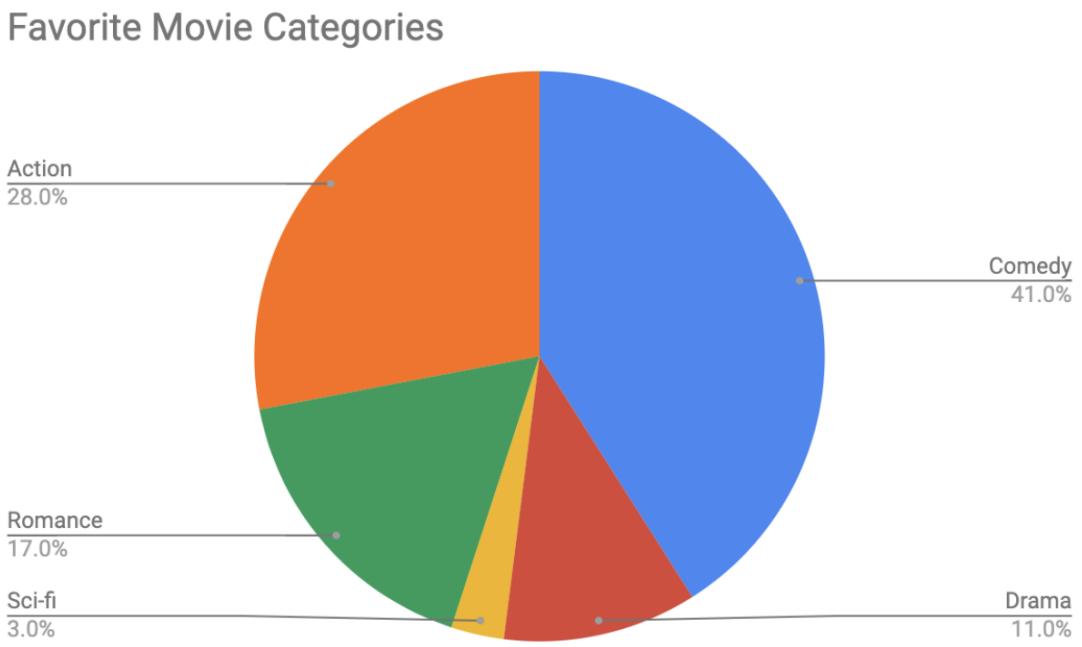
Pie chart

The **pie chart** is a circular graph that is divided into segments representing proportions corresponding to the quantity it represents, especially when dealing with parts of a whole.

For example, let's say you are determining favorite movie categories among avid movie watchers. You have gathered the following data:

Movie category	Preference
Comedy	41%
Drama	11%
Sci-fi	3%
Romance	17%
Action	28%

Visually, it would resemble something like this:

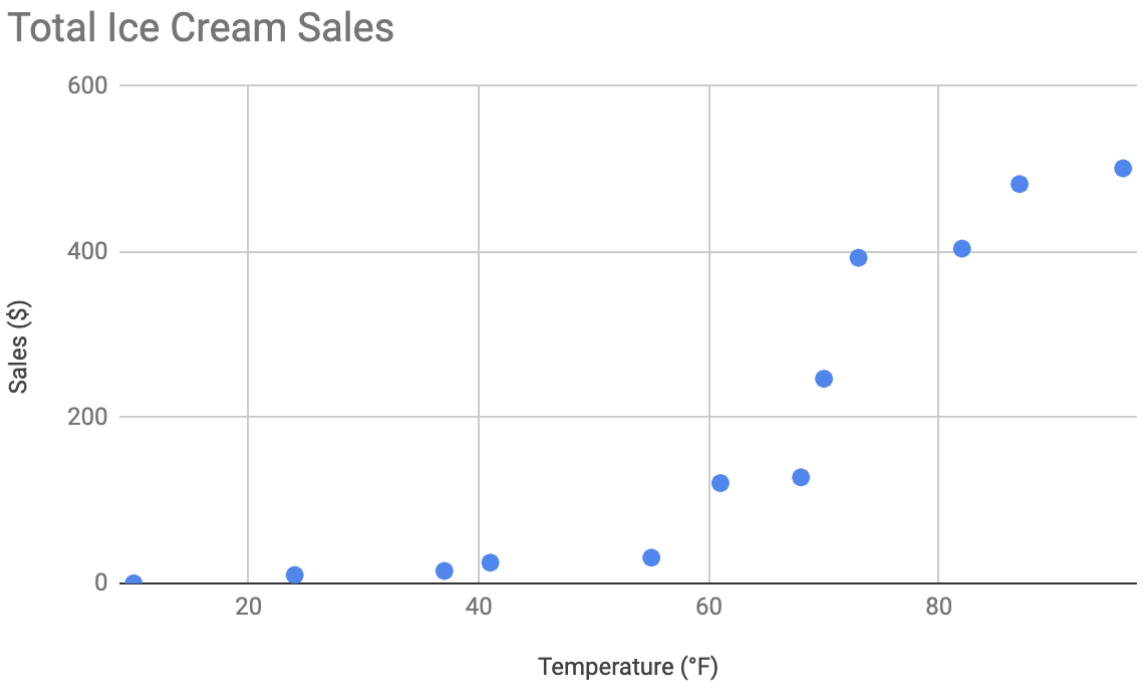


Action- 28% Comedy- 41% Romance- 17% Sci-fi- 3% Drama- 11%

Scatter plot

Scatter plots show relationships between different variables. Scatter plots are typically used for two variables for a set of data, although additional variables can be displayed.

For example, you might want to show data of the relationship between temperature changes and ice cream sales. It would resemble something like this:

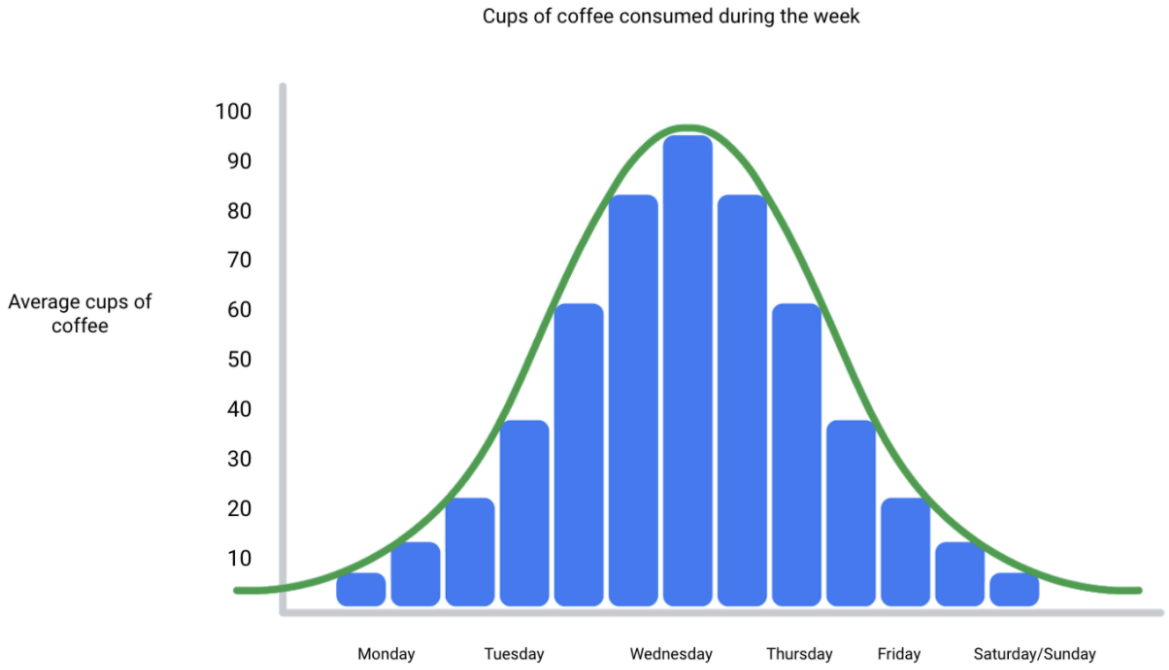


As you may notice, the higher the temperature got, the more demand there was for ice cream – so the scatter plot is great for showing the relationship between the two variables.

Distribution graph

A **distribution graph** displays the spread of various outcomes in a dataset.

Let's apply this to real data. To account for its supplies, a brand new coffee shop owner wants to measure how many cups of coffee their customers consume, and they want to know if that information is dependent on the days and times of the week. That distribution graph would resemble something like this:

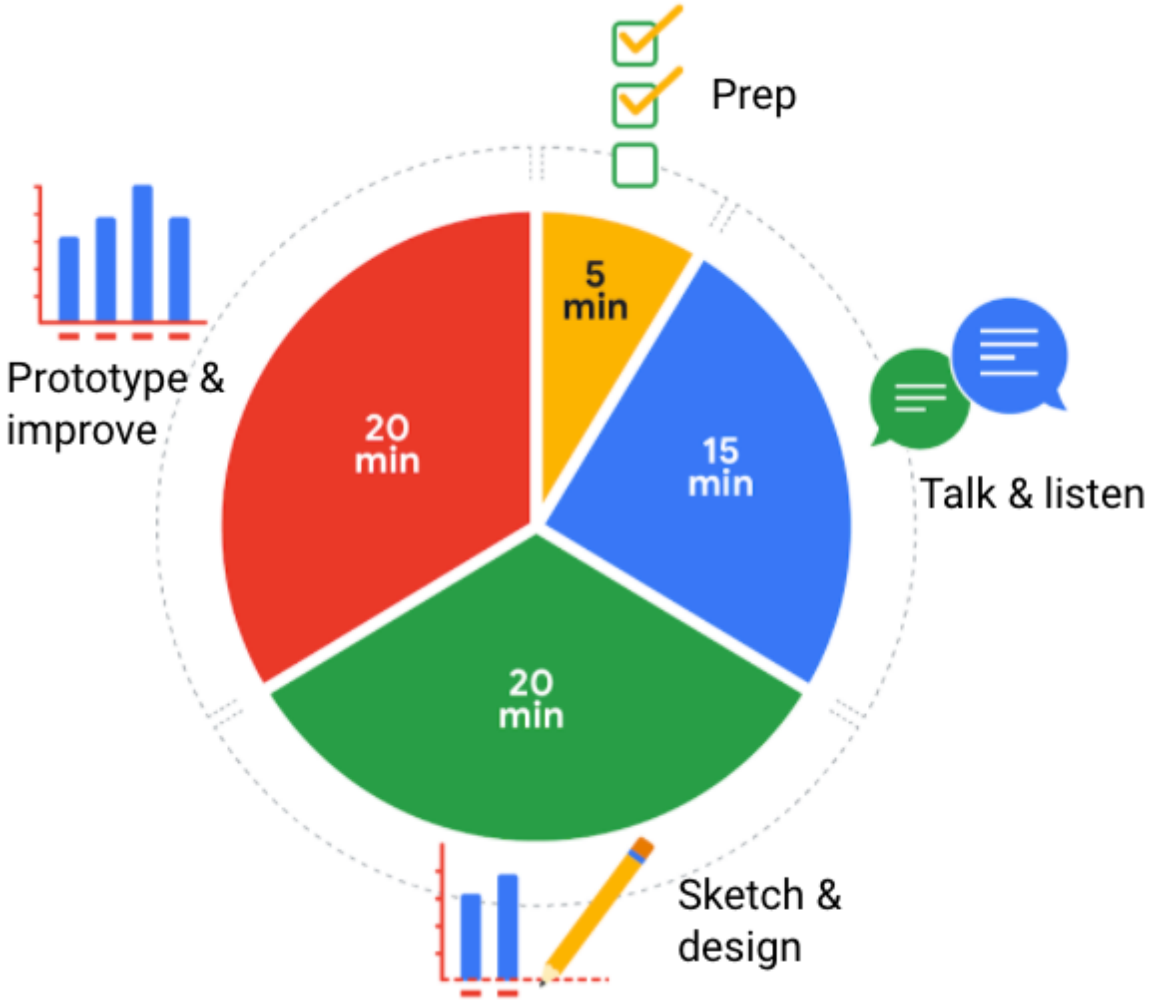


From this distribution graph, you may notice that the amount of coffee sales steadily increases from the beginning of the week, reaching the highest point mid-week, and then decreases towards the end of the week.

If outcomes are categorized on the x-axis by distinct numeric values (or ranges of numeric values), the distribution becomes a **histogram**. If data is collected from a customer rewards program, they could categorize how many customers consume between one and ten cups of coffee per week. The histogram would have ten columns representing the number of cups, and the height of the columns would indicate the number of customers drinking that many cups of coffee per week.

Reviewing each of these visual examples, where do you notice that they fit in relation to your type of data? One way to answer this is by evaluating patterns in data. Meaningful patterns can take many forms, such as:

- **Change:** This is a trend or instance of observations that become different over time. A great way to measure change in data is through a line or column chart.
- **Clustering:** A collection of data points with similar or different values. This is best represented through a distribution graph.
- **Relativity:** These are observations considered in relation or in proportion to something else. You have probably seen examples of relativity data in a pie chart.
- **Ranking:** This is a position in a scale of achievement or status. Data that requires ranking is best represented by a column chart.
- **Correlation:** This shows a mutual relationship or connection between two or more things. A scatter plot is an excellent way to represent this type of data pattern.



Picture 11: Chart construction time allocation

Data pre-processing techniques that play a key role in the process are :

- Data cleansing
- Data Manipulation
- Data normalization
- Data Transformation
- Missing values imputation
- Noise identification
- Minimizing the pre-processing tasks

2.5 Data Visualization in Business

Companies tend to rely on dashboards (a compilation of several related data visualizations) to give them high-level insights on company-wide, market-level, or employee-level performance. The following are some common applications of dashboards in business.

Application	Description
Sales & Marketing	This is one of the most popular uses for dashboards. Companies like to regularly track their revenue, conversions, lead sources, etc. and rely on data visualization to synthesize these large and constantly updated data into visual summaries.Funnel reporting in terms of sales velocity and efficiency, Camparing ROI, distribution of opportunities and leads across region, time, etc are some of the matrices which requires dashboards and visualization on latest as well as historic data. Sales and Marketing teams are one of the major consumers of BI tools driven reporting and monitoring dashboards.
Customer Success	These dashboards can be created by the team, but are also often built into customer service platforms such as Zendesk. They include various KPIs of the customer success team, such as the ratio of tickets open to tickets closed and time to resolution.
Product Management	These dashboards tend to synthesize sales, marketing, and customer research data together and are typically used for executive reporting. The visuals display metrics such as dollars and hours devoted to various projects and most requested features by customers.
Clinical Performance Management	Data visualizations are also helpful in the healthcare industry to monitor healthcare systems operations, clinical performance monitoring and patient profiling. Healthcare provider organizations (hospitals and health systems) can better examine their clinical, administrative and financial data to support clinical costing and resource coordination, better-planned care for patients and provide competitive advantage alongside maintaining quality standards.
Finance	Finance is another popular domain where dashboards help cover a variety of aspects such as- profit & loss, cash flow management, revenue, profit margin, cost heads etc. Finance dashboards can often be helpful in identifying trends on revenue, profitability, cash flows, accounts payable, day sales outstanding and so on. A key area to leverage finance dashboards is identifying performance of key metrics over a period of time and creating and comparing performance against internal (and/or external) benchmarks. There is no dearth of data that can flow into a financial dashboard!
Human Resources	Human resource is another critical functional domain where dashboards and reporting play a key role. HR and People Analysts are actively hired across organizations for measuring employee productivity, attrition or turnover rates, understanding training costs per employee, recruiting conversion rate, average employee retention period, cost per hire and so on. Human resource can constitute one of the major cost heads for most service companies and hence drives the need for HR management and reporting.

2.6.1 Data Mining and Data Visualization

According to a paper in 2018(EDUCBA 2018), there are some key differences between data mining and data visualizations as suggested below:

Data Mining involves different processes such as data extraction, data management, data transformations, data pre-processing, etc.

Data Visualization, the primary goal is to convey the information efficiently and clearly without any deviations or complexities in the form of statistical graphs, information graphs, and plots.

The author has also listed top 7 comparisons between data mining and data visualization, and 12 key differences between them. The article provides a very clear understanding of each of these techniques.

BASIS FOR COMPARISON	Data Mining	Data Visualization
Definition	Searches and produces a suitable result from large data chunks	Gives a simple overview of complex data
Preference	This has different applications and is preferred for web search engines	Preferred for data forecasting and predictions
Area	Comes under data science	Comes under the area of data science
Platform	Operated with web software systems or applications	Supports and works better in complex data analyses and applications
Generality	New technology but underdeveloped	More useful in real time data forecasting
Algorithm	Many algorithms exist in using data mining	No need of using any algorithms
Integration	Runs on any web-enabled platform or with any applications	Irrespective of hardware or software, it provides visual information

Part 2: Tableau Data Visualization

In this part, we are going to focus more on technical knowledge about visualizing data in Tableau.

Set up data sources

This page links to other resources explaining how to **set up your data sources** and prepare them for analysis once you have connected them to your Tableau account. It specifically includes articles explaining how to join or blend data, and what a union is and how they work. This is a great starting point as you get ready to begin using and combining data sources.

Join your data
Joining refers to the process of combining data sources based on common fields. This article gives a more detailed explanation of the different joins, how to use them in Tableau, and an example join with a step-by-step guide.

Don't be scared of relationships
Relationships allow you to combine multiple data sources in Tableau. This is a more flexible alternative to joins, and doesn't force you to create one single table with your multiple data sources. This article will give you more insight into how relationships work.

How relationships differ from joins
This article goes into more detail about the differences between using **relationships and joins**, and guides you through the process of using relationships to combine data.

Blend your data
Data blending is another method you can use to combine multiple data sources. Instead of truly combining the data, blends allow you to query and aggregate data from multiple sources. This resource goes into more detail about blending and includes a tutorial.

Combining multiple date fields
This resource provides examples that explain how to **combine date fields** when using four different methods of data combination in Tableau.

Part 3 Crafting stories with Data

Good data story telling is more about communicating a narrative that is customized for a particular audience or purpose. In observing visualization to strengthen the overall storytelling, we need to do a "tour":

1. **Setting context:**
   How does the visualization help set the context?
   How does the visualization help clarify the data?
   Do you notice a data visualization best practice?

2. **Analyzing variables:**
   How does the visualization perform against the five-second rule?
   How does the visualization help clarify the data?
   Do you notice a data visualization best practice?

3. **Drawing conclusions:**
   How does the visualization help make a point?
   How does the visualization help clarify the data?
   Do you notice a data visualization best practice?

Live versus static

Identifying whether data is live or static depends on certain factors:

- How old is the data?
- How long until the insights are stale or no longer valid to make decisions?
- Does this data or analysis need updating on a regular basis to remain valuable?

Static data involves providing screenshots or snapshots in presentations or building dashboards using snapshots of data. There are pros and cons to static data.

PROS

- Can tightly control a point-in-time narrative of the data and insight
- Allows for complex analysis to be explained in-depth to a larger audience

CONS

- Insight immediately begins to lose value and continues to do so the longer the data remains in a static state
- Snapshots can't keep up with the pace of data change

Live data means that you can build dashboards, reports, and views connected to automatically updated data.

PROS

- Dashboards can be built to be more dynamic and scalable
- Gives the most up-to-date data to the people who need it at the time when they need it
- Allows for up-to-date curated views into data with the ability to build a scalable "single source of truth" for various use cases
- Allows for immediate action to be taken on data that changes frequently
- Alleviates time/resources spent on processes for every analysis

CONS

- Can take engineering resources to keep pipelines live and scalable, which may be outside the scope of some companies' data resource allocation
- Without the ability to interpret data, you can lose control of the narrative, which can cause data chaos (i.e. teams coming to conflicting conclusions based on the same data)
- Can potentially cause a lack of trust if the data isn't handled properly

Part 4: Effective Presentation

In more technical part of building a presentation deck, we better make sure following best practices checked:

- Include a title, subtitle, and date
- Use a logical sequence of slides

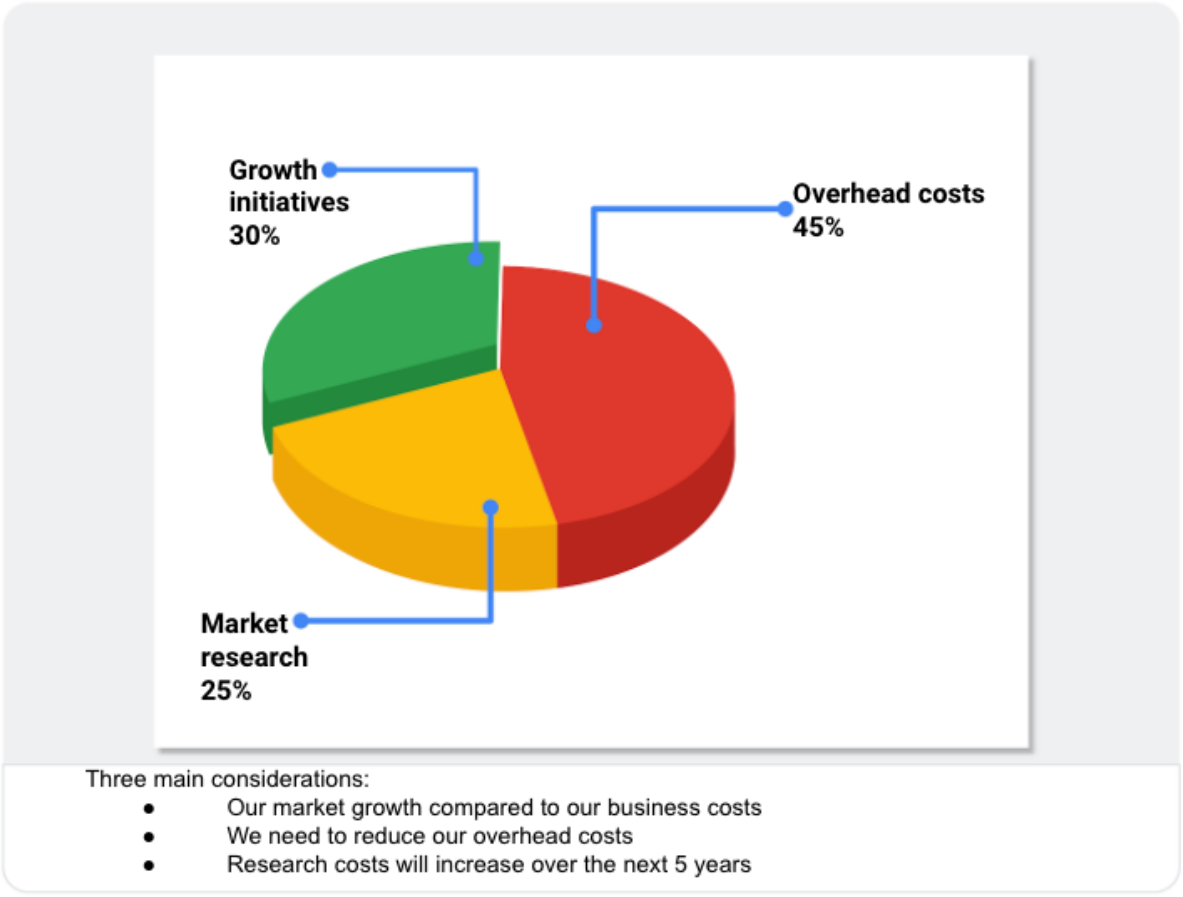
- Provide an agenda with a timeline
- Limit the amount of text on slides. Your audience should be able to scan each block of text on your slides within 5 seconds
- Start with the business task. Focus on the business task and frame the information in the context of the business task.
- Establish the initial hypothesis
- Show what business metrics you used
- Use visualizations
- Introduce the graphic by name
- Provide a title for each graph
- Go from the general to the specific
- Use speaker notes to help you remember talking points
- Include key takeaways

And next part are tips and tricks the data and results:

Tip 1: Know your flow

Picture 12: Presentation flow

Tip 2: Prepare talking points and limit text on slides



Picture 13: Talking points in bottom of PPT slide page

Tip 3: End with your recommendations

Tip 4: Allow enough time for the presentation and questions

Furthermore, in putting all slide together, we can arrange the layout in this order: *agenda* where we provide a high-level bulleted list of the topics you will cover and the amount of time you will spend on each, *purpose, data/analysis, pitch, call to action.*

Picture 14: Presentation in order

Last but not least, as a presenter we need to be prepared for question and answer. In addition, we can prepare before and during the presentation.

Before presentation:

1. Assemble and prepare your questions.
2. Discuss your presentation with your manager, other analysts, or other friendly contacts in your organization.
3. Ask a manager or other analysts what sort of questions were normally asked by your specific audience in the past.
4. Seek comments, feedback, and questions on the deck or the document of your analysis.
5. At least 24 hours ahead of the presentation, try and brainstorm tricky questions or unclear parts you may come across- this helps avoid surprises.
6. It never hurts to practice what you will be presenting, to account for any missing information or simply to calm your nerves.

During presentation:

1. Be prepared to respond to the things that you find and effectively and accurately explain your findings.
2. Address potential questions that may come up.

3. Avoid having a single question derail a presentation and propose following-up offline.
4. Put supplementary visualizations and content in the appendix to help answer questions.

Good data presentation

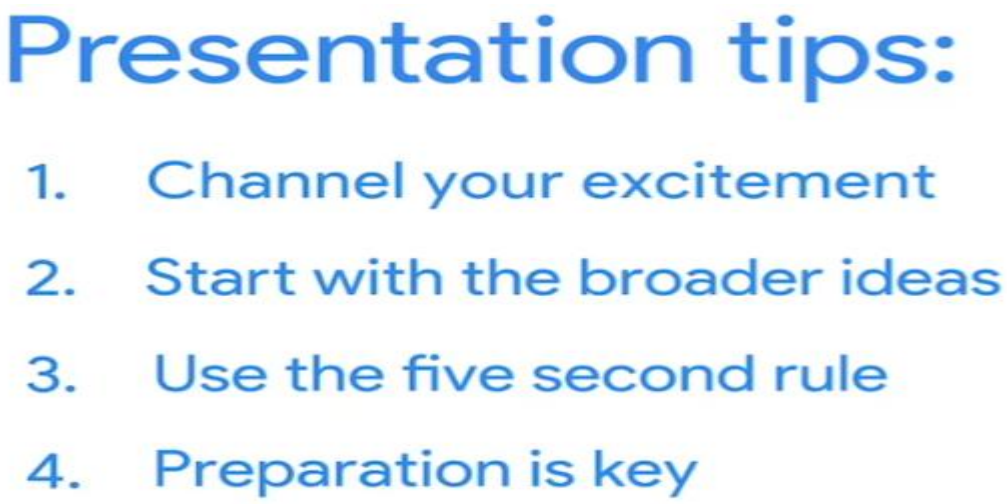
In the second video, numerous best practices are applied to create a better presentation on the same topic. This "good" presentation is so much easier to understand than the messy one! Here is a preview:

- Title and date the presentation was last updated
- Flow or table of contents
- Transition slides
- Visual introduction to the data (also used as a repeated theme)
- Animated bullet points
- Annotations on top of visuals
- Logic and progression
- Limitations to the data (caveats) - what the data can't tell you

Tip: As you watch this video, take notes about what Connor suggests to create a good presentation. You can keep these notes in your journal. When you create your own presentations, refer back to your notes. This will help you to develop your own thinking about the quality of presentations.

Good presentation: people are logically guided through the data

The good presentation logically guides the audience through the data – from the objectives at the beginning all the way to the conclusions at the end. Notice how the data visualizations are introduced using a common theme and are thoughtfully placed before each conclusion. A good presentation gives people in the audience the facts and data, helps them understand what the data means, and provides takeaways about how they can use their understanding to make a change or do some good.



Putting it all together: Your slide deck layout

In this section, we will describe how to put everything together in a sample slide deck layout.

First slide: Agenda

Provide a high-level bulleted list of the topics you will cover and the amount of time you will spend on each. Every company's norms are different, but in general, most presentations run from 30 minutes to an hour at most. Here is an example of a 30-minute agenda:

- Introductions (4 minutes)
- Project overview and goals (5 minutes)
- Data and analysis (10 minutes)
- Recommendations (3 minutes)
- Actionable steps (3 minutes)
- Questions (5 minutes)

Second slide: Purpose

Everyone might not be familiar with your project or know why it is important. They didn't spend the last couple of weeks thinking about the analysis and results of your project like you did. This slide summarizes the purpose of the project and why it is important to the business for your audience.

Here is an example of a purpose statement:

Service center consolidation is an important cost savings initiative. The aim of this project was to determine the impact of service center consolidation on customer response times.

Third slide: Data/analysis

First, It really is possible to tell your data story in a single slide if you summarize the key things about your data and analysis. You may have supporting slides with additional data or information in an appendix at the end of the presentation.

But, if you choose to tell your story using more than one slide, keep the following in mind:

- Slides typically have a logical order (beginning, middle, and end) to fully build the story.
- Each slide should logically introduce the slide that follows it. Visual cues from the slides or verbal cues from your talking points should let the audience know when you will go on to the next slide.
- Remember not to use too much text on the slides. When in doubt, refer back to the second tip on preparing talking points and limiting the text on slides.
- The high-level information that people read from the slides shouldn't be the same as the information you provide in your talking points. There should be a nice balance between the two to tell a good story. You don't want to simply read or say the words on the slides.

For extra visuals on the slides, use animations. For example, you can:

- Fade in one bullet point at a time as you discuss each on a slide.
- Only display the visual that is relevant to what you are talking about (fade out non-relevant visuals).
- Use arrows or callouts to point to a specific area of a visual that you are using.

Fourth slide: Recommendations

If you have been telling your story well in the previous slides, the recommendations will be obvious to your audience. This is when you might get a lot of questions about how your data supports your recommendations. Be ready to communicate how your data backs up your conclusion or recommendations in different ways. Having multiple words to state the same thing also helps if someone is having difficulty with one particular explanation.

Fifth slide: Call to action

Sometimes the call to action can be combined with the recommendations slide. If there are multiple actions or activities recommended, a separate slide is best.

Recall our example of a purpose statement: *Service center consolidation is an important cost savings initiative. The aim of this project was to determine the impact of service center consolidation on customer response times.*

Suppose the data analysis showed that service center consolidation negatively impacted customer response times. A call to action might be to examine if processes need to change to bring customer response times back to what they were before the consolidation.