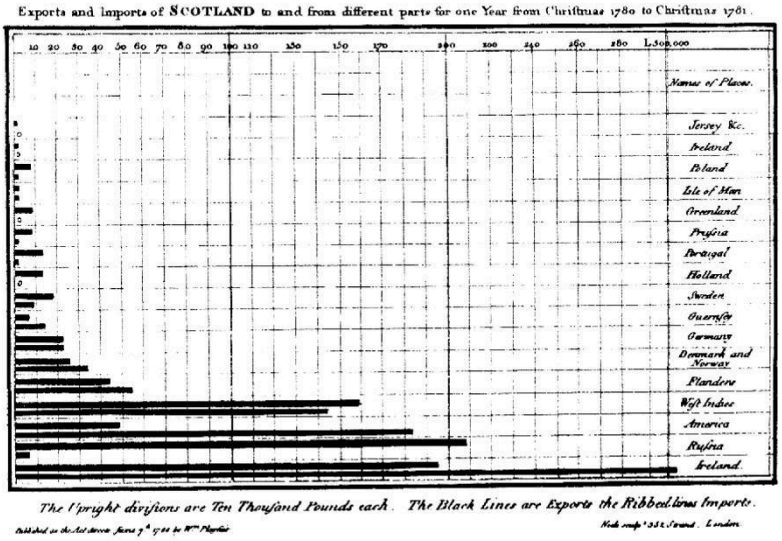
UNIT 2

Bar Chart

A bar chart or bar graph is a chart that represents categorical data with rectangular bars with heights proportional to the values that they represent. Here one axis of the chart plots categories and the other axis represents the value scale. The bars are of equal width which allows for instant comparison of data.

History of Bar Chart

Nicole Oresme, used a bar chart in the 14th century, in his publication titled – The Latitude of Forms where he plotted the velocity of a constantly accelerating object against time for the first time. Another visual representation of a bar chart came into the picture in 1765 when Joseph Priestley used individual horizontal bars to visualize the lifespan of a person and the whole chart to compare the life spans of multiple persons. However many sources still consider William Playfair to have invented the bar chart, where he represented the Exports and Imports of Scotland to and from different parts for one year published in The Commercial and Political Atlas which makes it known to be the first bar chart in history.



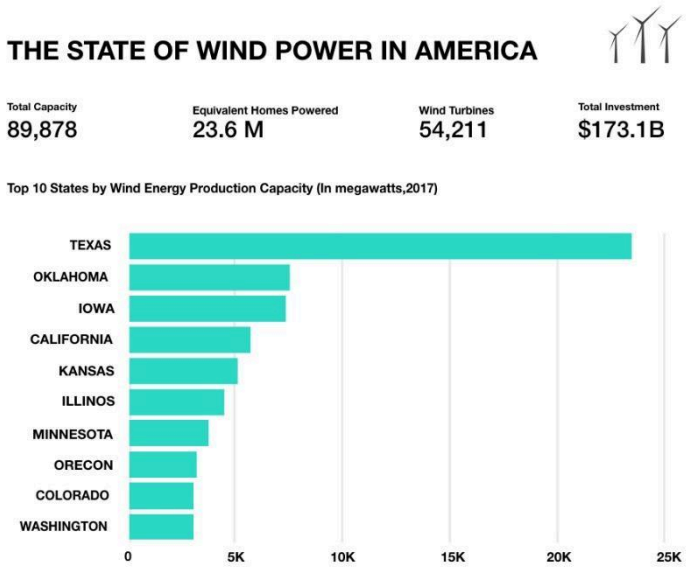
Nicole Oresme's chart The Latitude of Forms b) Exports and Imports of Scotland to and from different parts for one Year from Christmas 1780 to Christmas 1781 c) A Chart of Biography to serve as visual study for Joseph Priestly's Lectures on History and General Policy

When to Use a Bar Chart

1When you need to compare a large set of categorical values

Use bar graphs/charts to represent comparisons among discrete categories visually when categories are qualitative. Such categorical data is a grouping of data into discrete groups, such as the months of the year, age group, shoe sizes, and animals. Also use bar charts as an alternative to column charts for showing a larger set of data, where the vertical alignment of labels give more space for text to be easily read for each category. Technical analysts use bar

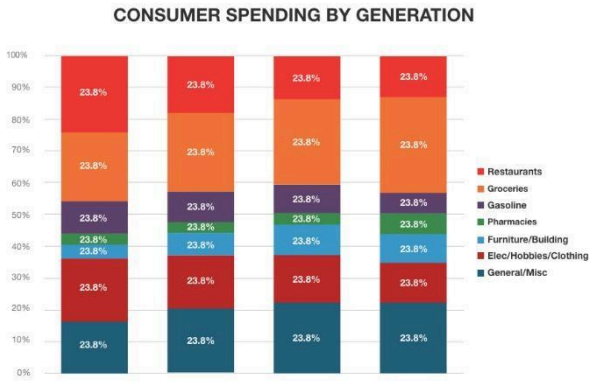
charts – or other chart types like candlesticks or line charts – to monitor the price performance of assets which aids in making trading decisions.



A bar chart comparing the wind energy production in different states of USA

When required to compare multiple categories or sub-categories simultaneously

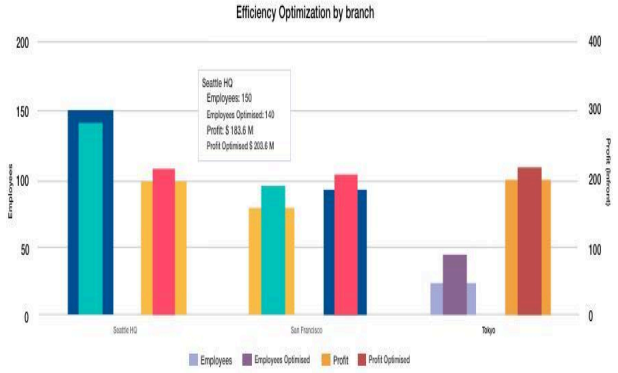
Use bar charts when comparison is required for both categories and subcategories, using bars clustered in groups of more than one, showing the values of more than one measured variable. 100% Stacked bar charts work really well here to indicate how much each sub-group contributed to its category's total. It can be used to compare how entities are performing against each other and how much did each of the sub-groups contribute to the whole.



Stacked bar chart comparing consumer spending across different categories for different generations

When you need to visualize two data sets on a single chart

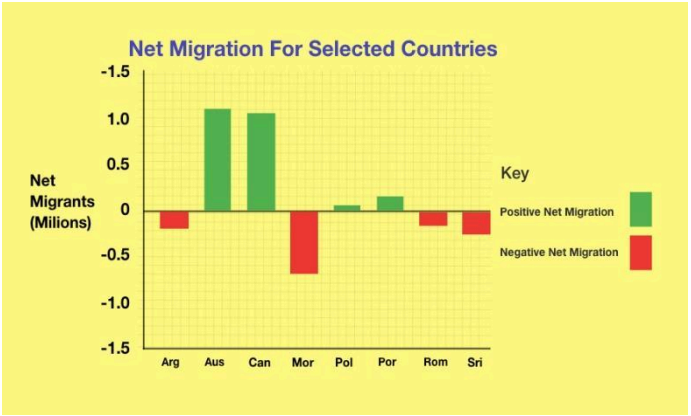
Use overlapping bar charts to allow comparison of similar data sets using differential width bars on the same chart. It can serve a dual purpose where on one axis, bars compare categories, while on the other they represent a discrete value. Also preferentially selecting or deselecting legend labels, a single data set can be viewed or a comparison of two data sets can be done simultaneously.



Overlapping bar chart comparing branch efficiency across locations in terms of people and profits

When you need to gather insights on deviations in data

Use column charts(vertical bar charts) when required to compare values that tend to go into negatives as well as positives. Alternatively, these charts can also be used to compare performance against an average benchmark or do a deviation analysis.



Column chart comparing net migration for different countries

Types of Bar Charts

1. Pareto charts

These charts are arranged from highest to lowest incidence.

2. Column or Vertical Bar Charts

The categories appear along the horizontal axis; the height of the bar corresponds to the value of each category. These charts are excellent for mapping data sets over a period of time.

3. Stacked Bar Chart

Stacked bars that represent different groups on top of each other. The height of the resulting bar shows the combined result of the groups.

4. Grouped Bar Chart

For each categorical group, there are two or more bars which are color-coded to represent a particular grouping.

When Not to Use a Bar Chart

1When you need to represent and compare a continuous set of data

Do not use Bar Graphs when you need to represent continuous ordered quantities. In case of continuous data (such as a person's height) needs to be represented then use a Histogram. It is a best practice to leave gaps between the bars of a Bar Graph, so it doesn't look like a Histogram.

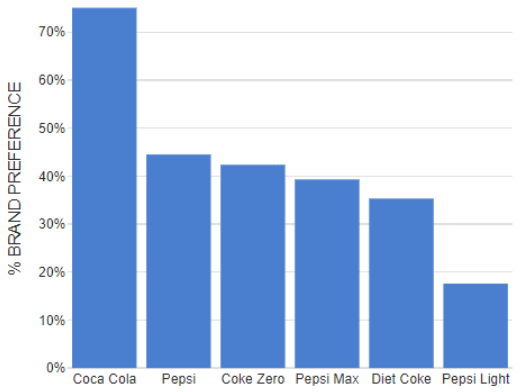
2When you need to represent trends in time and other variables

Use Line graphs to represent trends in numerous quantities over time, by using multiple lines instead of using bar graphs which will make it more difficult to visualize multiple trends even with stacked or group charts. Line graphs have an advantage in that it's easier to see small changes on line graphs than bar graphs, and that the line makes the overall trends very clear.

Column Chart

A column chart is a data visualization where each category is represented by a rectangle, with the height of the rectangle being proportional to the values being plotted. Column charts are also known as vertical bar charts.

In the example below, the height of each bar is proportional to the percentage of people who listed each type of cola as being their favorite.



Create your own column chart

Required data

This visualization typically displays categories along the horizontal axis and values along the vertical axis. The chart above plots the data that is shown in the table below.

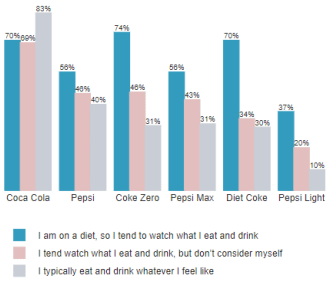
	%
Coca Cola	75%
Pepsi	44%
Coke Zero	42%
Pepsi Max	39%
Diet Coke	35%
Pepsi Light	17%

Create your own column chart

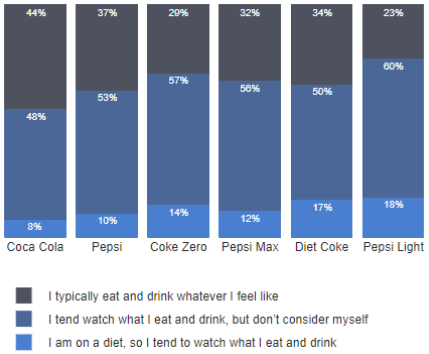
Main variants

There are many variations of the column chart. The main ones are:

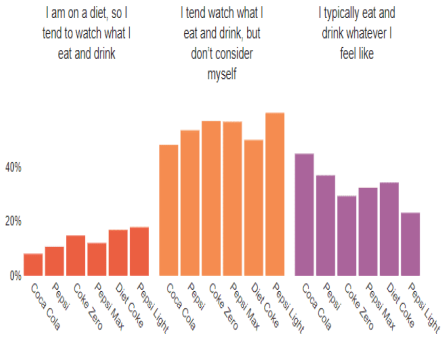
- Variants designed for dealing with multiple values for each category, including:



- *Clustered column chart*
- *Stacked column charts*



- *Small multiples*



- *Bar charts*, which are essentially the same, except that the whole chart is rotated by 90 degrees, with the data communicated by the width of the bars.
- *Pictograph column charts*, which replace the columns with images, with the goal of making the chart more recognizable and interesting (e.g., a column of height 5 for Coke may be replaced by cola cans).

Create your own column chart

Advantages of column charts

They are particularly useful when:

- **The data has a small number of discrete categories, with a single value for each category**. Where there are multiple values per category, the variables such as small multiples, cluster column charts, and stacked column charts, shown above, are superior.
- **The goal is to compare the values of each category**.
- **The intent is to make it simple for the viewer.** Column charts are arguably sometimes the best of all visualizations, as they tap into our instinctive ability to understand heights, whereas most other data visualizations require some degree of training for the reader to decode.

Limitations and alternatives

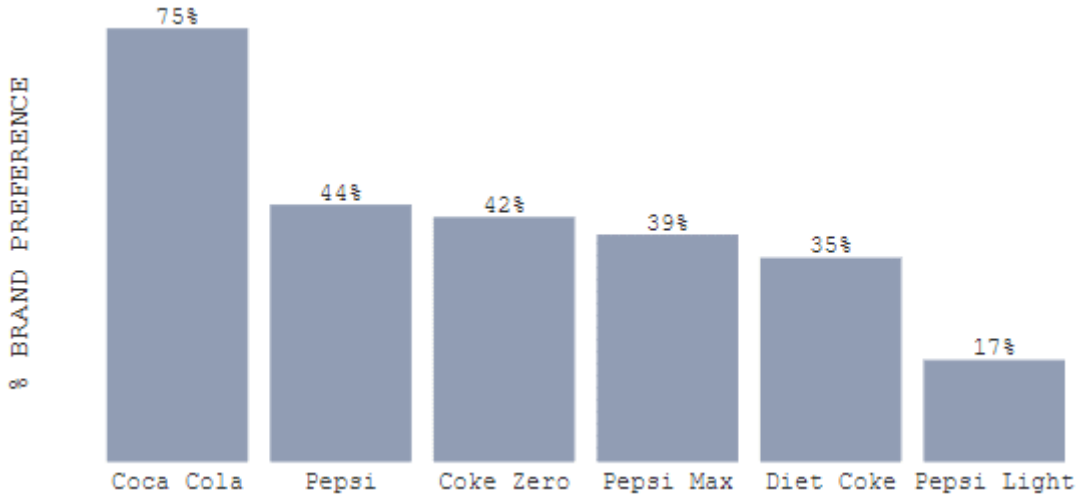
Column charts are a relatively poor choice when:

- **There are a very large number of categories**. With more than about ten data points, other visualizations such as *dot charts* or even *bubble clouds*, *donut charts*, *pie charts*, and *word clouds,* are often better.
- **It is interesting to look at the cumulative values of the categories**. In such situations pie charts, donut charts, and waterfall charts tend to be superior.
- **The values being represented are small counts** (numbers less than 10), in which case pictograph column charts and *minimal column charts* are often clearer and more interesting.
- **The intended audience has a low level of interest**. In this case, the variants of pictographs can be more visually engaging.
- **The values being represented are rates** (e.g., deaths per thousand), in which case *pictograph area and waffle charts* are better.

Create your own column chart

Tips on making a good column chart

- **Sort the categories, so that the highest category is on the left**, except where there is a natural order to the data (e.g., age categories).
- **The y-axis (vertical) axis should show the 0 value, with the column starting at 0**. Otherwise, the height of the bars becomes misleading.
- **Use a single color**. Multiple colors merely serve to distract.
- If you want the focus to be on the actual numbers, **consider removing the axes and placing the values at the ends of the columns, or inside the columns**. This is demonstrated in the example below. However, if the focus is intended to be on the trends, it is better to display the axes. When the chart is presented online, the values can then be shown when the user moves their mouse pointer over the columns.
- **The width of the columns should be wider than the gaps between, and the gaps need to be big enough that the columns are distinct,** as otherwise, the visualization focuses the viewer's eye more on evaluating the shape than on comparing the height of the columns.



Column chart software

There are many software packages in the world that can create column charts. The only trick is that often they do not have their own option, and you need to instead first create a bar chart and then choose an option telling the software to draw it vertically.

What is pie chart in data visualization?



A pie chart is a graphical representation technique that displays data in a circular-shaped graph. It is a composite static chart that works best with few variables. Pie charts are often used to represent sample data—with data points belonging to a combination of different categories.

A pie chart is a type of data visualization that represents data as slices of a circle. It is commonly used to display categorical data and illustrate the proportion or percentage distribution of different categories within a whole.

Here are the key components and characteristics of a pie chart:

1. Circle: The entire chart represents the whole or the total. It is typically represented as a circle, which is divided into slices.

2. Slices: Each slice of the pie chart represents a specific category or group within the data. The size of each slice is proportional to the value or percentage it represents in relation to the whole.

3. Category Labels: Labels are assigned to each slice to identify the corresponding category or group it represents. These labels are usually placed outside the chart near the corresponding slice or inside the slice itself.

4. Data Values or Percentages: Pie charts often include data values or percentages associated with each category. These values provide additional information about the distribution or proportion of each category.

5. Colors: Different colors or patterns are used to differentiate each slice and make it visually distinct from the others. The color choice should be intuitive and easy to distinguish.

6. Legend: If there are many categories or groups, a legend may be included to provide a clear explanation of the colors or patterns used in the chart.

Pie charts are useful for visualizing data that consists of discrete categories or groups. They effectively show how the parts contribute to the whole and make it easy to compare the relative sizes of different categories. However, it is important to note that pie charts can become less effective when there are too many categories or when the differences between categories are small.

When creating a pie chart, it's essential to ensure that the data is accurately represented, and the chart is easy to understand and interpret. Labeling the slices and providing additional information can enhance the clarity and usefulness of the chart. Additionally, it's worth considering other types of charts, such as bar charts or stacked bar charts, if the data involves a large number of categories or requires more precise comparisons.

Why is a pie charts a good data visualization?

Advantages of a Pie Chart

It represents data visually as a fractional part of a whole, which can be an effective communication tool for the even uninformed audience. It enables the audience to see a data comparison at a glance to make an immediate analysis or to understand information quickly.

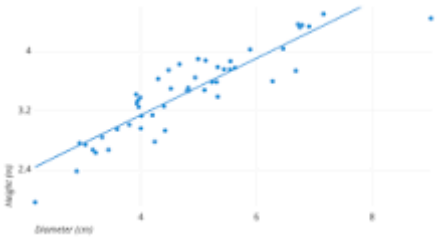
What would a pie chart be an effective visualization?

Pie charts are commonly used in statistical analysis, research, and data visualization to communicate data to a broader audience in a simple and intuitive way. They are especially useful for showing the relative size of each data point and comparing data points to each other.

Scatter Plot in data visualization

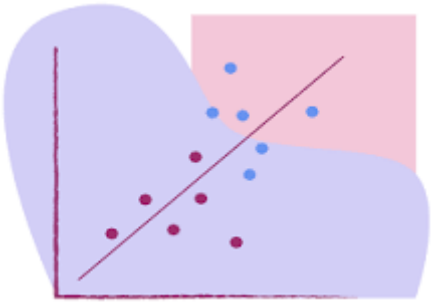
Scatter plots are the graphs that present the relationship between two variables in a data-set. It represents data points on a two-dimensional plane or on a Cartesian system. The independent variable or attribute is plotted on the X-axis, while the dependent variable is plotted on the Y-axis.

What is the purpose of a scatter plot?



A scatter plot (aka scatter chart, scatter graph) uses dots to represent values for two different numeric variables. The position of each dot on the horizontal and vertical axis indicates values for an individual data point. Scatter plots are used to observe relationships between variables.

What are scatter plots and its advantages in visualizing data?

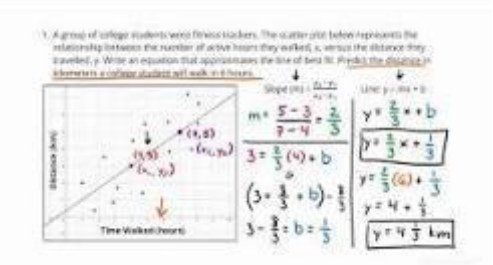


They identify correlation. Scatter plots allow you to compare two seemingly unrelated variables and determine the relationship between them. They're nonlinear. Many statistical graphs only allow you to record and interpret linear data, while scatter plots can display curved or irregular data points.

What data type is a scatter plot?

A scatterplot is a type of data display that shows the relationship between two numerical variables. Each member of the dataset gets plotted as a point whose (x , y) (x, y) (x,y)left parenthesis, x, comma, y, right parenthesis coordinates relates to its values for the two variables.

What is the formula for scatter plot?



The equation of a line of fit for the given scatter plot is y = m x + b , where m is the slope found in step 2 and b is the y-intercept found in step 3.

What are scatter plots most suitable for Visualising?

A: While scatter plots are most commonly used to visualize the relationship between two variables, they can also be extended to incorporate additional variables. By introducing color

coding or size variations, a scatter plot can effectively represent three or more variables, providing a more comprehensive analysis.

What are the several types of scatter plots? There are three types of scatter plots or charts: U-shaped, linear and exponential. These are the three most important ones: positive, negative, or no correlation.

What is a scatter diagram also called?

The scatter diagram is also called a scatter plot chart, XY chart, and correlation chart. A scatter diagram is a two-dimensional graphical representation of a set of data. The scatter diagram graphs pairs numerical data with one variable on each axis to look for a relationship between them.

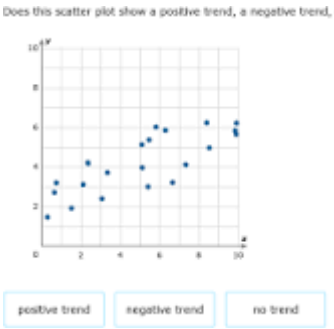
What is scatter diagram method?

The Scatter diagram method is a simple representation that is popularly used in commerce and statistics to find the correlation between two variables. These two variables are plotted along the X and Y axis on a two-dimensional graph and the pattern represents the association between these given variables.

What is scatter diagram with example?

Scatter Diagram – Definition

A scatter diagram is used to examine the relationship between both the axes (X and Y) with one variable. In the graph, if the variables are correlated, then the point drops along a curve or line. A scatter diagram or scatter plot gives an idea of the nature of relationship.
What are the trends of scatter plot?



A scatter plot shows a positive trend if y tends to increase as x increases. A scatter plot shows a negative trend if y tends to decrease as x increases. A scatter plot shows no trend if there is no obvious pattern.

What do you need to know about your audience when visualizing data?

You must know your target audience and take into consideration how familiar they are with the concepts being represented by the data and if they have the capacity to easily interpret the charts and graphs represented.

Data Visualization for Marketing Managers: Meeting the Needs of Modern Marketers"

Key Needs of Marketing Managers in Data Visualization:

1. Clear and Intuitive Representation: Marketing managers require data visualizations that are visually appealing, easy to understand, and provide a clear representation of complex marketing data. They need visualizations that effectively communicate marketing insights and trends, enabling them to make informed decisions.

2. Real-Time Tracking and Analysis: Marketing managers need data visualizations that offer real-time tracking and analysis capabilities. They should be able to monitor campaign performance, customer behavior, and market trends in real-time, allowing them to quickly respond to changes and optimize marketing strategies accordingly.

3. Interactive and Exploratory Features: Interactive data visualizations are essential for marketing managers to explore data at various levels of granularity. They need features like drill-down, filtering, and highlighting to delve deeper into specific marketing metrics, identify patterns, and gain actionable insights.

4. Multichannel Integration: Marketing managers operate across multiple channels, including social media, email marketing, paid advertising, and more. Their data visualization tools should integrate data from various sources and present a unified view, enabling them to analyze cross-channel performance and identify opportunities for optimization.

5. Performance Measurement and ROI Analysis: Marketing managers need data visualizations that help measure campaign performance and assess return on investment (ROI). They require metrics such as conversion rates, customer acquisition costs, revenue attribution, and marketing attribution models to evaluate the effectiveness of marketing efforts accurately.

6. Predictive Analytics and Forecasting: Anticipating future trends and making data-driven projections are vital for marketing managers. Data visualizations with predictive analytics and forecasting capabilities empower them to identify potential opportunities, estimate market demand, optimize resource allocation, and develop effective marketing strategies.

7. Data Security and Privacy: Marketing managers handle sensitive customer data and need data visualization tools that prioritize data security and privacy. They require solutions that comply with data protection regulations, provide access controls, and maintain the confidentiality and integrity of their marketing data.

8. Mobile Accessibility: With the increasing use of mobile devices, marketing managers need data visualization tools that are mobile-friendly and provide access to insights on the go. Mobile-responsive dashboards and applications allow them to monitor marketing performance and make informed decisions while away from their desks.

By addressing these specific needs, data visualization tools and techniques can empower marketing managers to gain valuable insights, make informed decisions, and optimize their marketing strategies effectively.

What is the impact of data visualization with the audiences?

an improved ability to maintain the audience's interest with information they can understand; an easy distribution of information that increases the opportunity to share insights with everyone involved; eliminate the need for data scientists since data is more accessible and understandable; and.

How can you make sure your visualizations are accessible to all members of the audience?

5 Simple Ways to Make Your Data Visualizations More Accessible Right Now

1. Describe the main takeaway in text. ...
2. Don't rely solely on color to differentiate data. ...
3. Pick your colors intentionally. ...
4. Use whitespace to separate elements. ...
5. Label data series directly.

What are 4 common ways of displaying data visually?



Some of the most common types of charts are:

- Bar graphs/charts.
- Line charts.
- Pie charts.
- Bubble charts.
- Stacked bar charts.s
- Treemaps.
- Word clouds.
- Pictographs.

Entitle a specific audience and mark their needs

What do you need to know about your audience when visualizing data?
You must know your target audience and **take into consideration how familiar they are with the concepts being represented by the data and if they have the capacity to easily interpret the charts and graphs represented**.
Entitle a specific audience and mark their needs

Constructing visualization and putting all of them together into a dashboard is not a way of providing data to the customers. There might be chances that one is not fit for all. We have to put more effort than just sharing performance with others, monitoring behavior, and measuring effectiveness. We have to answer these questions also:-

For whom are we designing visualization?

While designing a dashboard, we must know our priority persona. What challenges are we doing to face? How do we solve these challenges? Design the dashboard in such a way that meets all the requirements of users.

What decision do I need the user to make?

It must answer what decision I should take. Is this decision is risky? Is this profitable or not?. Whether I buy this property or not. Sometimes a decision needs to be answered multiple times a day or even a week or month at a meeting. So visualization should be created in such a way it will give a binary response to you.

Choose the right visual (The Key)

Once you know your audience and the data, it is time to select the right type of visual that best expresses the information included in the data:

Line Chart

When we want to represent continuous data with small changes, we use a line chart**.** It works well for a high number of values with different time intervals.

Bar Chart

When we want to compare data, there can be a horizontal or vertical bar chart. Example Like time spent on a smartphone, compare which field had the highest profit or compare no of paid and unpaid apps downloaded by types of gadgets

Pie Chart

Mainly the pie chart is used for representing the proportion or percentage of data. It is useful when we have less than seven categories. It also helps in determining at what percentage that particular category holds.

Column Chart

It is used when we want to compare various categories with subcategories. It is also used to compare various items within a particular range. Like in this example, we compare the profit of a particular product in a specific country.

Area Chart

It is good practice to use area charts when we want to show how values develop with time. It mainly used when we want to know the exact share of a particular category. It helps to represent a significant difference between values.

Apply Text Carefully and Intentionally

At the top or upper left corner put all the vital point because the human eye is drawn that place first. Try to add three or four views in a single dashboard as it is one of the best practices for it. Because if we add too many graphs, it will difficult to understand. When applying multiple filters, group them, and add a border around it to make it more transparent and attractive.

Use the predictable pattern for layouts

Human eyes quickly caught indicators that help in understanding important information. You usually grab patterns, and if they are random or don’t make sense, sometimes it is tough to understand what visualization wants to communicate. To know about human thinking, we

have to represent data that make sense to viewers, either it is sequential or numeric. If you are using no graphs, make sure the chart should be properly visible, and connections between data should be clear. Don't let your viewers get confused as it is not counted in its best practices and users can quickly they can go from to point to another.

Select the right data visualization tool

The tools for visualization of data defer from developers to Data Engineers to Data Analysts to BI Engineers. Some of the Tools that are Famous among the community are -

- Echart
- Highchart
- Tableau
- Fine BI
- Power BI
- Ali DataV
- FineReport
- Digital Hail

Use attractive colors for telling data stories

Colors play an important role in depicting graphs without using words. It helps to communicate a lot about your visuals. Try to keep it simple as it is one of the best practices for it. Using color for highlighting essential points helps to understand the dashboard more frequently and quickly. Proper Color clubbing matters a lot. The viewer can understand faster and promptly try to use natural colors. For example, in a graph, use different shades of particular colors to show a profit for a specific month and the brightest for a month have the highest benefit.

What are the different types of data visualization?
The main types of data visualization include **charts, graphs and maps** in the form of line charts, bar graphs, tree charts, dual-axis charts, mind maps, funnel charts and heatmaps.

Data visualization (or 'data viz') is one of the most important aspects of data analytics. Mapping raw data using graphical elements is great for aiding pattern-spotting and it's useful for sharing findings in an easily digestible, eye-catching way. And while the priority should always be the integrity of your data, if done well, data visualization can also be a lot of fun.

Master the art of data viz and you'll soon be spotting trends and correlations, all while flexing your creative muscle. But before we can unlock all these benefits, we first need to understand the basics, including **the different types of data visualization and how they're used**. In this post, we'll cover 13 of the most common ones, starting with…

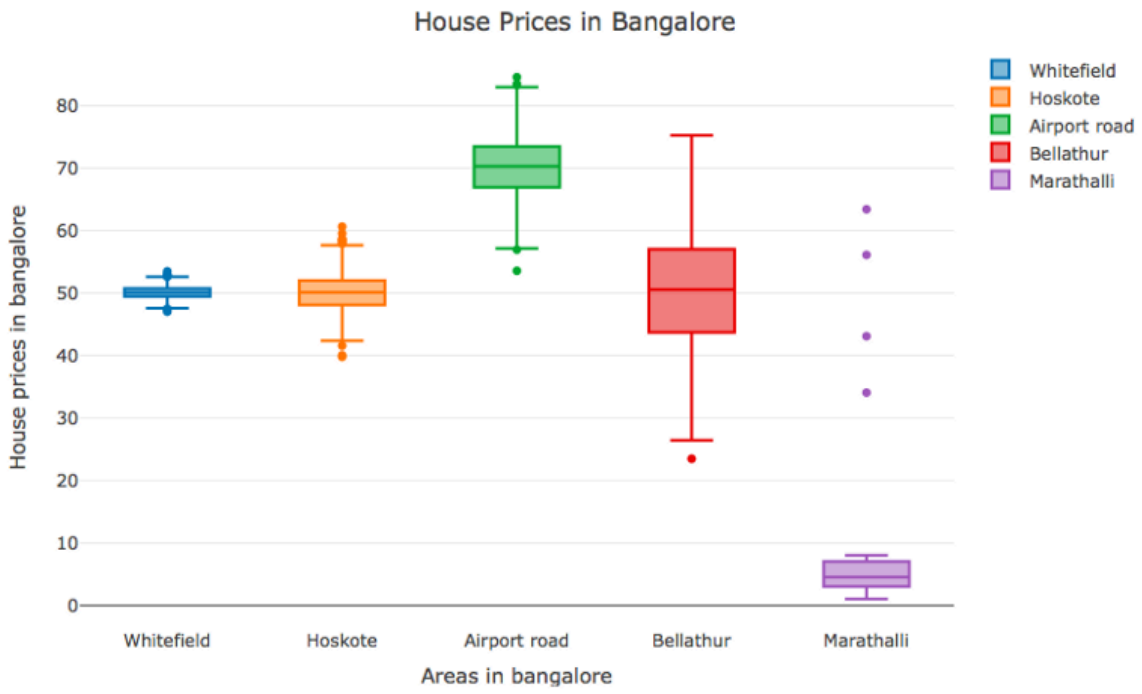
1. Pivot tables

	January	February	March	April	May	June	July	August	September	October	November	December
Accessories	$5,478	$5,369	$8,735	$7,981	$9,615	$8,858	$17,135	$11,758	$25,400	$13,087	$25,477	$28,486
Appliances	$3,176	$4,933	$6,700	$6,075	$7,526	$7,479	$3,384	$12,862	$10,828	$9,155	$18,306	$17,107
Art	$966	$1,006	$1,413	$2,382	$2,256	$2,182	$2,102	$1,690	$3,660	$1,905	$3,816	$3,740
Binders	$12,412	$4,286	$13,728	$13,384	$9,245	$13,218	$7,755	$21,302	$37,337	$18,090	$20,789	$31,867
Bookcases	$5,062	$1,940	$7,147	$4,926	$6,290	$7,445	$10,292	$5,622	$22,849	$8,771	$23,561	$10,977
Chairs	$11,285	$7,768	$20,832	$18,855	$25,703	$21,145	$23,585	$17,770	$52,147	$21,905	$47,314	$60,141
Copiers	$3,960		$22,590	$6,880	$18,400	$900	$9,780	$5,730	$10,320	$37,020	$15,150	$18,800
Envelopes	$750	$669	$1,657	$852	$1,190	$514	$1,200	$701	$2,177	$1,393	$2,917	$2,458
Fasteners	$88	$159	$150	$258	$109	$116	$182	$235	$414	$326	$548	$441
Furnishings	$3,980	$2,316	$5,068	$7,185	$7,305	$5,900	$7,355	$4,343	$11,805	$5,447	$16,757	$14,244
Labels	$207	$300	$940	$408	$885	$1,207	$1,692	$876	$1,476	$1,269	$1,850	$1,376
Machines	$7,215	$8,990	$35,052	$18,190	$11,268	$12,183	$4,065	$6,262	$26,386	$10,613	$33,807	$15,210
Paper	$2,287	$2,805	$6,218	$3,865	$6,359	$6,546	$4,319	$6,360	$10,575	$5,309	$12,563	$11,274
Phones	$13,772	$9,000	$26,712	$18,647	$24,859	$25,492	$23,807	$28,046	$38,464	$25,963	$56,075	$39,169
Storage	$9,374	$6,125	$14,793	$15,806	$14,670	$17,272	$13,768	$17,421	$29,866	$15,822	$37,418	$31,510
Supplies	$4,403	$289	$10,607	$6,246	$1,154	$1,267	$8,816	$859	$6,442	$816	$1,372	$4,402
Tables	$10,952	$4,218	$16,913	$9,913	$9,288	$15,360	$10,344	$17,752	$19,626	$20,223	$31,401	$40,975

You might not think of tables as a form of data visualization, but they are! When dealing with vast repositories of information—ones that are too large to easily comprehend—pivot tables help us summarize key statistics in a single view. The type of information collected in pivot tables might include sums, means, or other numerical summaries.

While pivot tables aren't always the most visually inspiring form of data viz, they are useful in the right context. For instance, highlight tables, as shown in the image, use different shades or colors to easily flag the highest and lowest values in a dataset. Sometimes, this is all you need, making pivot tables a basic but effective form of data viz. They are also commonly used to underpin more complex forms of data visualization, hence making it on to our list.

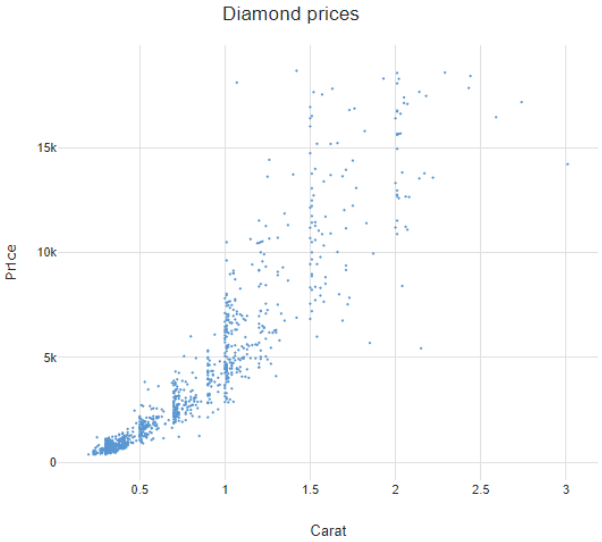
2. Boxplots



Another useful (if not particularly flashy) type of descriptive visualization is the boxplot (also known as a box-and-whisker plot). Like pivot tables, boxplots are useful for visualizing a dataset's key statistics. We can use them to represent minimum and maximum values, the median value, and the lower and upper quartiles (i.e. the median of the lower and upper halves of the data).

Boxplots are what is known as 'non-parametric.' This means they display variation in a data sample without making any assumptions about the data's distribution. This makes them useful for exploratory and explanatory data analysis, i.e. getting to understand a dataset's key features before drawing any broad conclusions about it.

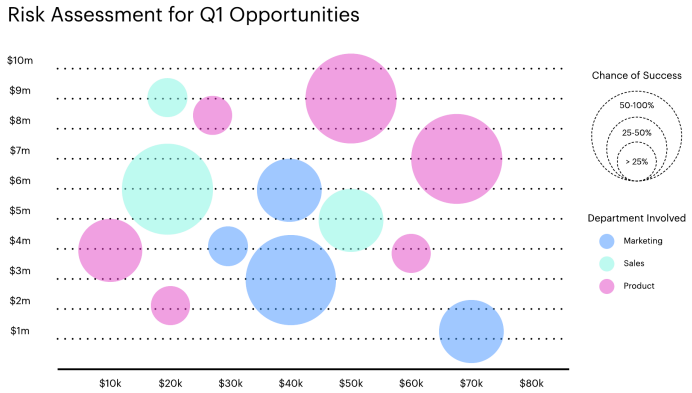
3. Scatterplots



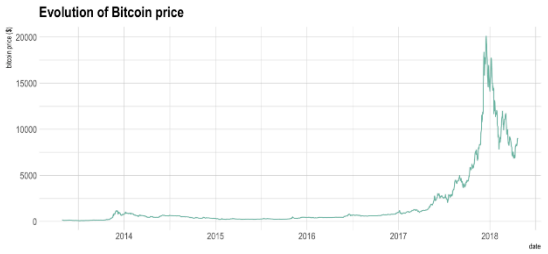
A scatterplot (also known as a scattergraph, scattergram, or scatter chart) displays the relationship between two variables on an x- and y-axis. Each item of data is shown as a single point, creating the chart's visual 'scatter' effect. When there are three interrelated data points (i.e. if there's a z-axis) 3D scatterplots are also possible.

Scatterplots are best used for large datasets where time is not a significant factor. For instance, a simple scatterplot might measure people's weight against height. This would help identify any correlation between the two measures. However, because other factors affect the data (e.g. people's weights are also related to their diet) scatterplots are best for **inferring relationships between variables** rather than drawing firm conclusions. Nevertheless, they are an excellent tool for hypothesis creation.

A common variant of the scatterplot is the bubble chart. Displaying different-sized circles (rather than single points), bubble charts represent three dimensions of data, rather than the usual two.



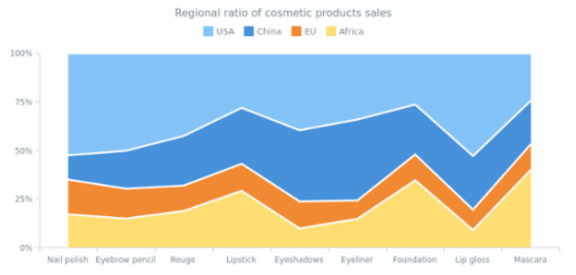
4. Line graphs



Line graphs, or line charts, are a simple but effective staple for representing time-series data. They are visually similar to scatterplots but represent data points separated by time intervals with segments joined by a line. This allows for quick observation of features like acceleration (when the line goes up), deceleration (when the line goes down), and volatility (when the line moves up and down erratically).

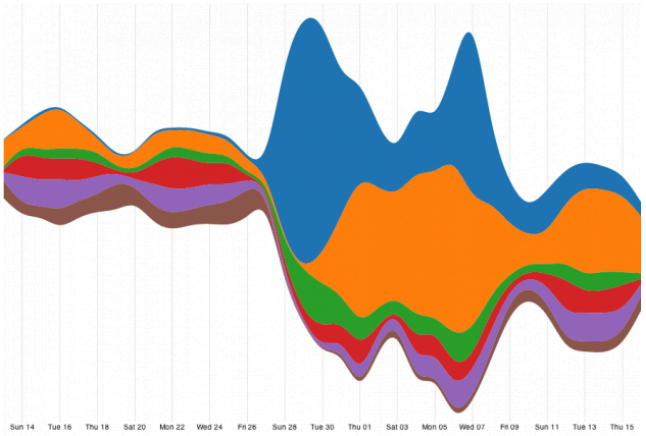
While the simple line graph shown represents a single dataset, more complex line graphs may overlay several lines to represent different data. This is useful for spotting correlations or deviation. A common example of a line graph in action is the measure of stock market behavior or resource costs over time, e.g. the price of gold over several years.

5. Area charts

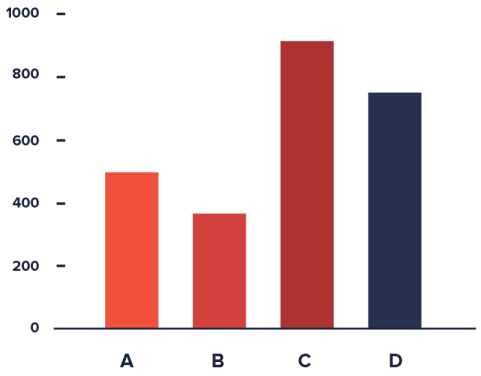


Area charts, similar to line charts, are also used for tracking data over time. However, in an area chart, the space between the plotted line and the x-axis is shaded or colored for visibility. This is particularly useful for highlighting the difference between multiple variables, or for measuring overall volumes (rather than highlighting the difference between discrete data points).

For example, in the image provided—which is known as a stacked area chart—the most important factor to note is the volume of products sold in each country, which is represented by the shaded areas. A common variant on the area chart is the streamgraph, where data is plotted around a central axis to minimize so-called ‘wobble.’

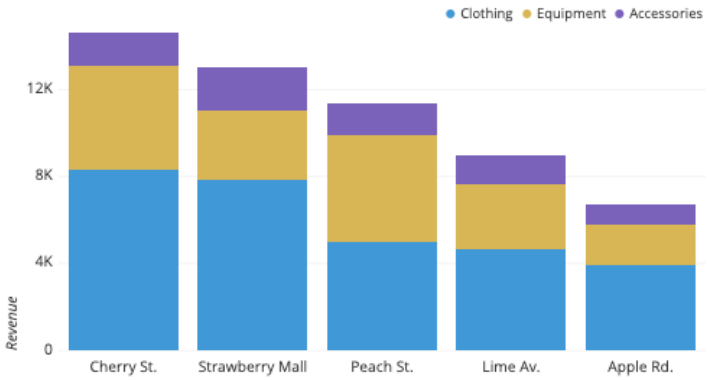


6. Bar charts

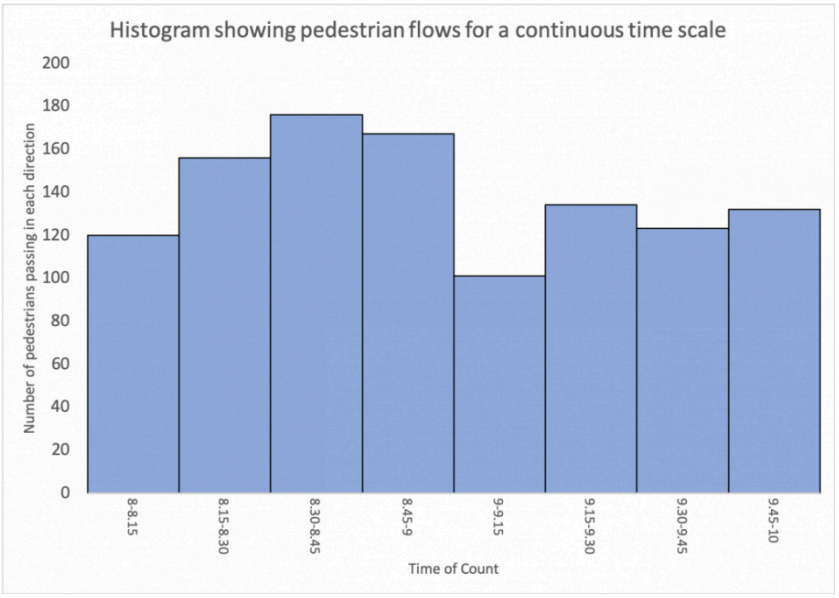


Another common visualization—one you’ll no doubt be familiar with from school—is the bar chart. Bar charts are a simple but highly effective way of plotting categorical data against discrete values. The heights (or widths) of the bars are in direct proportion to the values they represent. This makes bar charts an excellent way of comparing discrete variables at a glance.

Some bar charts cluster bars into groups of two or three (or more) allowing you to compare numerous variables at different points in time. Another variation is the stacked bar chart, which divides each bar into separate sub-bars, one stacked on top of another. This allows for the introduction of additional variables.



7. Histograms



Although visually similar to bar charts, histograms are not the same thing. Bar charts measure categorical data, while **histograms measure the distribution of numerical data**, i.e. the frequency with which a discrete data point appears in a dataset.

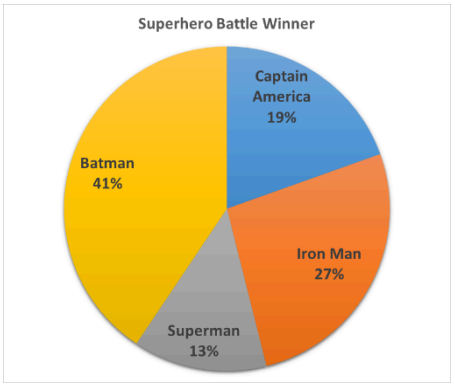
In a histogram, each bar represents how often a data point falls within a given range. For example, each column might represent different age groups (20 to 29, 30 to 39, and so on). This makes histograms excellent for summarizing large amounts of continuous data without needing to inspect every single value.

If you struggle to distinguish between bar charts and histograms, look out for spacing—there should always be a space between bars on a bar chart (to signify that the categories are discrete) while there should be no gap between the bars on a histogram (signifying that the data are continuous). You'd be surprised how often people get this wrong though, so keep your eyes peeled!

Curious about a career in Data Analytics?



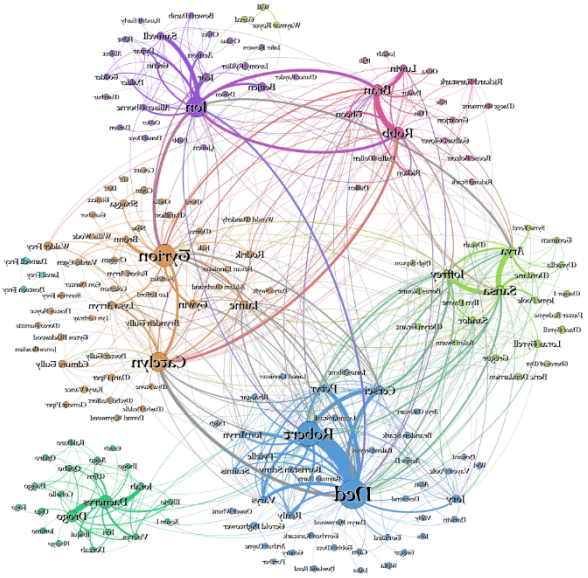
8. Pie charts



Another visualization you may remember from school is the pie chart. While pie charts are similar to bar charts in that they represent categorical data, this is where the similarities end. The main difference (besides how they look) is that bar charts represent numerous categories of data, while **pie charts represent a single variable,** broken down into percentages or proportions.

Each 'slice of the pie' in a pie chart is proportional to the quantity it contributes to the whole, i.e. the entire circle. For this reason, pie charts are best-suited to data that is split into about five or six categories…add more than that and it quickly becomes too complex to effectively represent the data.

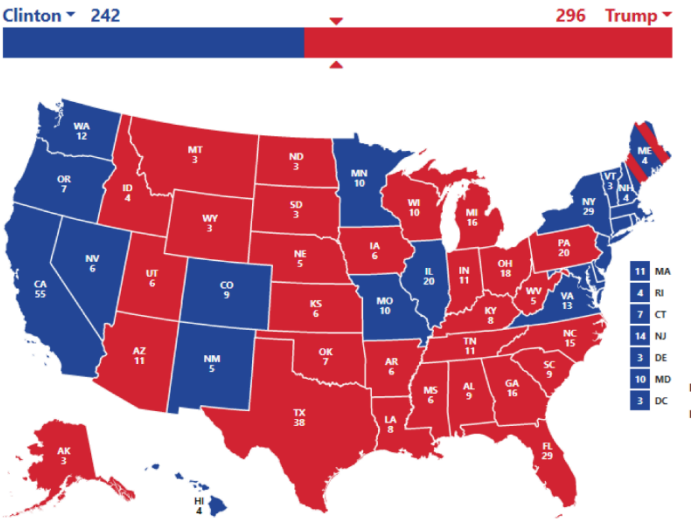
9. Network graphs



As sources of data grow more complex and interconnected, so must the visualizations we use to represent them. Enter network graphs, which are used to show how different elements of a network relate to one another. Each element in a network graph is represented by an individual node, interconnected to related nodes via lines. This approach is excellent for visualizing clusters within the larger whole—patterns that can otherwise be hard to spot.

The joy of this type of visualization is that you can represent networks with varying degrees of complexity without impacting the usefulness of the visualization. In fact, the more elements and connections a diagram includes, the more likely it is to help you spot the larger clusters hidden in the data.

10. Geographical maps

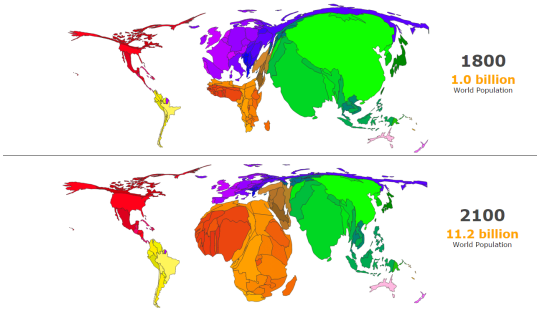


One of the most versatile types of data visualization is the geographical map, which can bring life to a whole range of different location-specific data. A common example is the distribution of vote share during an election, like that shown in the image.

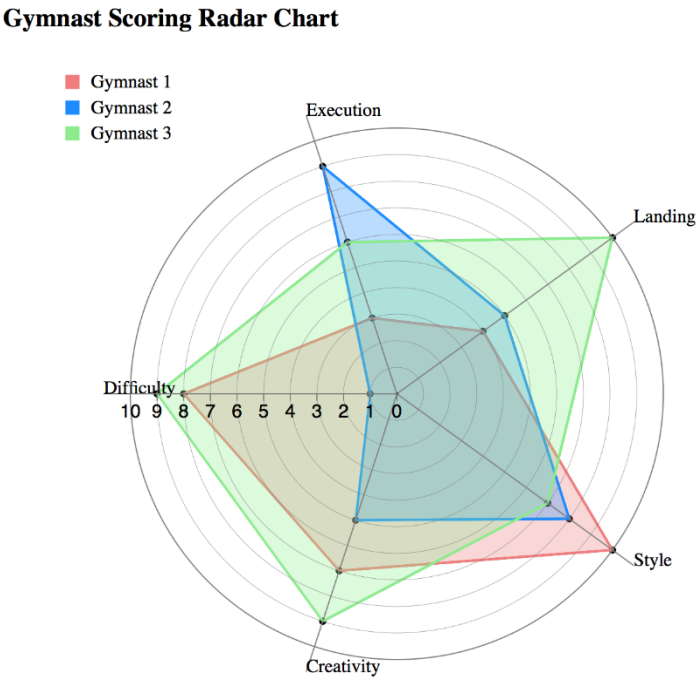
Maps can be used in diverse ways. For example, geographical heat maps use color to show the variation of a particular element over a given area, offering visual clues about data

distribution. A simple example is the social media company Snapchat, which uses heat maps to show where the highest density of snaps are being shared.

Other types of maps include dot distribution maps (which combine the idea of a scattergram with a map) and cartograms, where the size of geographical locations are distorted to match the proportion of a selected variable, e.g. world population.



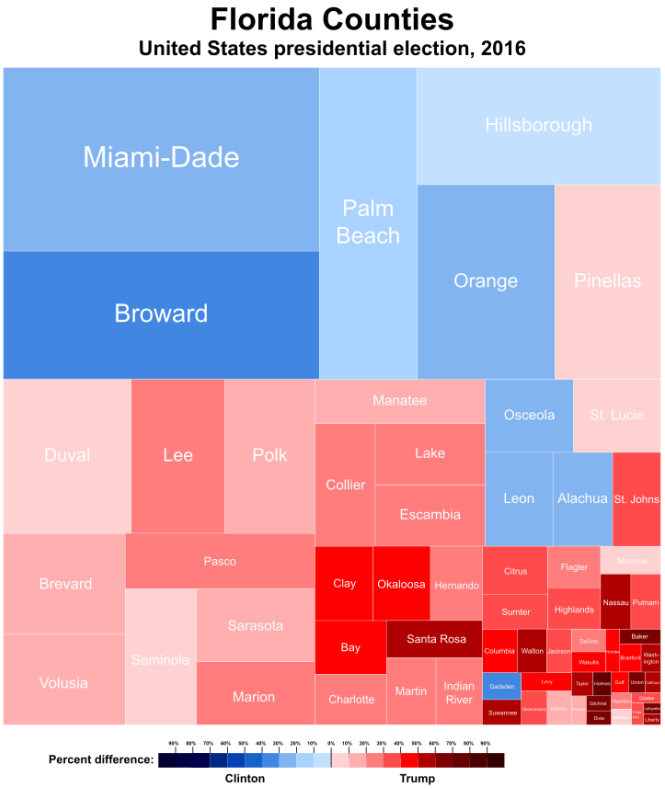
11. Radar charts



Radar charts (also known as spider charts) are useful for representing multivariate data (i.e. data that incorporate more than one variable) in a two-dimensional format. They are commonly used to compare features between different observations. They are also helpful for identifying outliers or commonality between observations.

Radar charts usually work by overlaying two or more variables on the same axis, using different colored lines to distinguish between them. For example, you might use a radar chart to compare the features of three different products, including aspects like price, durability, cost of production, and so on. Radar charts are also commonly used in sport to compare athletic performance, as displayed in the image.

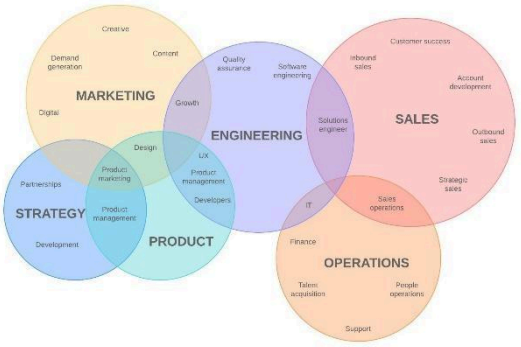
12. Treemaps



Treemaps are a type of data visualization that are excellent for displaying hierarchical data, usually in the form of nested rectangles. This involves breaking each category down into smaller rectangles, which represent sub-categories.

Treemaps are commonly used to display things like products or distribution of disk space by location or file type. Because they make efficient use of space, they are excellent for displaying thousands of different categories in a limited amount of real estate. This ability to represent highly complex data makes them a popular visualization in data analytics and data science.

13. Venn diagrams



Last but not least: the classic Venn diagram. Venn diagrams use a series of overlapping shapes (usually circles, but sometimes ellipses or other abstract forms) to highlight common features between different groups of items. Each area created by the overlapping shapes represents features that groups share in common. Where circles don't overlap, the groups do not share features in common.

Venn diagrams are useful for quickly visualizing the relationship between different groups of data. However, be aware that they can easily oversimplify these relationships. If you try to tackle this by adding more data, they can quickly become cumbersome. As a result, Venn diagrams are best used for descriptive purposes.

Infographics

An infographic is a collection of imagery, data visualizations like pie charts and bar graphs, and minimal text that gives an easy-to-understand.

What is the use of infographics?
Infographics can **help people understand complex concepts by using visual aids such as charts, graphs, or diagrams**. They can use both images and text in a visual format to explain concepts. They're often used for marketing purposes but they can be useful when writing articles or sharing research too.

What is infographics concept and data visualization technique?



Infographics Concepts and Data Visualization Techniques are **graphic visual representations of information, data or knowledge**. Infographics present complex information in a prompt & clear format, such as in signs, maps, journalism, technical writing, survey, marketing collaterals and education.

What are the 3 types of infographics?

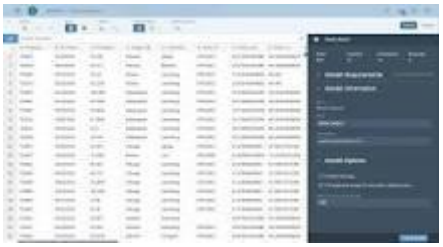
9 of the most popular types of infographics are:

- Statistical infographics.
- Informational infographics.
- Timeline infographics.
- Process infographics.
- Geographic infographics.
- Comparison infographics.
- Hierarchical infographics.
- List infographics.

SAP Analytics Cloud **brings together analytics and planning in a single solution in the cloud**. You can instantly move from insight to action, simulate any scenario for

better business outcomes, and generate plans from predictions automatically to drive agile decisions.

What is SAP Analytics Cloud model?



Models are **where you do all your data modeling in preparation for analysis**. Data modeling entails data wrangling, or cleaning, your dataset, defining your measures and dimensions, and enhancing your data by establishing hierarchies, setting units and currencies, and adding formulas.

What are the main components of SAP Analytics Cloud?
In addition to business planning, the other key components are **BI (for reporting, Dashboarding, data-discovery and visualization), predictive analytics and governance, risk, and compliance (GRC)**.
SAP Analytics Cloud

SAP Analytics Cloud (or SAP Cloud for Analytics) is a software as a service (SaaS) business intelligence (BI) platform designed by SAP. Analytics Cloud is made specifically with the intent of providing all analytics capabilities to all users in one product.

SAP Analytics Cloud evolved out of the SAP Cloud for Planning product, which was released in February 2015. In addition to business planning, the other key components are BI (for reporting, Dashboarding, data-discovery and visualization), predictive analytics and governance, risk, and compliance (GRC). The BI functions released in November 2015 and the predictive capabilities were added at a later date.

Built natively on SAP HANA Cloud Platform (HCP), SAP Analytics Cloud allows data analysts and business decision makers to visualize, plan and make predictions all from one secure, cloud-based environment. SAP claims this differs from other BI platforms, which often require data to be integrated from various sources and users to jump between different applications when performing tasks, such as creating reports. With all the data sources and analytics functions in one product, Analytics Cloud users can work more efficiently, according to SAP. The key functions are accessed from the same user interface that is designed for ease-of-use for business users.

Features and Benefits

Additional features include:

- Integration with SAP Analysis for Microsoft Office: This includes read and write functions for users who want to import data and work in readily familiar environments.
- Data locking and enhanced data access rights: Used for forecasting processes, where responsibilities held by planners are enforced by data locking and additional locked states (open, locked and restricted) are defined by enhanced data access rights.

- Predictive analytics: Implements machine learning to perform guided analysis using Smart Discovery, transformations and insights.
- Access to on-premise and cloud data: Provides real-time access to SAP applications such as HANA, as well as non-SAP applications for on-premise and cloud locations.
- Embedded analytics: Allows for users to access analytic features such as what-if analysis and ad-hoc.
- Access to SAP S/4HANA: This combines transactions, analytics, and planning in one application.
- Creation and modification tools: For data-driven budgeting, analysis, and forecasting from one cloud interface.

SAP Analytics Cloud vs Tableau

Tableau is another enterprise analytics tool similar to SAP Analytics Cloud. Tableau, however, is separated into specific desktop, server and online applications. Tableau Desktop is a desktop application, Online is the software as a service offering, and Server is used across enterprise organizations for sharing reports, dashboards and data sources.

Tableau features include:

- REST API
- Document API for .twb and .tds files
- No-code data queries
- Sharable and embedded dashboards
- Dashboards for mobile devices
- Management for metadata
- Rollback revision history

Tableau can be just as user-friendly as SAP Analytics Cloud; however, data preparation and blending options are limited, product support is limited and the software may run slower on older hardware. Tableau does act as an efficient data visualization tool and is a considerable alternative to SAP Analytics Cloud.

SAP has other cloud-based BI products, including SAP Lumira Cloud, BI OnDemand and CrystalReports.com, as well as a cloud-hosted version of its SAP BusinessObjects BI platform, but these have more limited functionality than Cloud for Analytics and are based on moving existing content to the cloud.

Key Capabilities of SAP SAC

What are the capabilities of SAP Analytics Cloud?
Smart Capabilities
AI allows SAP Analytics Cloud provides its users with a number of augmented analytics features that, in their turn, help businesses make more insightful decisions. They are, for instance, **Search to Insight, Smart Insights, Smart Discovery, Time Series Forecasting, and Smart Grouping**

What are key capabilities of SAP HANA analytics cloud?
Pull from all capabilities – **business intelligence, augmented and predictive analytics, and planning** – and custom widgets to design functionally-rich applications.

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