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What is Data Visualization?

There's a story behind your numbers. Visualizing data brings them to life.

Data Visualization Definition

Our simple definition: Data viz is the communication of data in a visual manner, or turning raw data into insights that can be easily interpreted by your readers.

Other definitions include:

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efinition of Data Visualization: Data visualization refers to the techniques
unicate data or information by encoding it as visual objects (points, lines

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displaying data or information in graphical charts, figures and bars.

- **Learn about the 17 Most Common Data Viz Types:** The list of examples, when to use them and best practices are further below in this article.

What makes data visualization effective?

Visualizing data is effective when *done right*. We define *right* when the data visualizations have served its purpose. A quick test - when people can interpret your visualization by asking more questions on the information displayed versus how or what is displayed, then you know you are on the right path. So in order to be highly effective, it is important to design the right visualizations for your data to allow yourself and team members to interpret and make decisions based off of what they observe. How do we do that? It's simple. We create the proper visualizations by understanding the different types of visualizations and answering 5 questions.

5 Types of Big Data Visualization Categories

Temporal

Data visualizations belong in the temporal category if they satisfy two conditions: that they are linear, and that they are one-dimensional. Temporal visualizations normally feature lines that either stand alone or overlap with each other, with a start and finish time.

Overview e are familiar charts we can recognize from school and the workplace, which means we have an easier understanding when we read them.

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Examples of temporal data visualization include:

- Scatter plots
- Polar area diagrams
- Time series sequences
- Timelines
- Line graphs

Hierarchical

Data visualizations that belong in the hierarchical category are those that order groups within larger groups. Hierarchical visualizations are best suited if you're looking to display clusters of information, especially if they flow from a single origin point.

The downside to these graphs is that they tend to be more complex and difficult to read, which is why the tree diagram is used most often. It is the simplest to follow due to its linear path.

Examples of hierarchical data visualizations include:

- Tree diagrams
- charts
- Sunburst diagrams

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Network

Datasets connect deeply with other datasets. Network data visualizations show how they relate to one another within a network. In other words, demonstrating relationships between datasets without wordy explanations.

Examples of network data visualizations include:

- Matrix charts
- Node-link diagrams
- Word clouds
- Alluvial diagrams

Multidimensional

Just like the name, multidimensional data visualizations have multiple dimensions. This means that there are always 2 or more variables in the mix to create a 3D data visualization. Because of the many concurrent layers and datasets, these types of visualizations tend to be the most vibrant or eye-catching visuals. Another plus? These visuals can break down a ton of data down to key takeaways.

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Examples of multidimensional data visualizations include:

- Scatter plots
- Pie charts
- Venn diagrams
- Stacked bar graphs
- Histograms

Geospatial

Geospatial or spatial data visualizations relate to real life physical locations, overlaying familiar maps with different data points. These types of data visualizations are commonly used to display sales or acquisitions over time, and can be most recognizable for their use in political campaigns or to display market penetration in multinational corporations.

Examples of geospatial data visualizations include:

- Flow map
- Density map
- Cartogram

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The 17 Most Common Graph Types

Presentation of data and information is not simply about picking any data v gn. Matching data to the right information visualization begins b ey questions:

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3. **Am I looking to compare multiple values or looking to analyze a single value over time?**
4. **Am I interested in analyzing trends in my data sets?**
5. **Is this visualization an important part of my overarching data story?**

With those questions (and your answers) in mind, we'll dive into the 11 most common graph types you can mix and match to the best data visualization to bring your data story to life. We'll provide you with the data viz 101 and best practices, so feel free to navigate to the one you want to explore the most.

- **Bar Chart**
- **Line Chart**
- **Scatterplot**
- **Sparkline**
- **Pie Chart**
- **Gauge**
- **Waterfall Chart**
- **Funnel Chart**
- **Heat Map**
- **Histogram**
- **Box Plot**
- **Maps**
- **Tables**
- **Indicators**
- **Area Chart**
- **Radar or Spider Chart**
- **Tree Map**

1. Bar Chart

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At some point or another, you've either seen, interacted with, or built a bar
e. Bar charts are such a popular graph visualization because of

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When do I use a bar chart visualization?

Use a bar chart for the following reasons:

- You want to compare two or more values in the same category
- You want to compare parts of a whole
- You don't have too many groups (less than 10 works best)
- You want to understand how multiple similar data sets relate to each other

Don't use a bar chart for the following reasons:

- The category you're visualizing only has one value associated with it
- You want to visualize continuous data

Best practices for a bar chart visualization

If you use a bar chart, here are the key design best practices:

- Use **consistent colours and labeling** throughout so that you can identify relationships more easily
- **Simplify the length of the y-axis** labels and don't forget to **start from 0** so you can keep your data in order

2. Line Chart

Like bar charts, line charts help to visualize data in a compact and precise format which makes it easy to rapidly scan information in order to understand trends. Line charts are used to show resulting data relative to a continuous variable - most commonly time or money. The proper use of color in this visualization is necessary because different colored l en easier for users to analyze information.

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Use a line chart for the following reasons:

- You want to understand trends, patterns, and fluctuations in your data
- You want to compare different yet related data sets with multiple series
- You want to make projections beyond your data

Don't use a line chart for the following reason:

- You want to demonstrate an in-depth view of your data

Best practices for a line chart visualization

If you use a line chart, here are the key design best practices:

- Along with using a **different colour** for each category you're comparing, make sure you also use solid lines to keep the line chart clear and concise
- To avoid confusion, try **not to compare more than 4 categories** in one line chart

3. Scatterplot

Scatterplots are the right data visualizations to use when there are many different data points, and you want to highlight similarities in the data set. This is useful when looking for outliers or for understanding the distribution of your data.

If the data forms a band extending from lower left to upper right, there most likely a positive correlation between the two variables. If the band runs from upper left to lower right, a negative correlation is probable. If it is hard to see a pattern, there is probably no correlation.

When do I use a scatter plot visualization?

Use a scatterplot for the following reasons:

- You want to show the relationship between two variables

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Don’t use a scatterplot for the following reasons:

- You want to rapidly scan information
- You want clear and precise data points

Best practices for a scatter plot visualization

If you use a scatterplot, here are the key design best practices:

- Although trend lines are a great way to analyze the data on a scatterplot, ensure you stick to **1 or 2 trend lines** to avoid confusion
- Don’t forget to **start at 0** for the y-axis

4. Sparkline

Sparklines are arguably the best data visualization for showing trends because of how compact they are. They get the job done when it comes to painting a picture for your audience fast. Though, it is important to make sure your audience understands how to read sparklines correctly to optimize their use.

When do I use a sparkline visualization?

Use a sparkline for the following reasons:

- You can pair it with a metric that has a current status value tracked over a specific time period
- You want to show a specific trend behind a metric

Don’t use a sparkline for the following reasons:

- You want to plot multiple series
- You want to illustrate precise data points (i.e. individual values)

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If you use a sparkline, here are the key design best practices:

- To assist with readability, consider **adding indicators** on the side that give a better glimpse into the data, like in the example above
- Stick to **one colour** for your sparklines to keep them consistent on your dashboard

5. Pie Chart

Pie charts are an interesting graph visualization. At a high-level, they're easy to read and understand because the parts-of-a-whole relationship is made very obvious. But top data visual experts agree that one of their disadvantages is that the percentage of each section isn't obvious without adding numerical values to each slice of the pie.

So, what's the point? As long as you stick to best practices, pie charts can be a quick way to scan information.

When do I use a pie chart visualization?

Use a pie chart for the following reasons:

- You want to compare relative values
- You want to compare parts of a whole
- You want to rapidly scan metrics

Don't use a pie chart for the following reason:

- You want to precisely compare data

Best practices for a pie chart visualization

If you use a pie chart, here are the key design best practices:

- Make sure that the pie slices **add up to 100%**. To make this easier, add the numerical values and percentages to your pie chart

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have too many categories, you won't be able to differentiate between the slices

6. Gauge

Gauges typically only compare two values on a scale: they compare a current value and a target value, which often indicates whether your progress is either good or bad, in the green or in the red.

When do I use a gauge visualization?

Use a gauge for the following reason:

- You want to track single metrics that have a clear, in the moment objective

Don't use a gauge for the following reasons:

- You want to track multiple metrics
- You're looking to visualize precise data points

Best practices for a gauge visualization

If you use a gauge, here are the key design best practices:

- Feel free to **play around with the size and shape** of the gauge. Whether it's an arc, a circle or a line, it'll get the same job done
- Keep the **colours consistent** with what means "good" or "bad" for you and your numbers
- Use **consistent colours and labeling** throughout so that you can identify relationships more easily
- **Simplify the length of the y-axis** labels and don't forget to **start from 0** so you can a in order

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7. Waterfall Chart

A waterfall chart is an information visualization that should be used to show how an initial value is affected by intermediate values and resulted in a final value. The values can be either negative or positive.

When do I use a waterfall chart visualization?

Use a waterfall chart for the following reason:

- To reveal the composition or makeup of a number

Don't use a waterfall chart for the following reason:

- You want to focus on more than one number or metric

Best practices for a waterfall chart visualization

If you use a waterfall chart, here are the key design best practices:

- Use **contrasting colors** to highlight differences in data sets
- Choose **warm colors** to indicate increases and **cool colors** to indicate decreases

8. Funnel Chart

A funnel chart is your data visualization of choice if you want to display a series of steps and the completion rate for each step. This can be used to track the sales process, a marketing funnel or the conversion rate across a series of pages or steps. Funnel charts are most often u ow something moves through different stages in a process. A funnel

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When do I use a funnel chart visualization?

Use a funnel chart for the following reason:

- To display a series of steps and each step's completion rate

Don't use a funnel chart for the following reason:

- To visualize individual, unconnected metrics

Best practices for a funnel chart visualization

If you use a funnel chart, here are the key design best practices:

- **Scale the size of each section** to accurately reflect the size of its data set
- **Use contrasting colors or one color** in gradating hues, from darkest to lightest as the size of the funnel decreases

9. Heat Map

A heat map or choropleth map is a data visualization that shows the relationship between two measures and provides rating information. The rating information is displayed using varying colors or saturation and can exhibit ratings such as high to low or bad to awesome, and needs improvement to working well.

It can also be a thematic map in which the area inside recognized boundaries is shaded in proportion to the data being represented.

When do I use a heat map visualization?

map for the following reasons:

- To show a relationship between two measures

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Don’t use a heat map for the following reason:

- To visualize individual, unconnected metrics

Best practices for a heat map visualization

If you use a heat map, here are the key design best practices:

- Use a **simple map outline** to avoid distracting from the data
- Use a **single color in varying shades** to show changes in data
- Avoid using **multiple patterns**

10. Histogram

A histogram is a data visualization that shows the distribution of data over a continuous interval or certain time period. It's basically a combination of a vertical bar chart and a line chart. The continuous variable shown on the X-axis is broken into discrete intervals and the number of data you have in that discrete interval determines the height of the bar.

Histograms give an estimate as to where values are concentrated, what the extremes are and whether there are any gaps or unusual values throughout your data set.

When do I use a histogram visualization?

Use a histogram for the following reason:

- To make comparisons in data sets over an interval or time
- To show a distribution of data

Don’t use a histogram for the following reason:

+ variables in data sets

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If you use a histogram, here are the key design best practices:

- Avoid bars that are **too wide** that can hide important details or **too narrow** that can cause a lot of noise
- Use **equal round numbers** to create bar sizes
- Use **consistent colours and labeling** throughout so that you can identify relationships more easily

11. Box Plot

(Source: Python Graph Gallery)

A box plot, or box and whisker diagram, is a visual representation of displaying a distribution of data, usually across groups, based on a five number summary: the minimum, first quartile, the median (second quartile), third quartile, and the maximum.

The simplest of box plots display the full range of variation from minimum to maximum, the likely range of variation, and a typical value. A box plot will also show the outliers.

When do I use a box plot visualization?

Use a box plot for the following reasons:

- To display or compare a distribution of data
- To identify the minimum, maximum and median of data

Don't use a box plot for the following reason:

- To visualize individual, unconnected data sets

Best practices for a box plot visualization

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box plot, here are the key design best practices:

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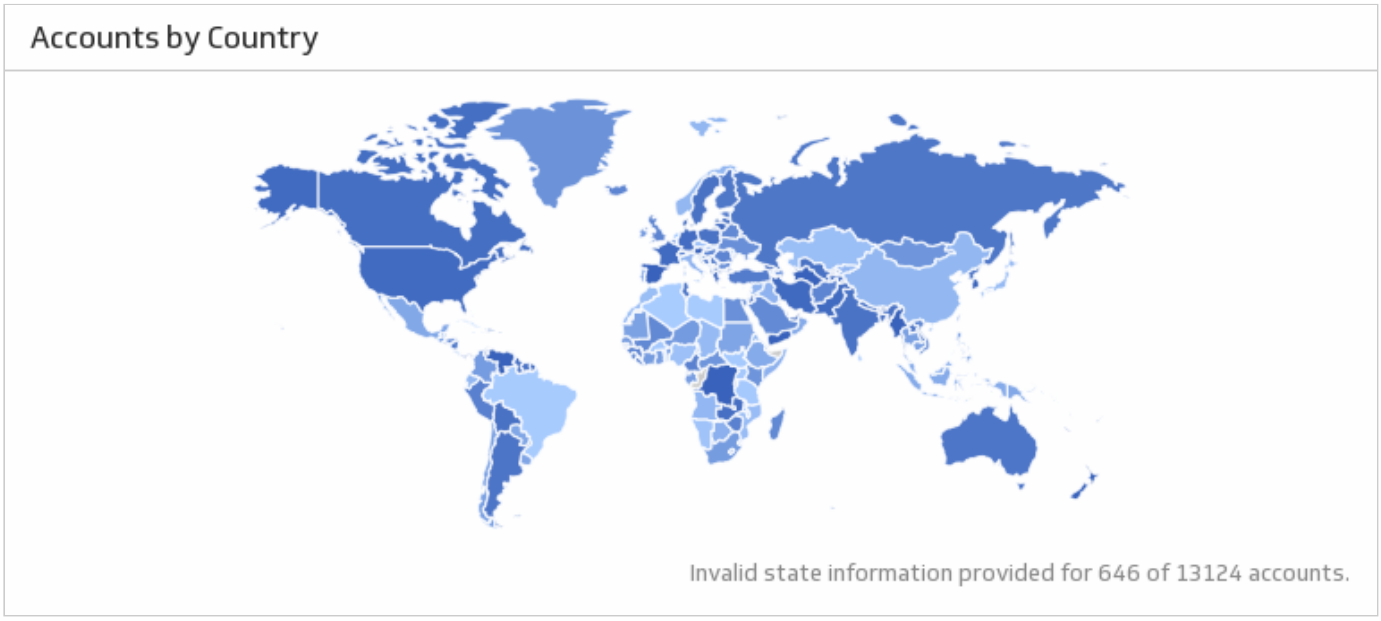
- If plotting multiple datasets, use **different symbols, line styles or colour** to differentiate each
- Always **remove unnecessary clutter** from the plots

12. Maps



I want the map above in my business dashboard!

Maps are an amazing visualization to add to your dashboard if organizing data geographically tells an important story for your business. For example, if your dashboard is looking looking at monthly sales, it could be extremely useful to see the geographic locations of your customers.

Above, you'll find a map visualization that integrates with Salesforce to measure accounts by country. Keep in mind that if your dashboard is looking at daily sales, this visualization may provide less value to your day-to-day discussions.

When do I use a map visualization?

Use a map for the following reason:

- an important part of your data story

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Don't use a map for the following reasons:

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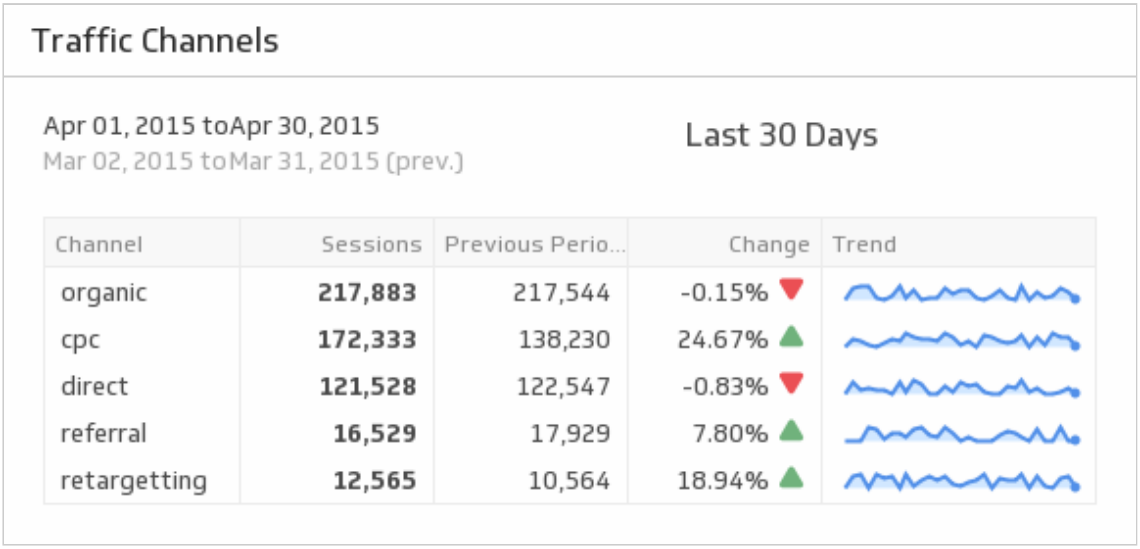
Best practices for a map visualization

If you use a map visualization, here are the key design best practices:

- **Avoid using multiple colours** and patterns on your map. Use varying shades of the same colour instead
- Make sure to **include a legend** with your map, so that everyone understands what the data means

13. Tables



I want the table above in my business dashboard!

If you're someone who wants a little bit of everything in front of you in order to make thorough decisions, then tables are the visualization to go with. Tables are great because you can display both data points and graphics, such as bullet charts, icons, and sparklines. This visualization type also organizes your data into columns and rows, which is great for reporting.

Above is an example of how to bring in your Google Analytics data into a table, so that you can see all the information you need in one place.

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o keep in mind is that tables can sometimes be overwhelming if you have a dashboard with many metrics that you want to display. It's

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When do I use a table visualization?

Use a table for the following reasons:

- You want to display two-dimensional data sets that can be organized categorically
- You can drill-down to break up large data sets with a natural drill-down path

Don’t use a table for the following reason:

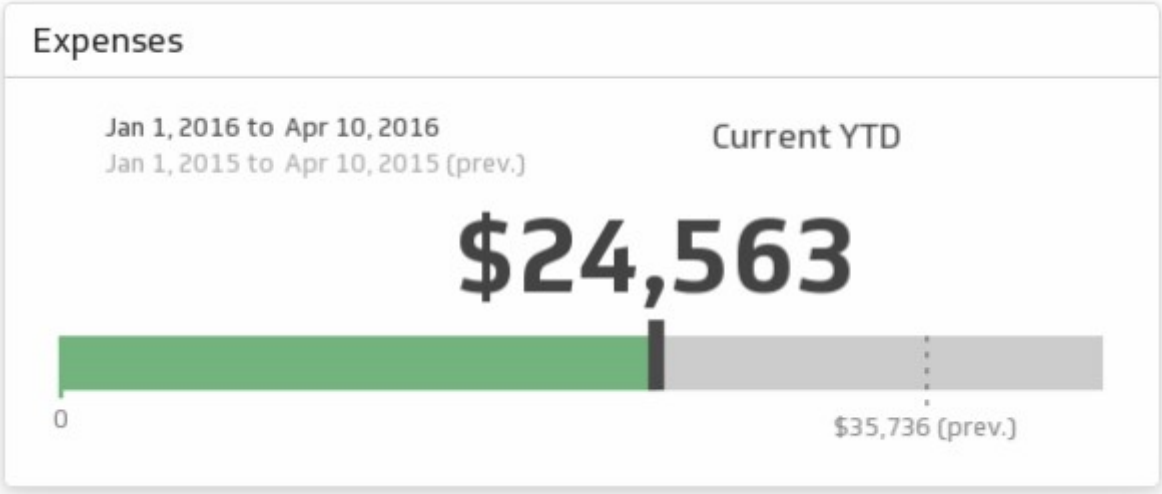
- You want to display large amounts of data

Best practices for a table visualization

If you use a table, here are the key design best practices:

- **Be mindful of the order** of the data. Make sure that labels, categories and numbers come first then move on to the graphics
- Try not to have more than 10 different rows in your table to **avoid clutter**

14. Indicators



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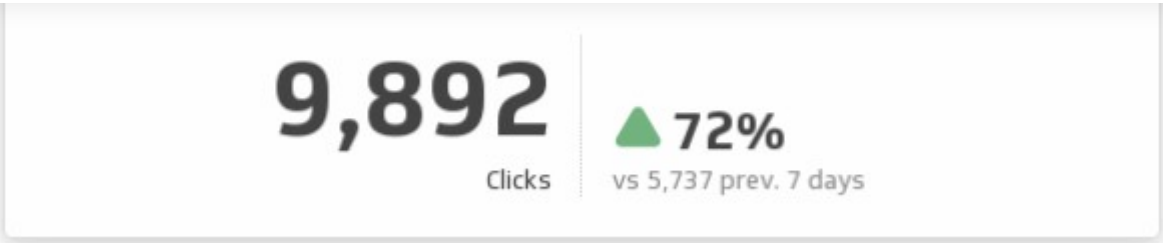
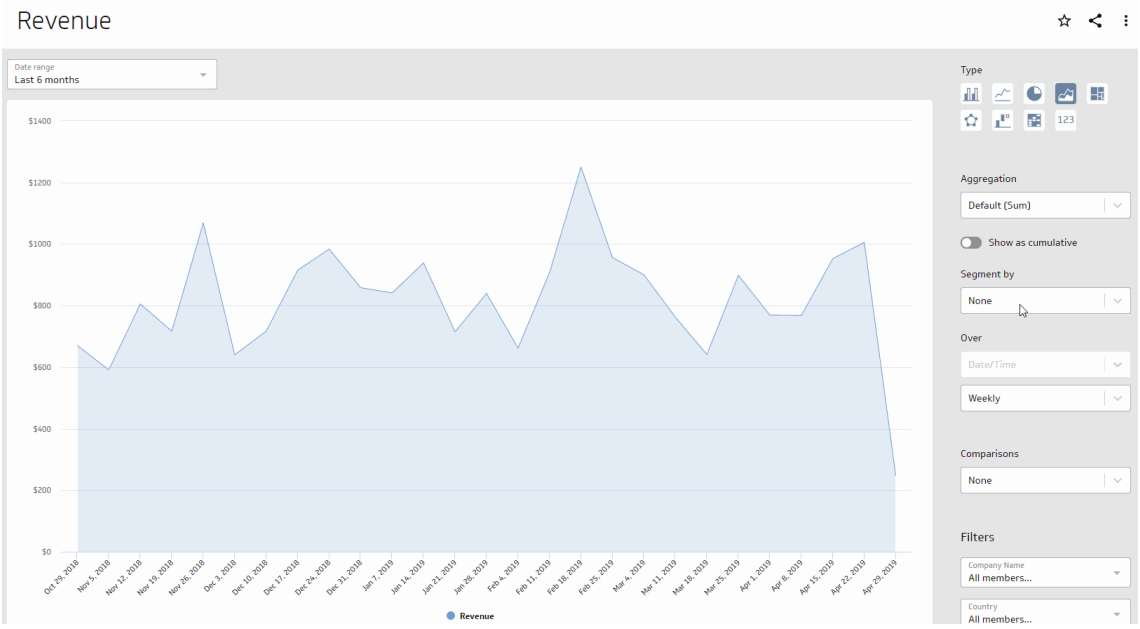


Indicators are useful for an at a glance view of a metric you need to keep track of. An indicator is simply a number showing the current value of whichever performance metric you're tracking. To make it more useful, add a comparison to the previous time period to show whether your metric is tracking up or down.

Some people like to get fancy with indicators and use gauges or tickers. They present the same type of information, just in a different visual way.

15. Area Chart



An area chart is very similar to a line graph but may do a better job at highlighting the relative differences between items. Use an area chart when you want to see how different items stack up or contribute to the whole.

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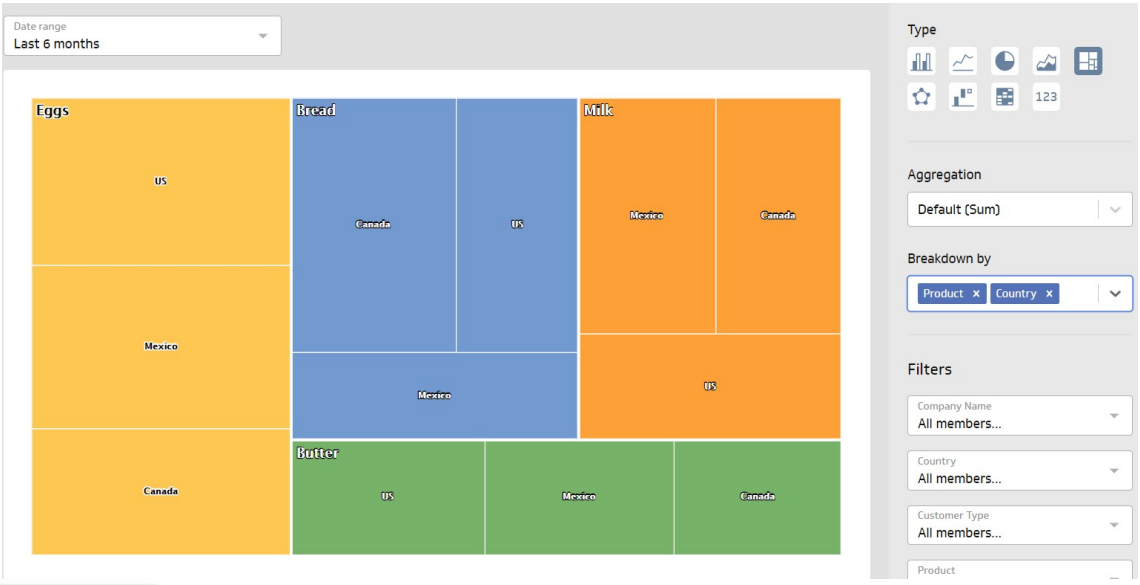
A radar chart is useful for understanding the relative differences between items in your data. Radar charts make it easy to compare multiple items and see if there are differences that may be worth further investigation.

17. Treemap



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's a visual tool that can be used to break down the relationships ultiple variables in your data. They can be used strictly as a

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layers to show the hierarchical relationship between items.

Questions? We've got answers.

The 7 data viz questions we get asked most often, answered by one of our co-founders

- What is data visualization and why is it important?
- How does data visualization help? What are the benefits?
- What is the purpose of using a dashboard for data visualization?
- Why do we visualize data?
- Why is visual analytics important?
- What are data visualization techniques?
- Why is text added to a data visualization presentation?

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Other Awesome Resources

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Google Trends & Think with Google

Enjoy browsing? It's no secret that Google has a ton of information to share. Look for data about popular topics, online trends, and current events. ***Think with Google** is targeted towards savvy marketers who want to stay in-the-know.

Pew Research Center

Pew Research Center is a leading think tank in the US filled with credible information about the issues shaping the world. From public opinoion polling to content analysis, to demographic research, explore all of the data-driven research they have to offer.

Visualization

Data Visualization Catalogue

It started as a project but this site blew up with quick and simple summaries of differet chart/graph types and their methodologies.

Data Journalism Handbook

An interesting pick, this handbook provides journalists or anyone interested in journalism, details on how to use data to enhance their work to tell better news stories.

The Data Viz Project

Ferdio, an infographic agency, designed this site to show off all types of data visualizations to help you choose the right one. You'll be able to answer the question: "What is data visualization design?" after checking this out.

Coolors

It's a super fast (and free) colour schemes generator to help you create unique palettes for any data viz project.

Final thoughts on data visualizations

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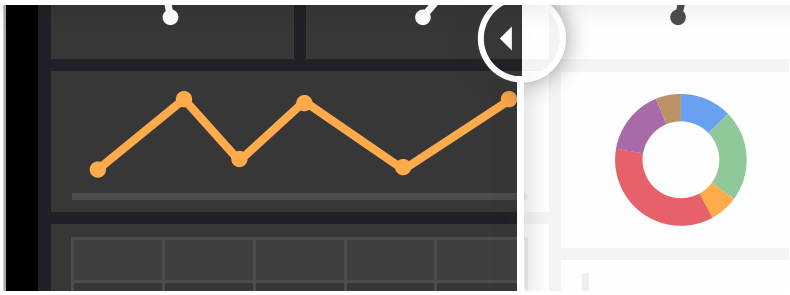

There are countless data visualizations out there and they all tell different yet impactful data stories. In other words, your data isn't rendered visually useless just because it doesn't work in one particular category or type of data visualization. You just need to help your data find its *visual* match. Once you've got that covered, you can start pinpointing key insights and trends.

When data visualizations are put together on a dashboard with a data visualization tool, these visualizations become magic in helping people understand what is going on in their role/business that is impacting them.

It's also important to mention that data visualizations are not limited to certain colors, icons, and overall design. You're the artist here; your visual preferences can make a difference when telling your story.

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Templates and Examples

Live Dashboard Examples

Dashboard Templates

Dashboard Examples

Klip Templates

KPI Examples

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