# Which chart or graph is right for you?
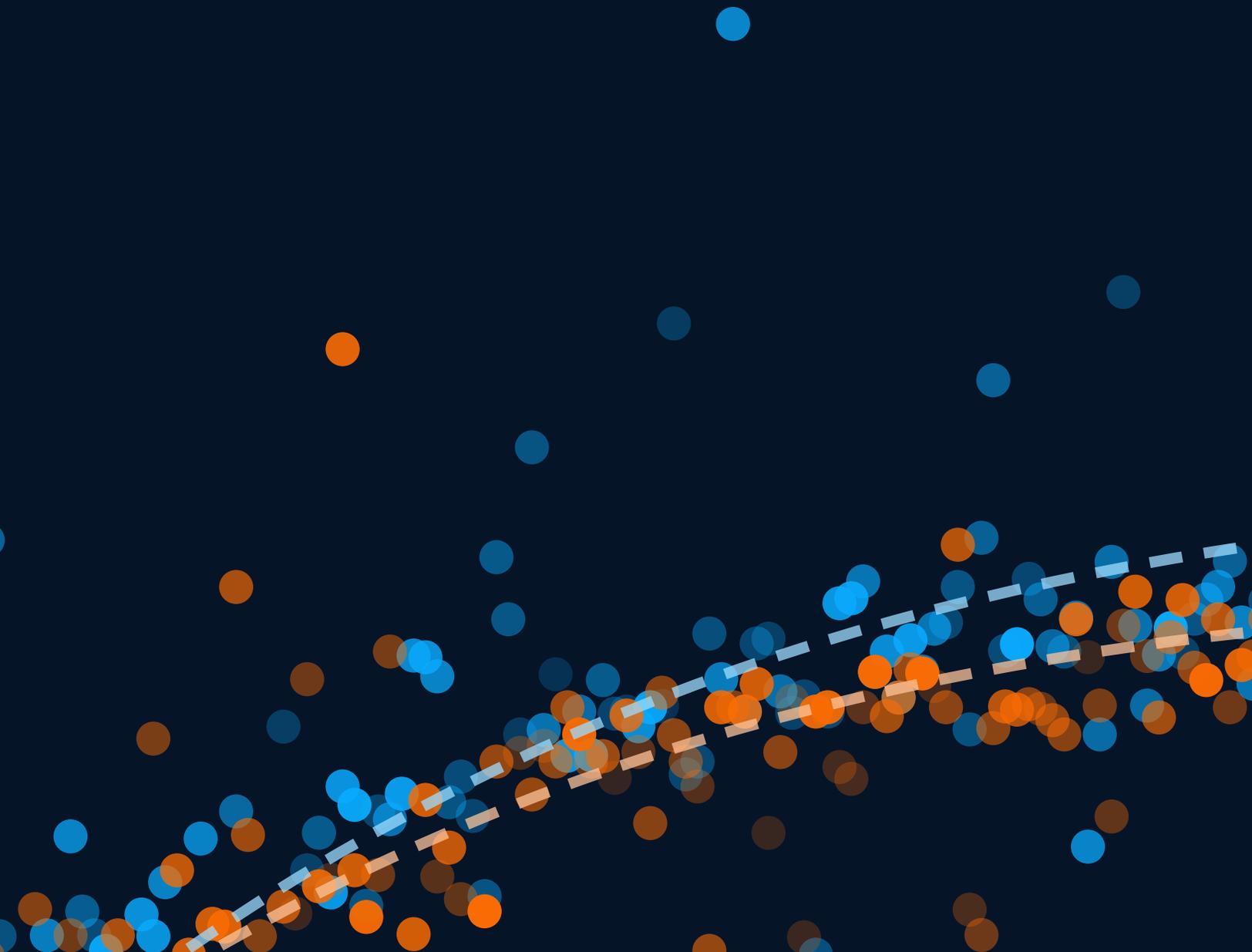
You've got data and you've got questions, but what's the best way to visualize that data to get the answers you need? Transforming data into an effective visualization or dashboard is the first step towards making your data make an impact.

In this paper, you'll learn about different chart (and graph) types and when to use them, along with tips on how to leverage those chart types for maximum impact.

# Contents

# Bar Chart

Bar charts are one of the most common data visualizations. You can use them to quickly compare data across categories, highlight differences, show trends and outliers, and reveal historical highs and lows at a glance. Bar charts are especially effective when you have data that can be split into multiple categories. For example, volume of shirts in different sizes, website traffic by referrer, or percent of spending by department.
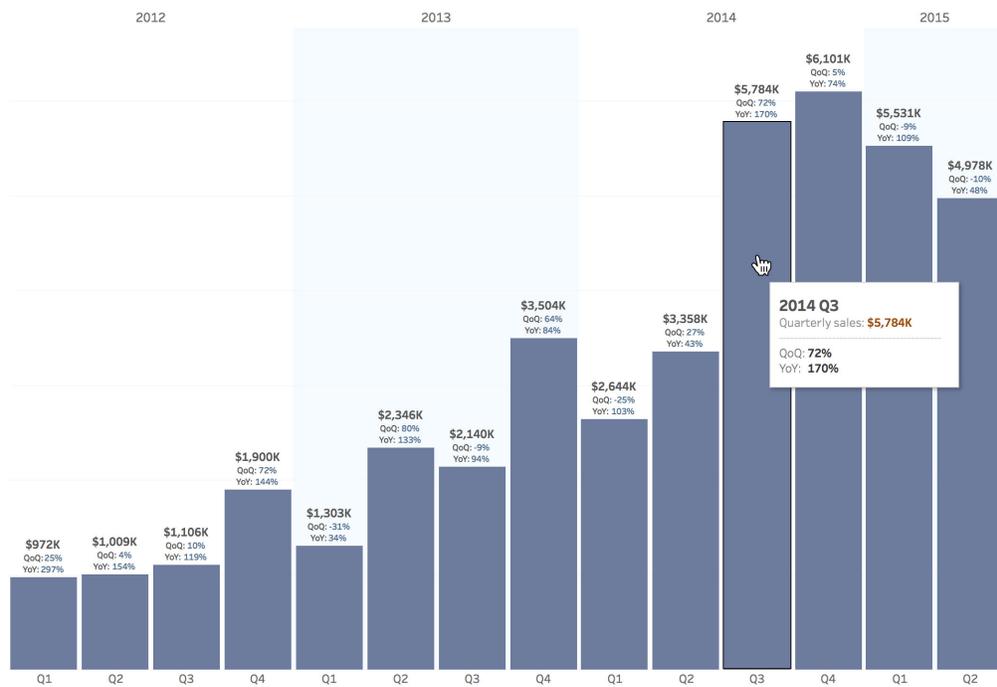


In this example, the bar chart quickly shows how the sum of sales has changed over the course of different quarters in the company's history.

## Tips:

**Add color to bars for more impact.** Color adds a quick, visual identifier that makes comparisons easy.

**Use stacked bars or side-by-side bars.** Stacked and side-by-side bar charts help you break down your data even further, giving more depth to your analysis.

**Combine bar charts with maps.** Maps are a powerful and intuitive way to visualize data. Using a map as a filter lets viewers drill down and find detailed answers.

**Put bars on both sides of an axis.** Plotting positive and negative data points along the same axis makes trends and outliers stand out.

# Line Chart

The line chart, or line graph, connects several distinct data points, presenting them as one continuous evolution. Use line charts to view trends in data, usually over time (like stock price changes over five years or website page views for the month). The result is a simple, straightforward way to visualize changes in one value relative to another. But line charts aren't limited to time. Any dimension—like date types, time intervals, and other ordinal data—can be used as the horizontal axis.
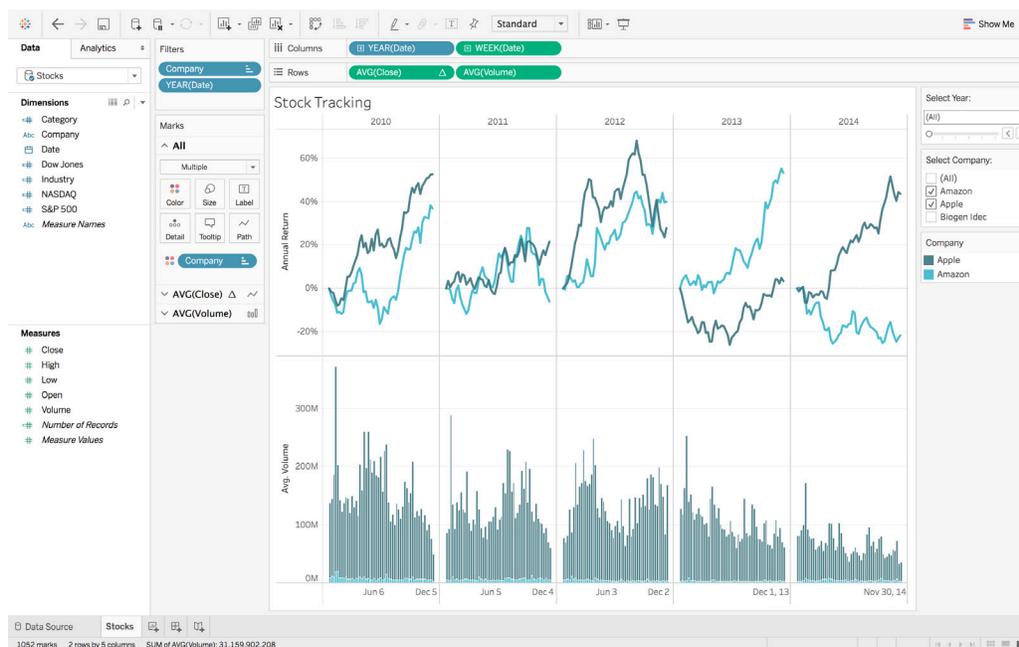


The line chart shows the annual return of stock prices for three large companies over time.

## Tips:

**Combine a line graph with bar charts.** Bar and line charts go well together. Showing two kinds of information on the same axis adds powerful context to your data.

**Shade the area under lines.** Shading the area under line charts provides an immediate visual cue for quantity. When your visualization includes multiple lines, use multiple colors to inform the viewer of each line's relative contribution to the whole.

# Pie Chart

Pie charts are powerful ways to add detail to other visualizations. Alone, a pie chart doesn't give the viewer a way to quickly and accurately compare information, so key points can get lost. Instead of making a pie chart the focus of your dashboard, use them alongside other charts and graphs to drill down into the data. This approach uses the pie chart's simplicity to add information, without distracting from the larger picture.
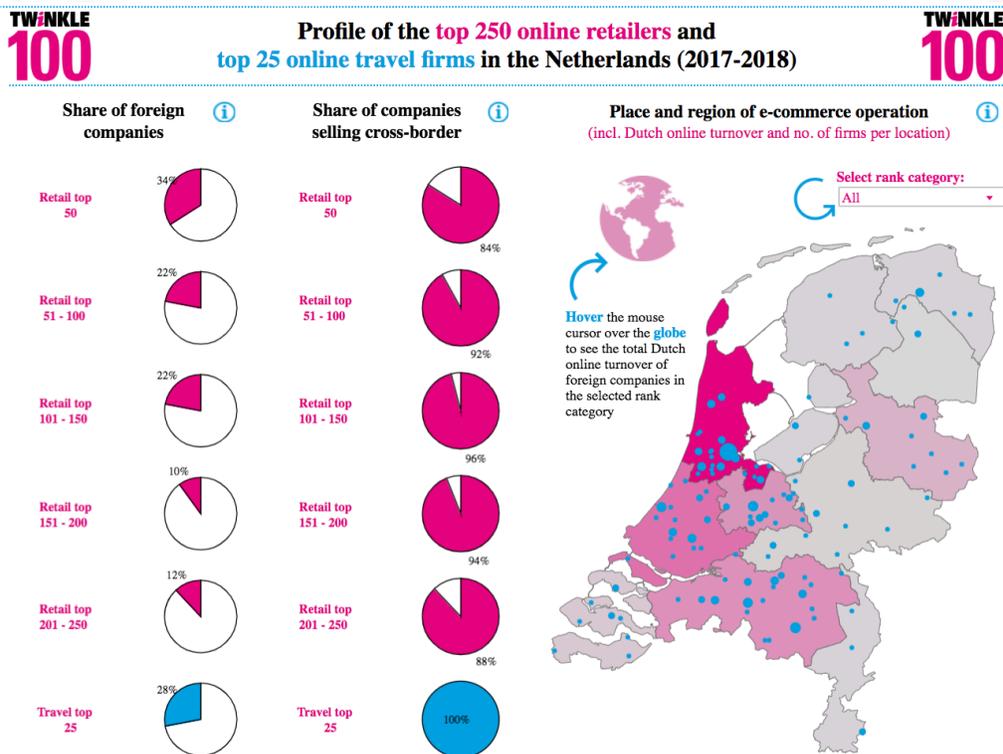


This visualization by the Amsterdam University of Applied Sciences uses pie charts to show the share of foreign retail companies selling cross border. The addition of the map provides further context.

## Tips:

**Limit the number of pie wedges.** If you have too many proportions to compare, the viewer may have trouble getting meaning from the chart. Similarly, limit dashboards to a small total number of pie charts.

**Overlay pies on maps.** Pie charts can further break down geographical trends in your data, creating a compelling visualization.

# Maps

Maps are a no-brainer for visualizing any kind of location information, whether it's postal codes, state abbreviations, country names, or your own custom geocoding. If you have geographic information associated with your data, maps are a simple and compelling way to show how location correlates with trends in your data. For example, insurance claims by state, product export destinations by country, car accidents by zip code, and custom sales territories.
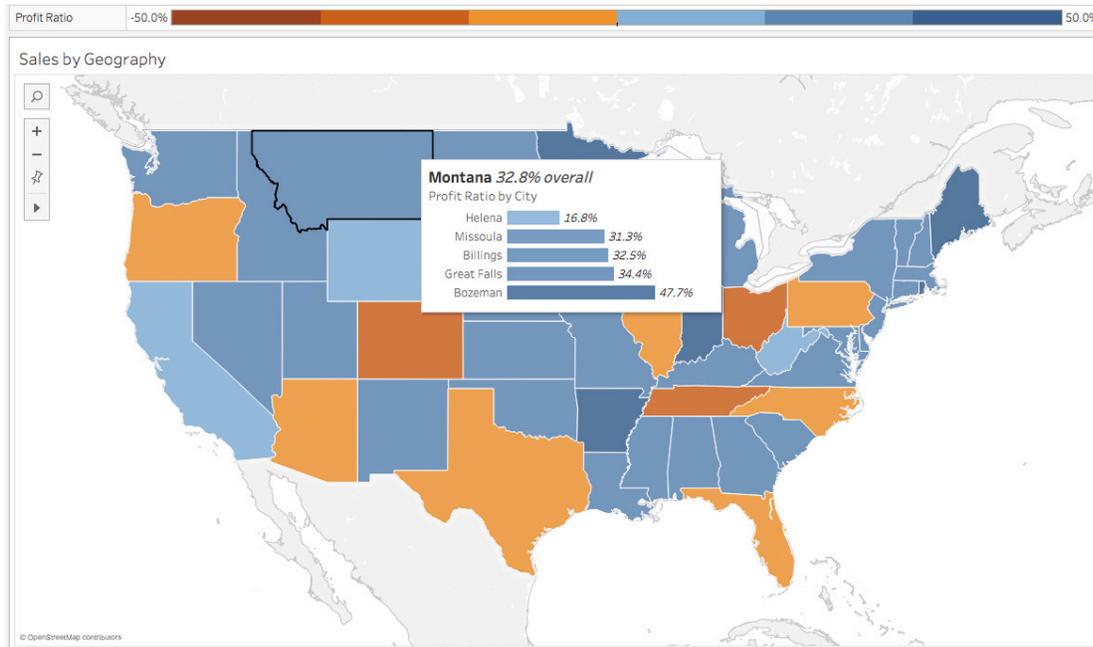


This map shows profit ratio by state. By layering in a tooltip, you can dig into the city level without leaving the view. In this case, we see that Montana has a 32.8% profit ratio overall, which we can visually compare to other states through the use of color.

## Tips:

**Use a map as a filter for other types of charts, graphs, and tables.** A map provides an intuitive way to drill down into your data. Viewers can see large trends at a glance, and use filter actions to quickly investigate even further.

**Layer data points on top of maps.** Marks can be overlaid on a map to show individual data points with more precision. Try varying their size to add more visual detail to your analysis.

# Density Map

Density maps reveal patterns or relative concentrations that might otherwise be hidden due to an overlapping mark on a map—helping you identify locations with greater or fewer numbers of data points. Density maps are most effective when working with a data set containing many data points in a small geographic area.
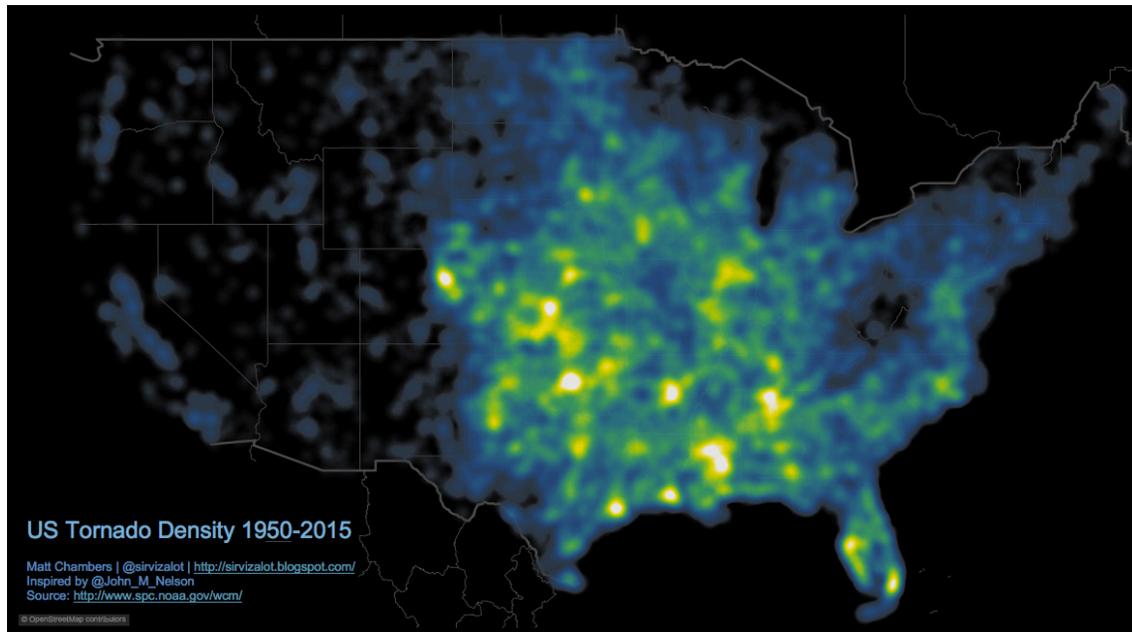


This density map by Matt Chambers shows the density of tornado occurrences in the United States. The dark background emphasizes the areas that are more prone to tornadoes.

## Tips:

**Use Pages to understand spatial patterns.** With the Pages shelf in Tableau, you can move through the years, months, or days to see how the data changes over time and you can see relative comparisons as you animate the data.

**Use a background image to provide context.** If you're using a non-traditional map (like a map of a tennis court, for example), make sure you use a relevant background image to ground the data in context.

# Scatter Plots

Scatter plots are an effective way to investigate the relationship between different variables, showing if one variable is a good predictor of another, or if they tend to change independently. A scatter plot presents lots of distinct data points on a single chart. The chart can then be enhanced with analytics like cluster analysis or trend lines. For example, you could use this chart to visualize technology early-adopters' and laggards' purchase patterns or shipping costs of different product categories to different regions.

Sales and Profit by Customer
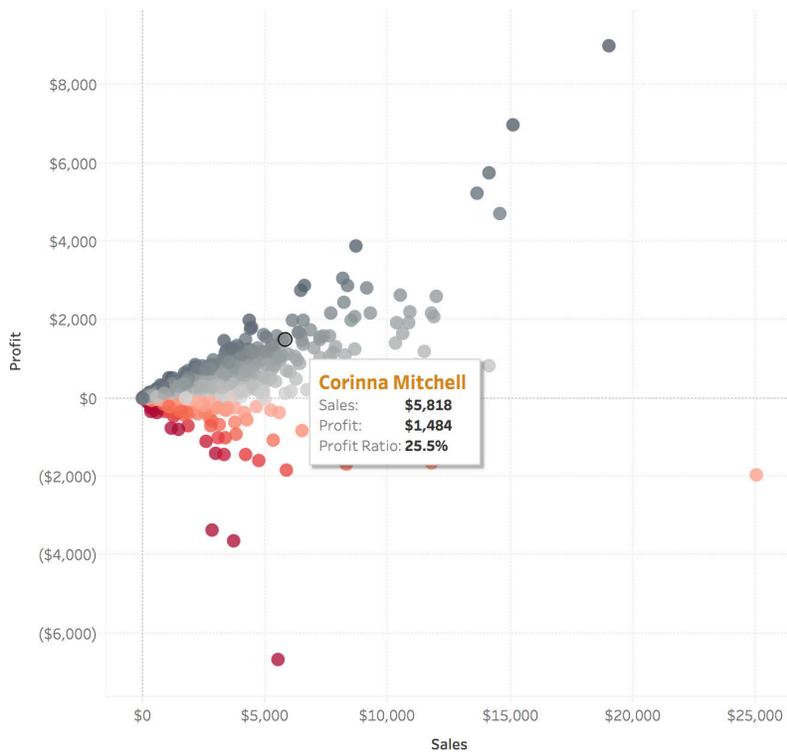


This scatterplot shows sales and profit by customer, with each mark symbolizing a customer.

## Tips:

**Use cluster analysis to identify segments.** Cluster analysis groups data points into distinct segments, based on the variables you select.

**Use highlight actions.** By adding a highlight action to your scatter plots, quickly see which points have attributes in common, without losing sight of the rest of the dataset.

**Customize marks.** Custom marks add a quick visual cue to your chart, clearly distinguishing different groups of points.

# Gantt Chart

Gantt charts display a project schedule or show changes in activity over time. A Gantt chart shows steps that need to be completed before others can begin, along with resource allocation. But Gantt charts aren't limited to projects. You can represent any data related to a time series with this chart type, like the duration of a machine's use or availability of players on a team, for example.
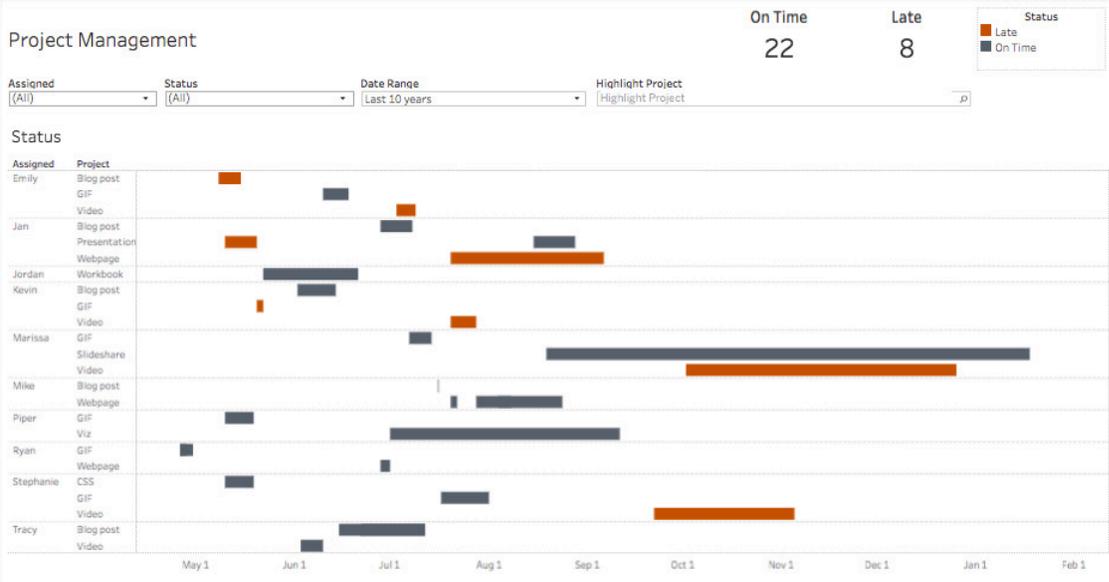


This Gantt chart shows the status of ongoing projects and whether or not they are late or on time.

## Tips:

**Add color.** Changing the color of the bars within the Gantt chart quickly informs viewers about key aspects of the variable.

**Combine maps and other chart types with Gantt charts.** Including Gantt charts in a dashboard with other chart types can help correlate otherwise disconnected data.

# Bubble Chart

Although bubbles aren't technically their own type of visualization, using them as a technique adds detail to scatter plots or maps to show the relationship between three or more measures. Varying the size and color of circles creates visually compelling charts that present large volumes of data at once.
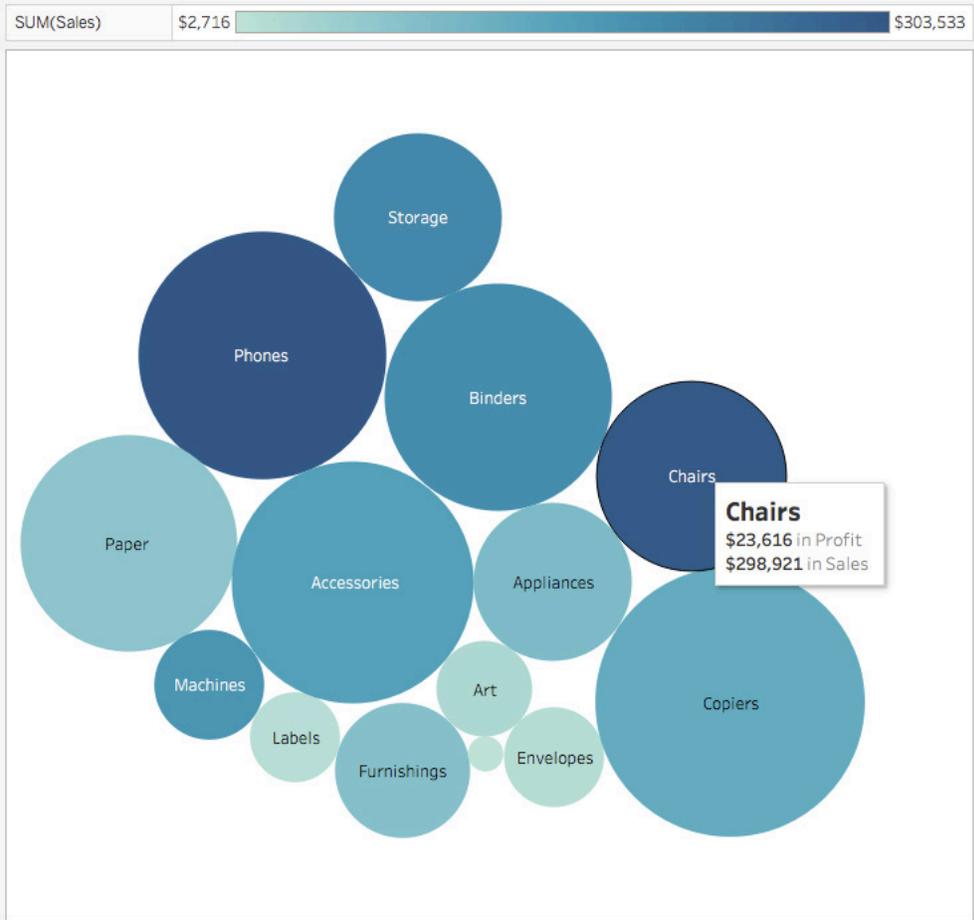


In this example, the bubble chart displays the relationship between values—in this case, product category, sales, and profit. The product categories with the most sales instantly stand out in dark blue, while the size of the bubble reflects the amount of profit that product has generated.

## Tips:

**Add color.** Color can add more dimension to a bubble chart, while creating an attractive visual "pop."

**Overlay bubbles on maps.** Bubbles quickly inform a viewer about relative concentration of data. Using these as an overlay puts geographically-related data in context for the viewer.

# Histogram Chart

Histograms show how your data is distributed across distinct groups. Histograms group your data into specific categories (also known as "bins"), then assign a bar that is proportional to the number of records in each category. You could use this chart type to visualize things like number of customers by company size, student performance on an exam, or frequency of a product defect.
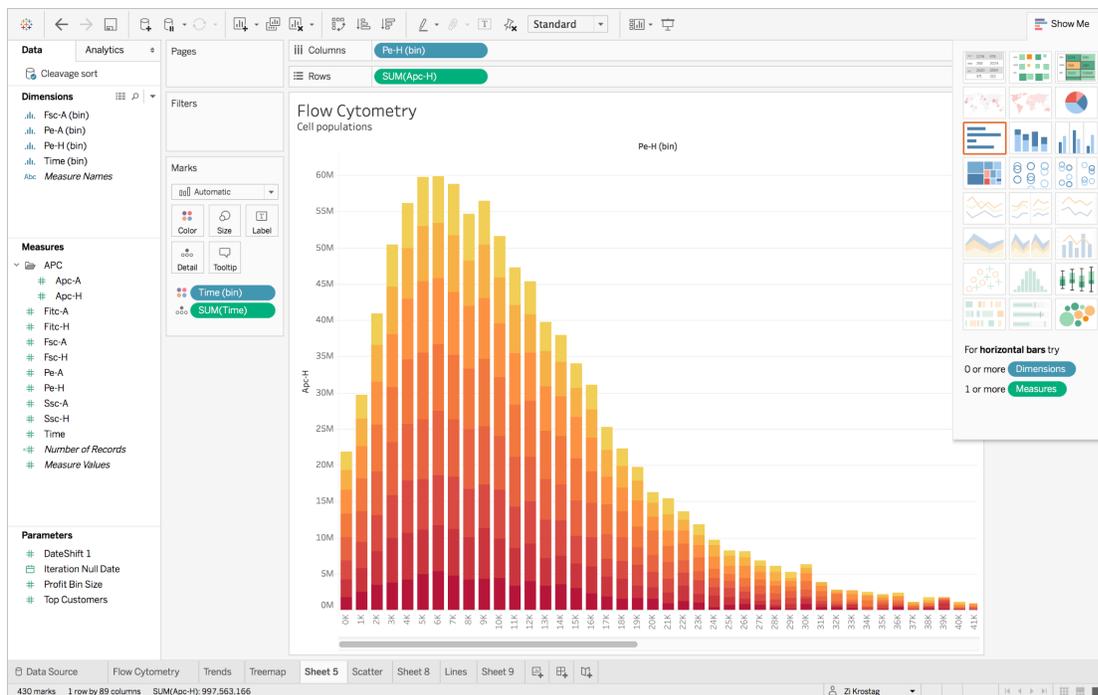


Flow cytometry is a "technique used to detect and measure physical and chemical characteristics of a population of cells or particles." This histogram shows cell populations, binned by "Pe-H" (protein family).

## Tips:

**Test different groupings of data.** Creating a variety of histograms can help to determine the most useful groupings of data.

**Add color to break bins down.** Apply color to bars representing each group to show a second set of categories on the same chart.

# Bullet Chart

With bullet charts, quickly compare progress against a goal. At its core, a bullet graph is a variation of a bar chart. Designed to replace dashboard gauges, meters, and thermometers, a bullet chart shows more information and provides more points of comparison, while using less space. Because it doesn't display history, this chart is best suited for quick "how are we doing" dashboards, rather than deep analysis.
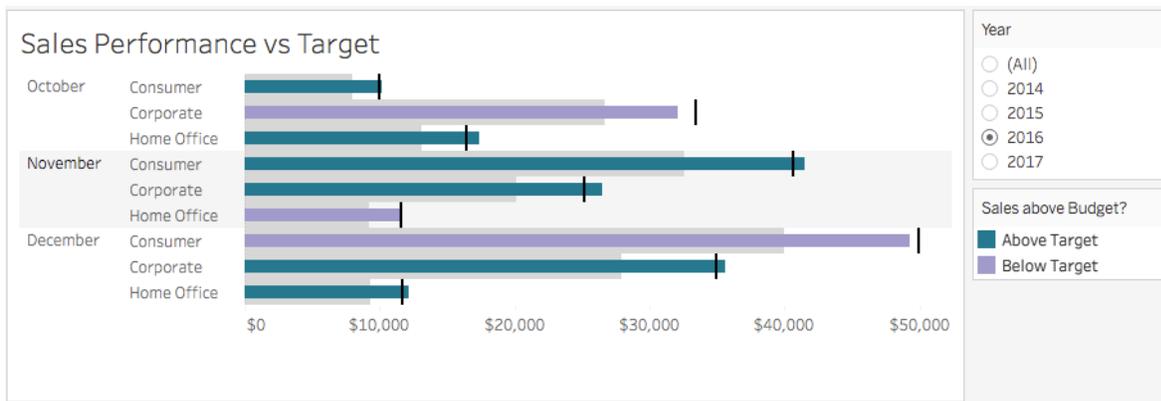


In this bullet chart, we can see overall sales performance at a glance to determine that the Corporate product segment did not hit its target in October or December, and Home Office was also lagging behind in November.

## Tips:

**Use color to illustrate achievement thresholds.** Including color as a backdrop gives the viewer another reference to better understand how performance is measured against goals.

**Add bullets to dashboards for summary insights.** Combining bullets with other chart types into a dashboard supports productive discussions around where to focus efforts to accomplish objectives.

# Highlight Table

Highlight tables take heat maps one step further. A highlight table uses color to grab the viewer's attention, while still presenting precise figures. For example, segmentation analysis of target market, product adoption across regions, and sales leads by individual representative.

## Product Drilldown
### Sales by Product Category

| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Furniture | 2014 | $6,243 | $1,840 | $14,574 | $7,945 | $6,913 | $13,206 | $10,821 | $7,320 | $23,816 | $12,304 | $21,565 | $30,646 |
| | 2015 | $11,740 | $3,134 | $12,500 | $10,476 | $9,375 | $7,714 | $13,674 | $9,639 | $26,273 | $12,027 | $30,881 | $23,086 |
| | 2016 | $7,623 | $3,926 | $12,801 | $13,212 | $15,120 | $13,071 | $13,069 | $12,483 | $27,263 | $11,873 | $31,784 | $36,679 |
| | 2017 | $5,964 | $6,866 | $10,893 | $9,066 | $16,958 | $19,009 | $11,813 | $15,442 | $29,028 | $21,884 | | |
| Office Supplies | 2014 | $4,851 | $1,072 | $8,606 | $11,155 | $7,136 | $12,953 | $15,121 | $11,379 | $27,423 | $7,211 | $26,862 | $18,006 |
| | 2015 | $1,809 | $5,368 | $15,883 | $12,559 | $9,114 | $10,648 | $4,720 | $11,735 | $19,306 | $8,673 | $21,218 | $16,202 |
| | 2016 | $5,300 | $6,794 | $17,347 | $10,647 | $13,035 | $10,902 | $12,924 | $8,960 | $23,264 | $16,282 | $20,487 | $37,998 |
| | 2017 | $21,274 | $7,408 | $14,550 | $15,072 | $13,737 | $16,912 | $10,241 | $30,060 | $31,896 | $23,037 | | |
| Technology | 2014 | $3,143 | $1,609 | $32,511 | $9,195 | $9,600 | $8,436 | $8,004 | $9,210 | $30,538 | $11,938 | $30,201 | $20,893 |
| | 2015 | $4,625 | $3,449 | $10,344 | $11,161 | $11,643 | $6,435 | $10,371 | $15,525 | $19,017 | $10,705 | $23,874 | $35,632 |
| | 2016 | $5,620 | $12,259 | $21,568 | $14,891 | $28,833 | $16,372 | $13,269 | $9,672 | $22,883 | $31,533 | $27,141 | $22,323 |
| | 2017 | $16,733 | $6,027 | $33,429 | $12,383 | $13,567 | $17,061 | $23,210 | $17,619 | $26,943 | $32,856 | | |

**Region**
- ☑ (All)
- ☑ Central
- ☑ East
- ☑ South
- ☑ West

**Sales**

$1,072   $37,998

The highlight table uses color to draw the eye to see the categories and months with the highest sales.

## Tips:

**Combine highlight tables with other chart types:** Buttressing a line chart with a highlight table, for example, lets a viewer keep overall data trends in mind while drilling down into specific cross sections of interest.

# Treemap

Treemaps relate different segments of your data to the whole. As the name of the chart suggests, each rectangle in a treemap is subdivided into smaller rectangles, or sub-branches, based on its proportion to the whole. They make efficient use of space to show percent total for each category.
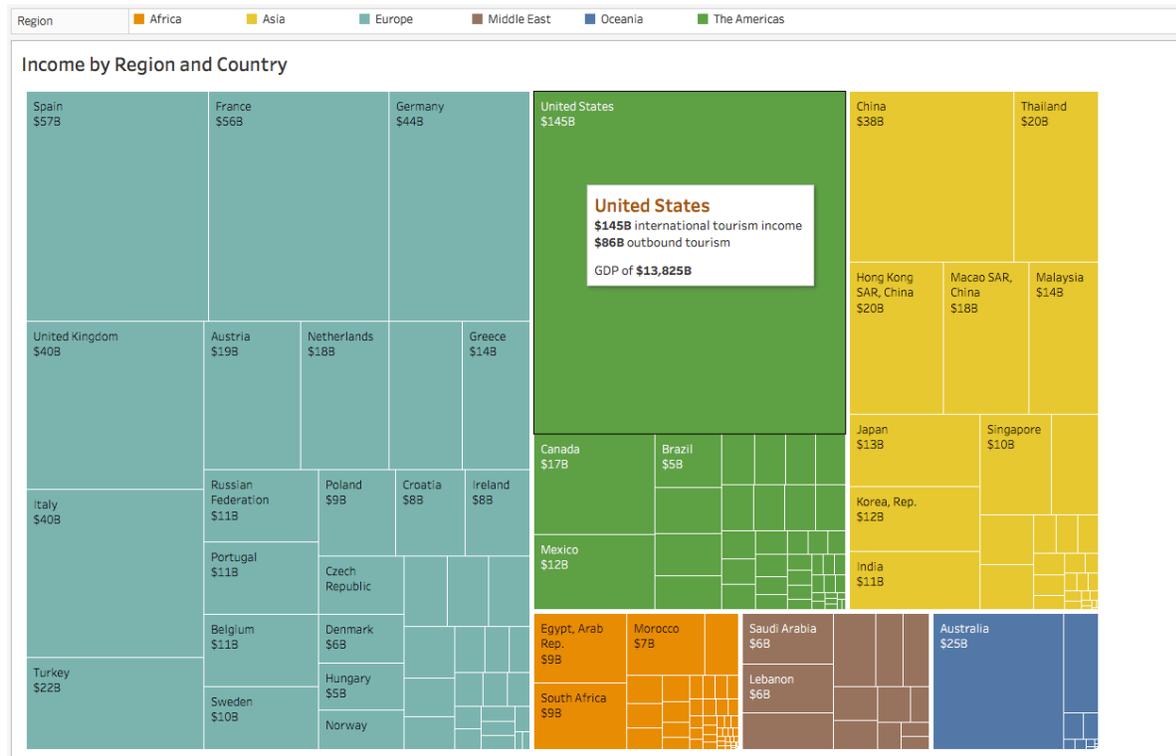


The treemap uses size to show the regions with the highest inbound tourism incomes compared to other countries in their region. The use of color differentiates between the regions.

## Tips:

**Color the rectangles by category.** Because treemaps are such a dense chart type, color makes it easier for the viewer to distinguish one category from another.

**Combine treemaps with bar charts.** The bar chart lets the viewer quickly compare items through the bar's length, while also showing the breakdown of categories within each bar.

# Box-and-Whisker Plot

Box-and-whisker plots, or boxplots, are a common way to show distributions of data. The name refers to the two parts of the diagram: the box, which contains the median of the data along with the 1st and 3rd quartiles (25% greater and less than the median), and the whiskers, which typically represent data within 1.5 times the interquartile range (the difference between the 1st and 3rd quartiles). The whiskers can also be used to show the maximum and minimum points within the data.
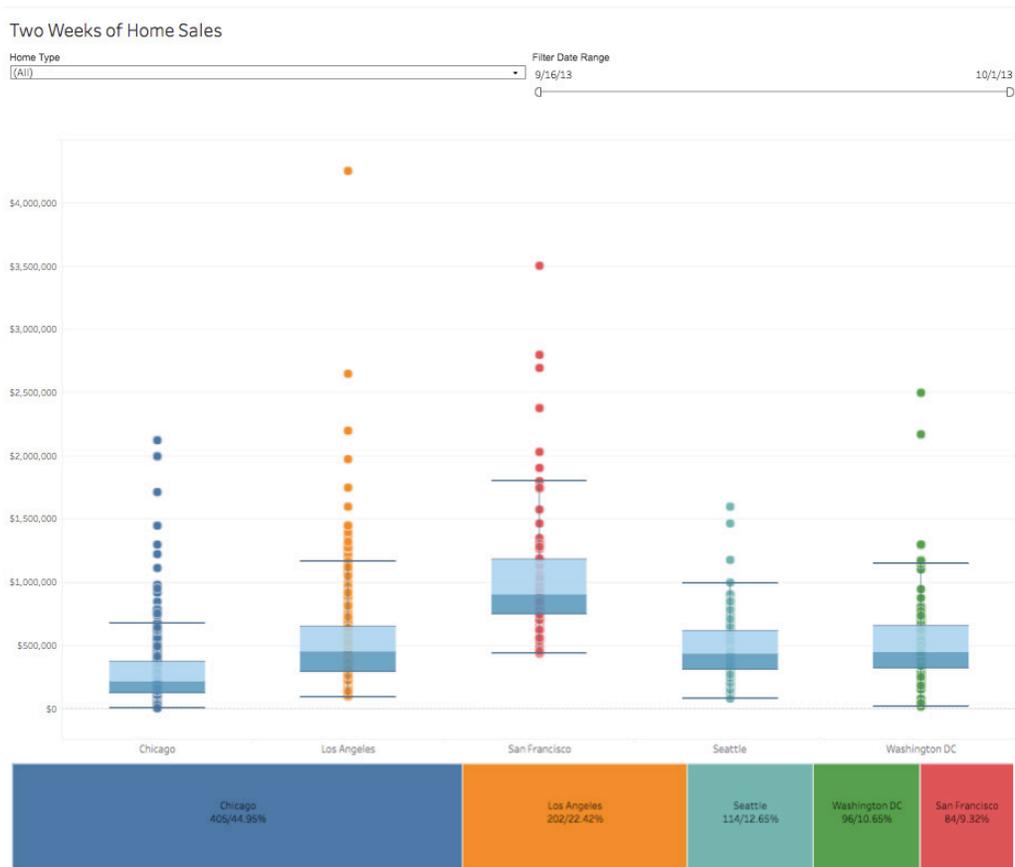


This box-and-whisker plot shows the distribution of closing prices for homes in five large cities over the course of a two-week time frame. The bar below provides added context with the total number of homes sold for each city

## Tips:

**Hide the points within the box**. This helps the viewer focus on the outliers.

**Compare box plots across categorical dimensions.** Box plots are great for quickly comparing distributions between datasets.

# Candlestick Chart

Though candlestick charts may remind you of box–and–whisker plots, they mean different things. Candlestick charts are commonly used for financial analysis to show metrics about a financial instrument over a period of time. This chart type shows the open, close, high, and low values of an instrument over time, in an easy to understand format.
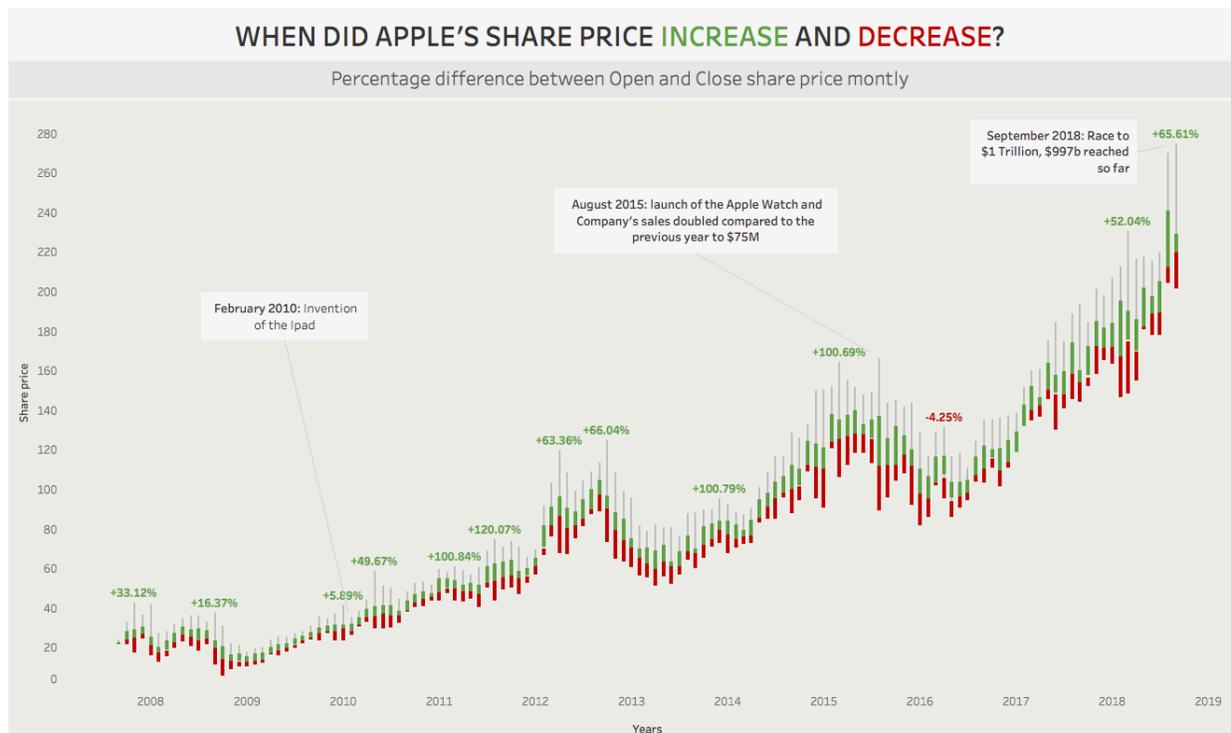


This example by Laura Scavino uses a candlestick chart to show the percentage difference between Apple's open and close share prices over time.

## Tips:

**Present multiple separate candlestick charts.** Trying to layer too many data points on a single chart can be confusing and difficult to navigate. Creating clear distinctions helps the viewer to analyze the charts separately

**Use highlight actions to correlate data.** Time-series data can be difficult to keep track of. Highlight actions allow a user to focus on a single date, while still seeing the historical information in the rest of the chart.

## About Tableau

Tableau helps people transform data into actionable insights that make an impact. Easily connect to data stored anywhere, in any format. Quickly perform ad-hoc analyses that reveal hidden opportunities. Drag and drop to create interactive dashboards with advanced visual analytics. Then share across your organization and empower teammates to explore their perspective on data. From global enterprises to early-stage startups and small businesses, people everywhere use Tableau's analytics platform to see and understand their data.

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