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Data Visualization in Power BI

TRANSFORM YOUR DATA INTO DECISIONS!

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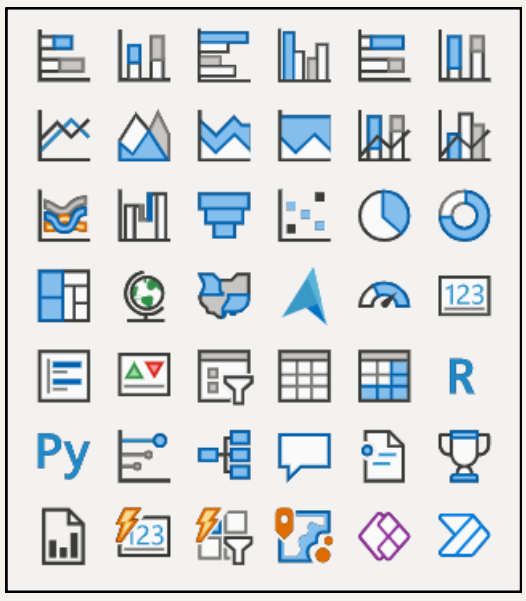
What is Data Visualization?

Data Visualization refers to the technique of displaying data in graphical or visual formats to help uncover patterns, trends, and valuable insights. It plays a crucial role in making data more understandable and supports more informed decision-making by simplifying complex datasets.

Power BI is a leading tool in the field of data visualization and business intelligence. It enables users to build dynamic, interactive dashboards and reports that provide clear and actionable insights.

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Importance of Visuals

Charts play a crucial role in data analysis by making complex information easier to understand visually.

- **Spotting Trends and Patterns:** When data points are displayed together, it becomes simpler to observe changes over time or across categories, helping identify underlying trends and recurring patterns.
- **Forecasting Future Values:** By analyzing the direction and relationship of data points, charts can help estimate potential future outcomes or values based on existing patterns.
- **Detecting Deviations:** When a new data point is added, it's easy to see whether it aligns with expectations or deviates from the trend, highlighting anomalies or outliers.
- **Making Visual Comparisons:** Charts make it straightforward to compare key data points side by side, offering quick visual insights into differences or similarities.

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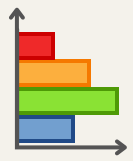
Column & Bar Charts

Column Chart: A column chart uses vertical bars to present data, making it easy to compare values across different categories, especially when the categories are relatively short. **Use Case:** Useful for comparing sales figures by region or department-wise expenditures.

Bar Chart: Bar charts display data with horizontal bars, where the length represents the value. It is deal when dealing with long category labels and useful for visualizing data with negative values, where the bars extend to the left for (-)ve values and to the right for (+)ve values. **Use Case:** Ideal for comparing values like customer satisfaction scores across departments.



Stacked Bar & Column Charts (stacks series on top of each other to show the total while still comparing part-to-whole relation-ships. *E.g., sales figures for multiple products across different regions.*)

Clustered Stacked Bar & Column Charts (displays multiple data series side by side within each category. *E.g., breakdown of total expenses by department over time.*)

100% Stacked Bar & Column Charts (Similar to the stacked chart but normalized to 100%, highlighting the proportional contribution of each series. *E.g., different product lines contribute to total sales percentage-wise across different years.*)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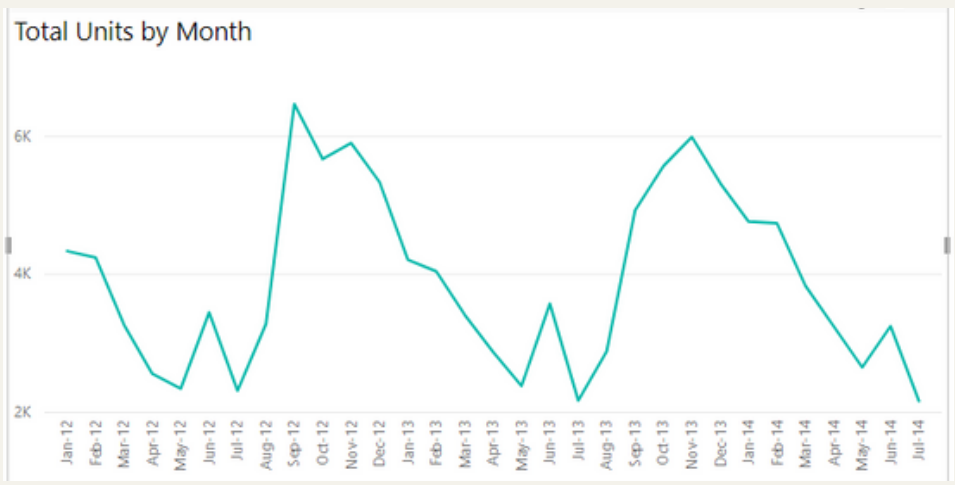
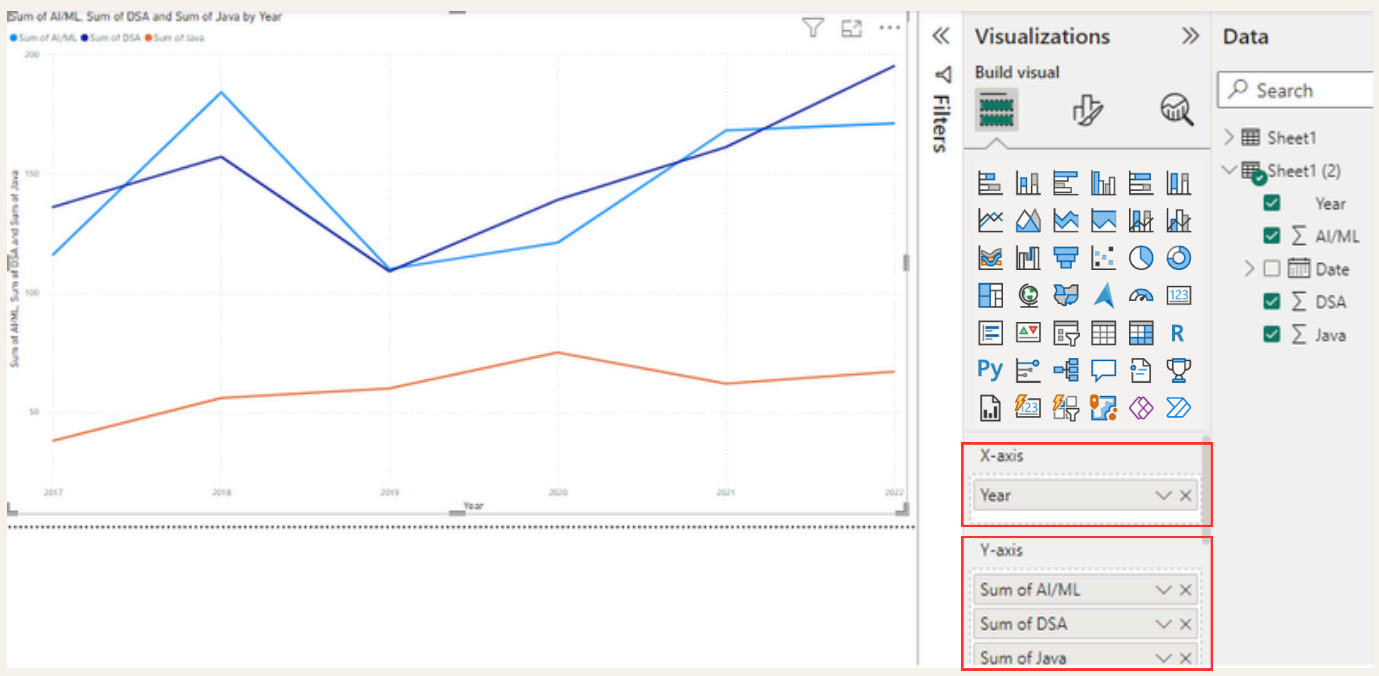
Line Charts

A line chart shows data trends over a period of time by connecting data points with a continuous line. It visualizes trends, such as sales growth or website traffic over time.

Use Case: Great for tracking monthly revenue growth or user activity trends.



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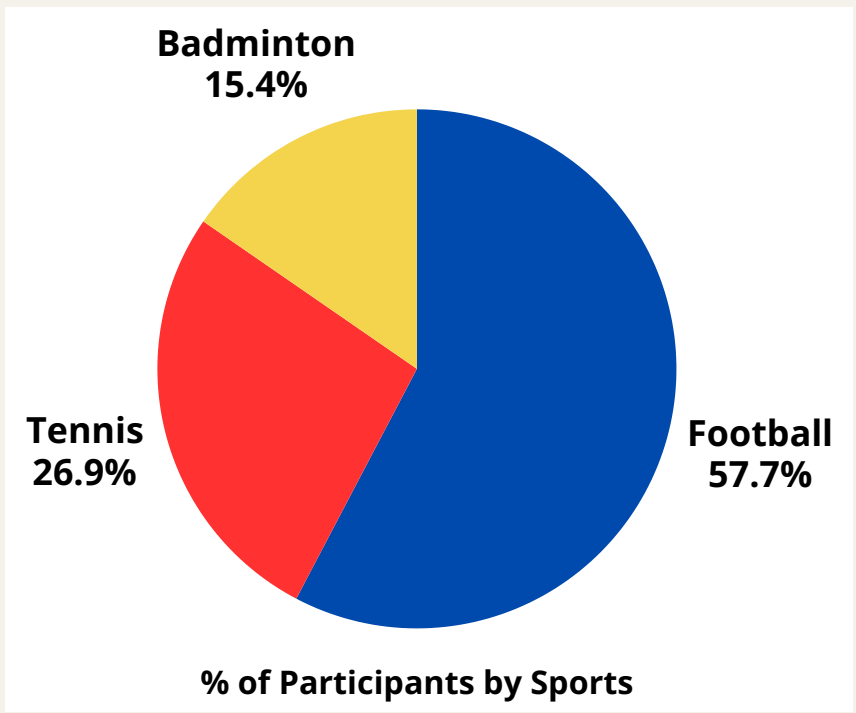
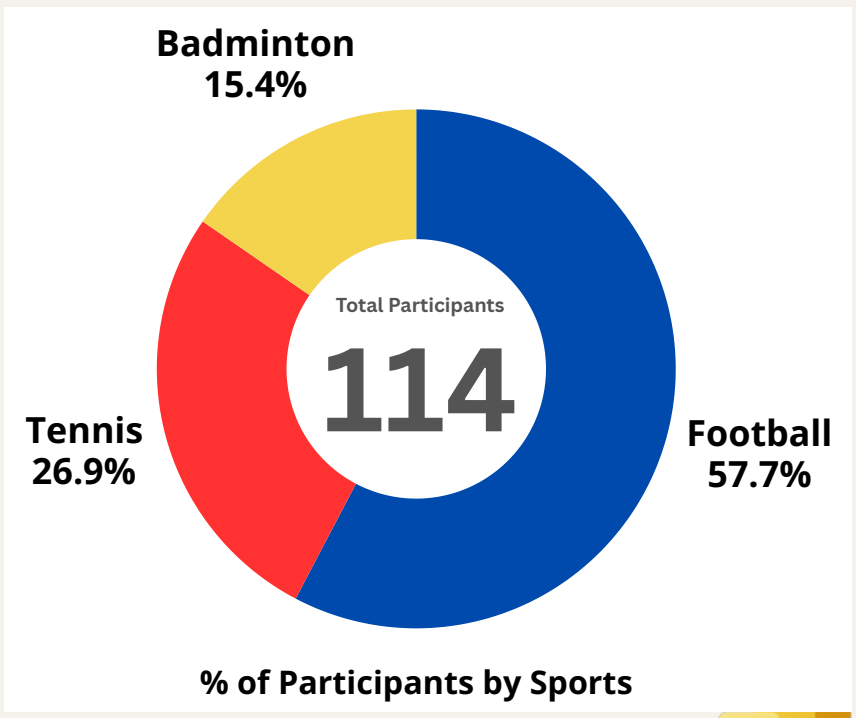
Pie & Donut Charts

Pie charts and Donut charts are both circular charts that visualize the proportion of parts to a whole.

However, donut charts have a hole in the center, making them look like a ring. This central void in donut charts can be used to display additional information.

Use Case: Best for displaying market share or budget allocations.



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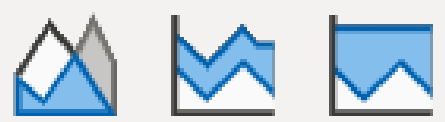
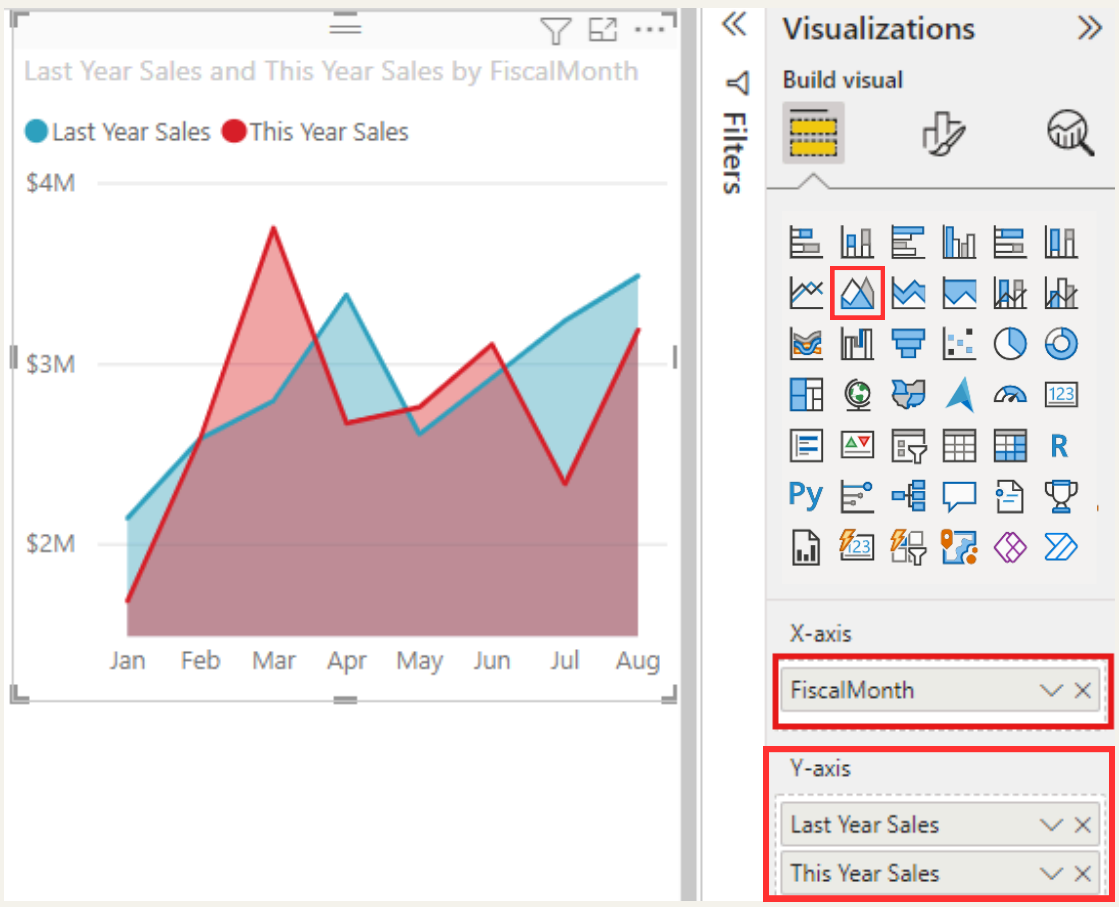
Area Charts

Similar to line charts but the area below the line is filled to emphasize volume. **Use Case:** Perfect for visualizing revenue accumulation or profit trends.



Types:

Basic Area Chart: Highlights the trend and total value across time.
Stacked Area Chart: Demonstrates how individual data segments contribute to the cumulative value over time.
100% Stacked Area Chart: visualizes the relative percentage contribution of multiple data series over time, where the total of each stacked area always equals 100%.



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Combo Charts

Combines column and line charts to compare different data sets using the same or separate Y-axes.

Use Case: Useful for comparing monthly sales (columns) and profit margin (line).

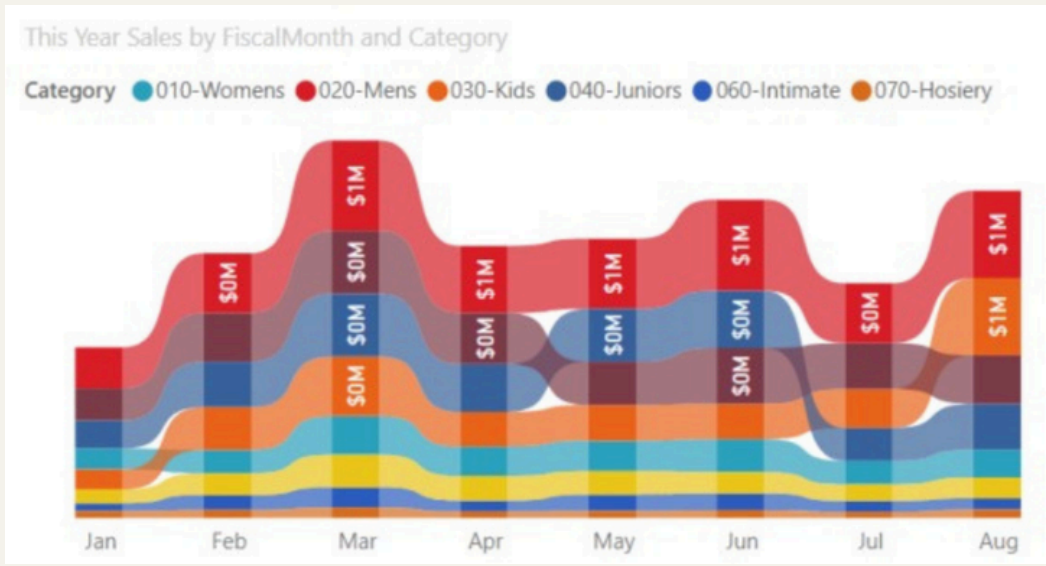
Line and stacked column chart

Line and clustered column chart

Ribbon Chart

Tracks ranking over time by keeping the highest value on top.

Use Case: Effective for showing how different products or regions ranked over various time periods.

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Waterfall Chart

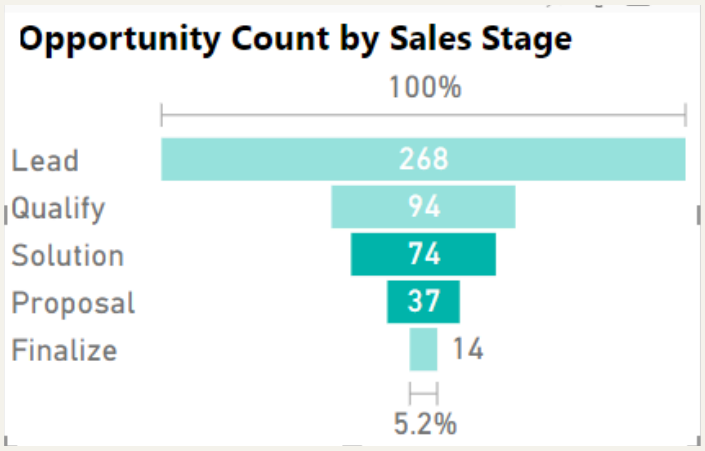
Shows a running total, illustrating how an initial value is affected by a series of positive and negative changes.

Use Case: Commonly used in financial reports to show changes in net income or balance sheets.

Funnel Chart

Represents a linear process with sequential stages, where values typically decrease at each stage.

Use Case: Great for visualizing sales pipelines, conversion funnels, or recruitment processes.

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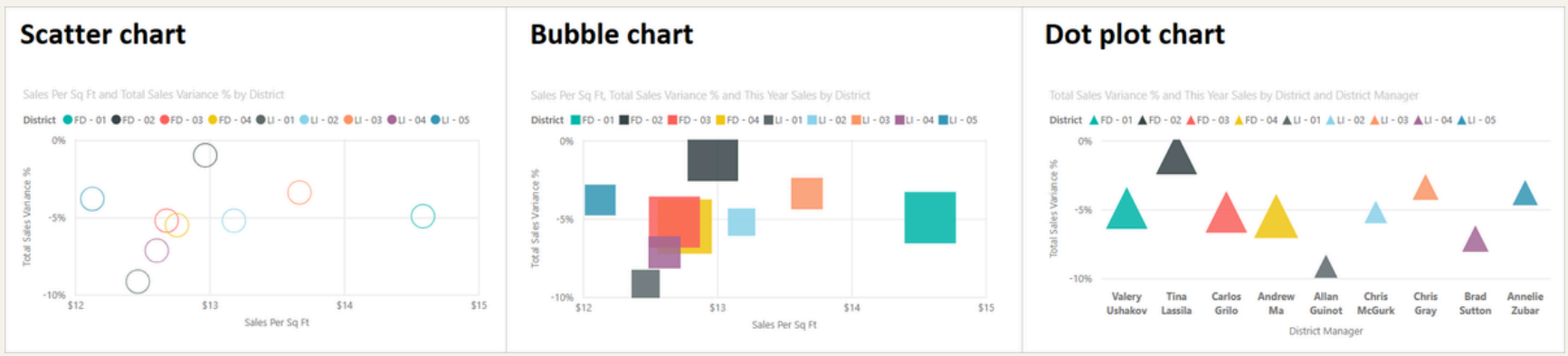
Scatter Chart

Scatter charts display data along a horizontal (x) and vertical (y) axis. The chart reveals how numerical values along the two axes are related. It helps in identifying trends, patterns, and correlations within the data.

Types:

- **Basic Scatter Chart:** E.g., Compare advertising spend vs. sales revenue to observe correlation.
- **Bubble Chart:** A variation of the scatter chart that adds a third dimension through the size of the bubble. Each bubble's position is determined by two variables (X and Y), and its size reflects a third metric. E.g., Visualize profit (size), revenue (X-axis), and customer base (Y-axis) across different regions.
- **Dot plot:** dot plots usually plot categorical data on one axis and numerical data on the other. They display individual data points clearly without overlapping. E.g., Show number of employees by department, where each dot represents a person or grouped count.



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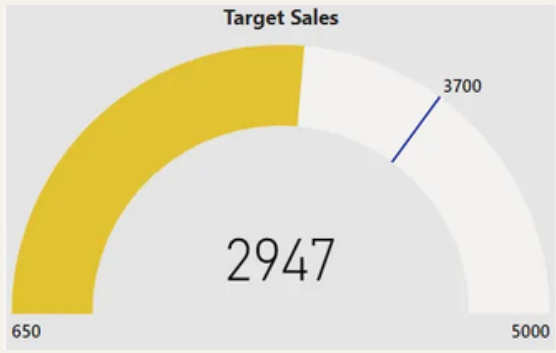
Gauge Chart

Displays a single value on a circular arc, measuring progress toward a goal with a needle, shading, and bold value.

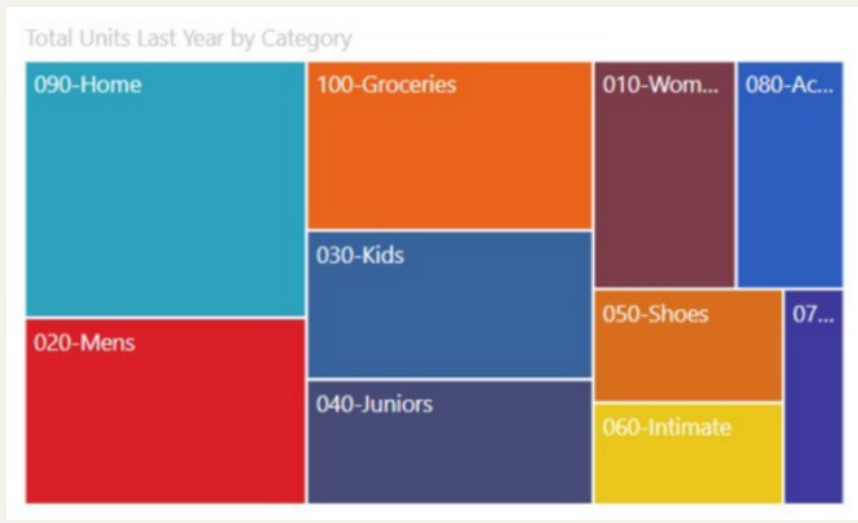
Use Case: Useful for visualizing progress toward targets, like sales goals or utilization rates.



Treemaps

Displays colored rectangles, where size represents value, and rectangles are nested to show hierarchical data.

Use Case: for visualizing sales by category and sub-category at once.

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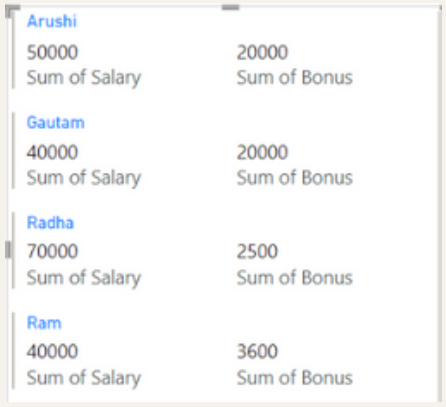
Cards

- **Single Number Card:** Displays a single, high-level metric like total revenue or user count.

- **Multi-Row Card:** Showcases multiple related metrics in a list-like format. E.g., Used for tracking key indicators such as sales figures, customer numbers, or performance summaries.



- **Card (new):** A versatile tool for presenting key metrics in a visually appealing format. Each card can display a specific metric, such as total sales or profit growth, and can be customized to reflect your objectives and key results (OKRs). This flexibility allows users to group multiple cards within a single container, providing full control over every component of each card, and a comprehensive overview of important data points at a glance.

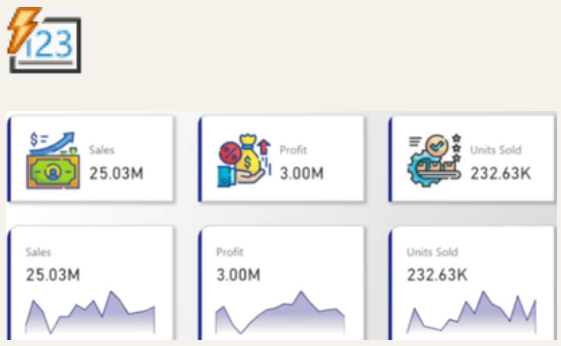



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Table & Matrix

Table: Displays data in rows and columns, much like Excel.

- **Use Case:** Perfect for showing raw data like product lists or transaction details.

Revenue Country and Category

Country	Product Category	Revenue
France	Accessories	1,051,481
France	Bikes	1,872,603
France	Clothing	458,422
Germany	Accessories	1,221,342
Germany	Bikes	2,465,427
Germany	Clothing	469,621
United Kingdom	Accessories	1,252,981
United Kingdom	Bikes	2,415,117
United Kingdom	Clothing	528,581
United States	Accessories	3,549,542
United States	Bikes	4,733,208
United States	Clothing	1,834,639
Total		**21,852,964**

Matrix: Similar to pivot tables, allows grouping data into categories with row and column hierarchies.

- **Use Case:** Best for comparing values across two dimensions, such as sales by year and region.

Country	Jun 2015	Jul 2015	Aug 2015	Sep 2015	Oct 2015	Nov 2015	Dec
France	**88,447**	**128,750**	**196,351**	**196,677**	**153,331**	**192,674**	**33**
Accessories		27,029	72,689	70,200	63,892	62,444	11
Bikes	88,447	93,189	79,409	96,722	65,579	96,338	17
Clothing		8,532	44,253	29,755	23,860	33,892	4
Germany	**71,449**	**172,939**	**207,887**	**226,359**	**230,068**	**201,682**	**34**
United Kingdom	**54,133**	**175,282**	**208,200**	**239,560**	**283,236**	**269,476**	**37**
United States	**123,727**	**312,083**	**635,747**	**632,650**	**710,334**	**775,096**	**1,06**
Total	**337,756**	**789,054**	**1,248,185**	**1,295,246**	**1,376,969**	**1,438,928**	**2,11**


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Maps

Map: Displays data points as bubbles on a geographical map.

- **Use Case:** Showing store locations or sales per city.

Filled Map: Uses shading to show values by geographic areas.

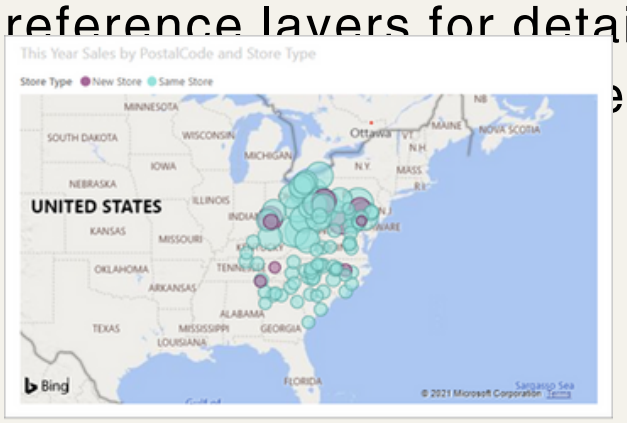
- **Use Case:** Useful for visualizing regional performance or distribution.

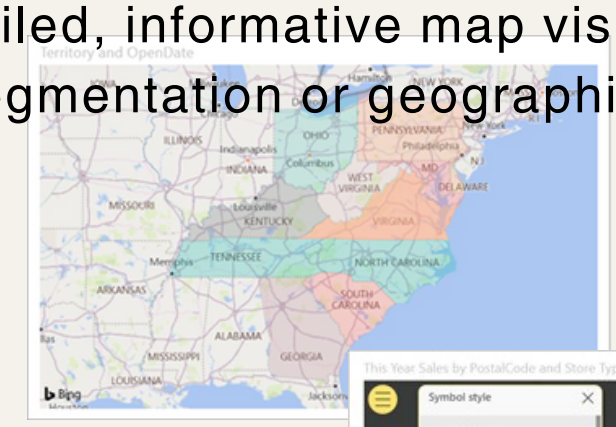
Azure Map: Offers advanced mapping to associate both categorical and quantitative information with spatial locations (multiple layers and dynamic views).

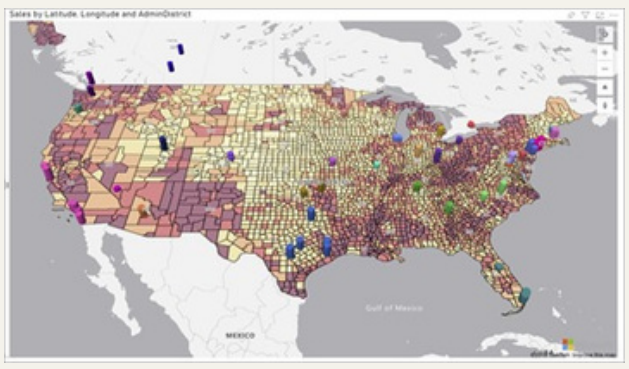
- **Use Case:** Ideal for real-time logistics tracking and urban analytics.

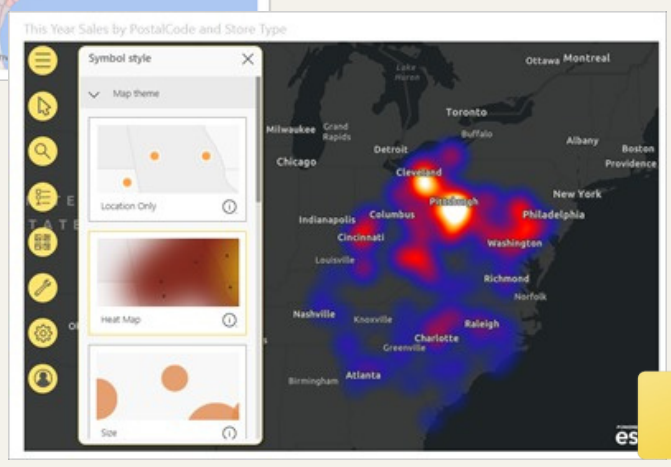
ArcGIS Map: Integrates advanced mapping features to enhance visuals by offering base maps, themes, symbol styles, reference layers for detailed, informative map visuals.

- **Use Case:** Ideal for demographic segmentation or geographic risk analysis.







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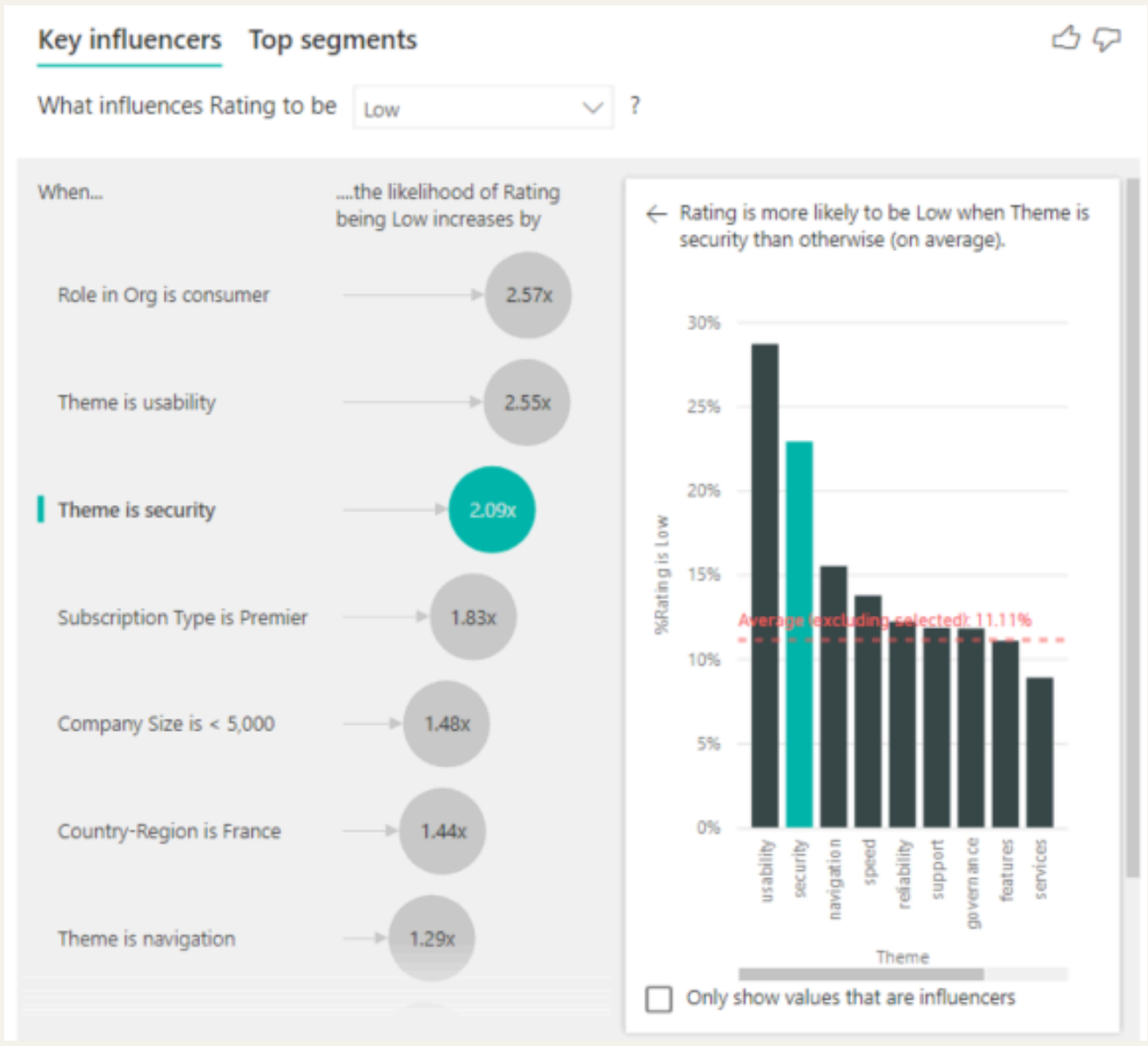
Key Influencers

Identifies and displays major factors influencing a specific result or value. It helps analyze what drives key metrics, like customer behavior or sales performance.

Use Cases: Ideal for understanding patterns, such as reasons for repeat orders or spikes in sales.

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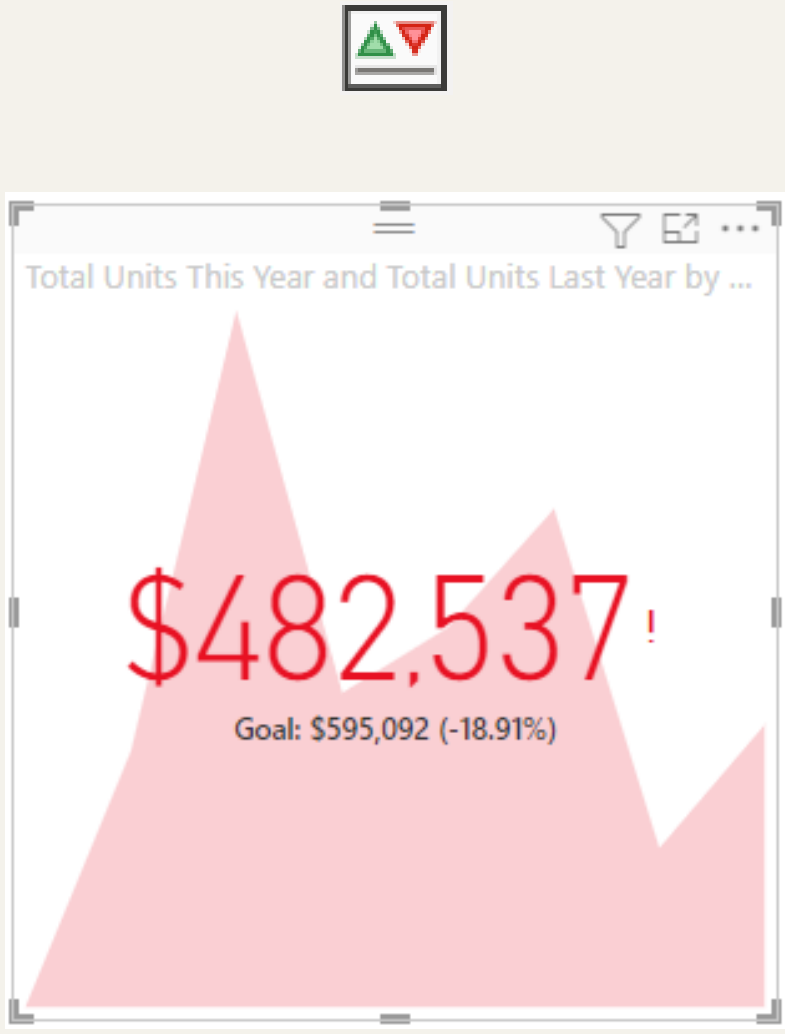
KPI (Key Performance Indicator)

Shows progress toward a measurable goal. Tracks performance, highlighting whether you're ahead, behind, or close to the target.

Use Cases: Displays whether current sales are on track to meet the monthly or yearly goal.

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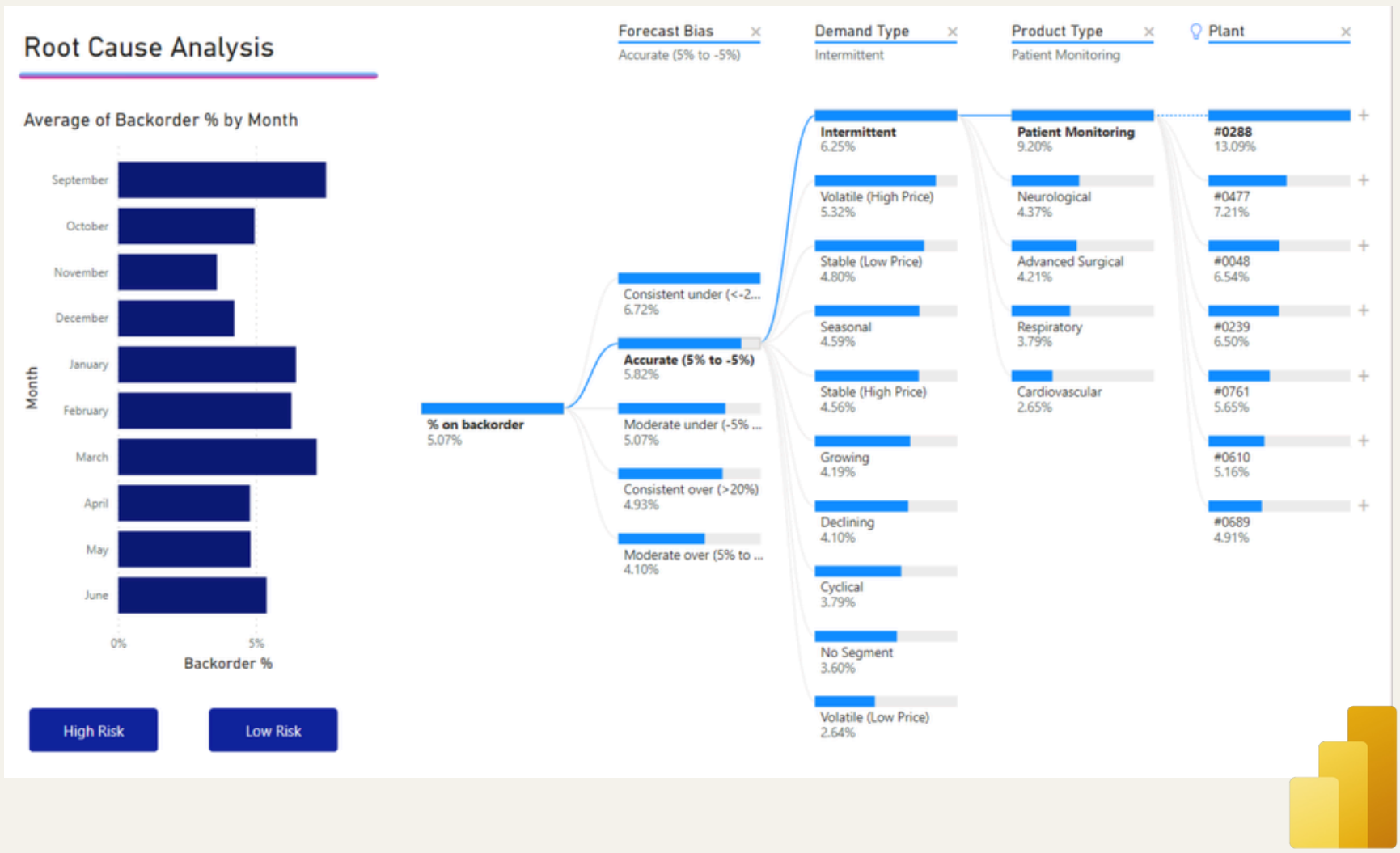
Decomposition Tree

Breaks down a metric into its contributing parts across multiple dimensions.

Use Case: Ideal for root cause analysis, like breaking down sales by region, then by product.

AI Integration: Power BI uses AI to suggest the most impactful factors automatically.

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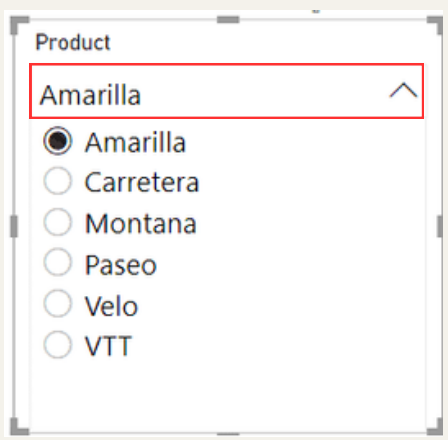
Slicer

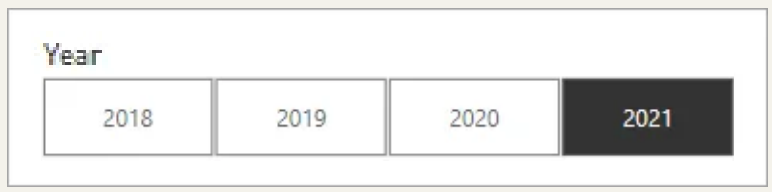
An interactive visual used to filter other visuals on a report page, available in various formats like category, range, or date.

It allows selection of one or more values, and displays the filtered state directly on the canvas.

Use Case: Enables users to narrow down visuals based on date, category, or product line. Available as dropdowns, sliders, or checkboxes.



In Power BI, there is also an option of **Button Slicer** at the bottom row of the *Visualizations* pane.



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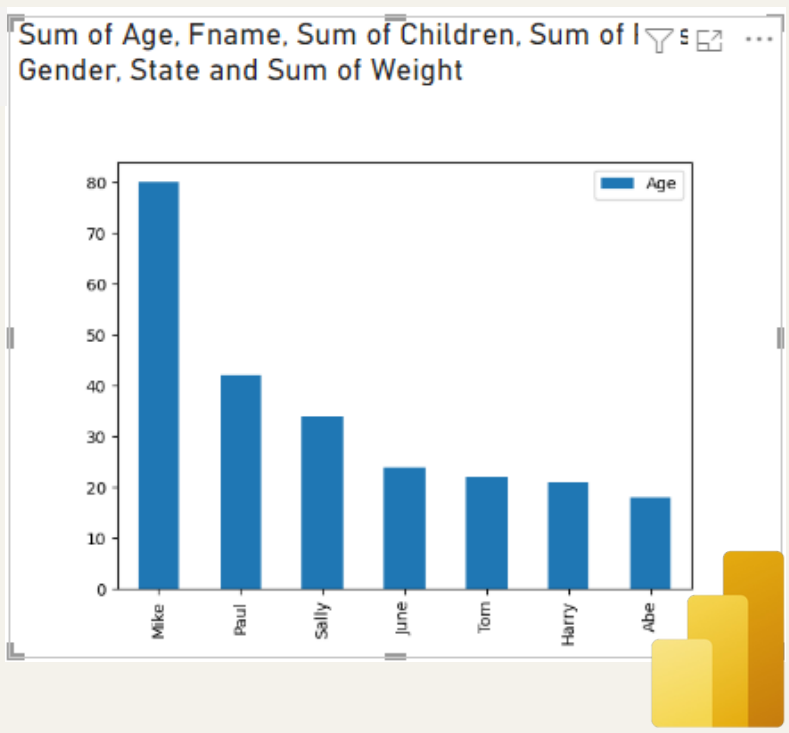
R & Python Visuals

R Script Visuals: Use R scripts to build custom charts and run statistical models. **Use Case:** Advanced data analytics, predictive modeling, or visualizations like violin plots or boxplots.

Python Visuals: Similar to R visuals, these use Python code for creating complex visuals or machine learning integrations. **Use Case:** Ideal for implementing models like clustering, forecasting, or natural language processing within Power BI.

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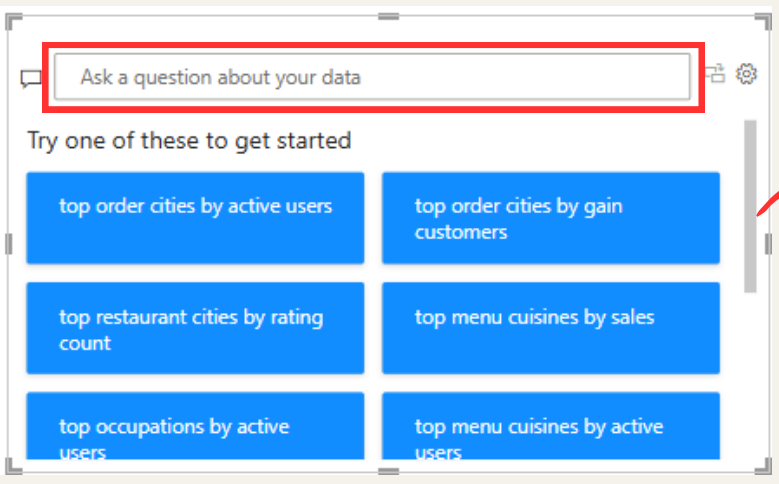
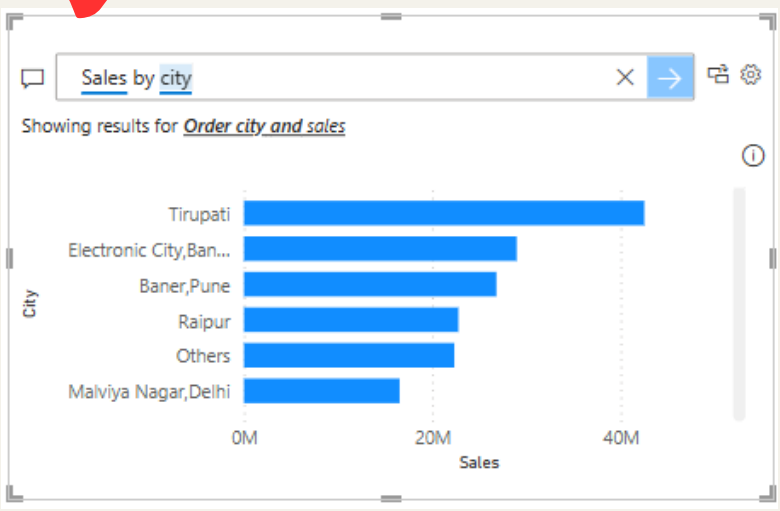
Q&A Visuals

Allows users to query data using natural language, and provides an appropriate visualization based on the query. For instance, it interprets questions like "Sales amount by City" and automatically generates the relevant chart or table.

Use Cases: Ideal for interactive reports where users can ask questions and instantly view data insights in various formats.



Write your question here



Note: You can bring this Q&A visual by double-clicking anywhere on your report.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Narrative

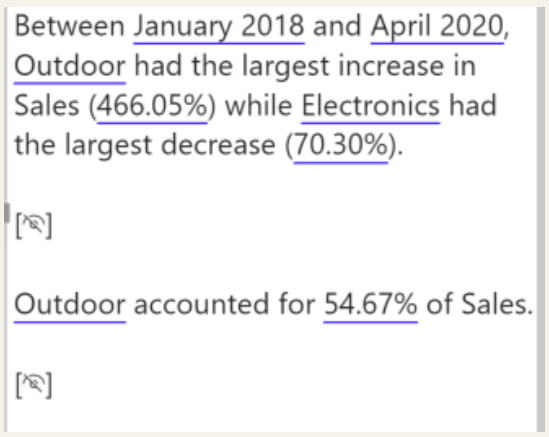
Transforms numbers and charts into natural language summaries, helping users interpret data quickly without diving deep into raw metrics. It automatically generates text-based explanations of your visuals based on selected fields and measures.

What It Does

- Converts data insights into plain English sentences
- Automatically updates text as data or filters change
- Can be customized to focus on specific KPIs or comparisons

Use Cases

- **Executive Dashboards:** Provide quick summaries of performance without needing to analyze each chart individually
- **Financial Reports:** Automatically describe profit/loss changes, growth rates, or budget comparisons
- **Sales Dashboards:** Highlight top-performing regions, products, or sales reps in simple sentences



You can also edit this narrative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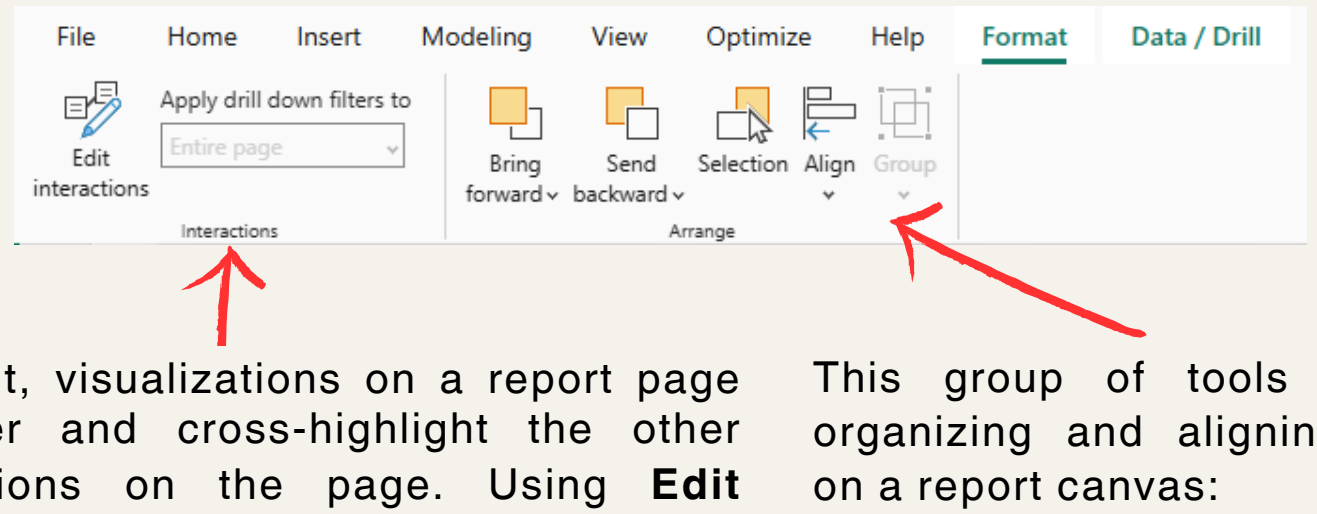
Arrangement & Controlling Interactions

When you select a visual object (such as a chart, card, table, slicer, etc.) on the report canvas, a **Format** tab appears contextually on the ribbon at the top.



By default, visualizations on a report page cross-filter and cross-highlight the other visualizations on the page. Using **Edit interactions**, you can control it:

- If you want the selected visualization to cross-filter one of the other visualizations on the page, select the **Filter** icon in the upper right corner of that visualization .
- If you want the selected visualization to **cross-highlight** one of the other visualizations on the page, select the **Highlight** icon .
- If you want the selected visualization to have **no impact** on one of the other visualizations on the page, select the **None** icon .

You can **apply drill-down filters** to affect the entire page or specific visuals.

This group of tools helps in organizing and aligning visuals on a report canvas:

Bring Forward / Send Backward: Control the layering of visuals by moving them in front of or behind other elements.

Selection Pane: Displays a list of all visuals on the page, allowing you to manage visibility and selection order easily. You can hide/show any visual.

Align: Align multiple visuals along edges (top, bottom, center, etc.) for a clean layout.

Group: Combine multiple visuals into a single group to move or format them together.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Choosing the Right Visual

Key Factors to Consider When Choosing a Visual

1. Purpose of the Analysis

Ask yourself: What story are you trying to tell?

- **Comparison** - Use bar or column charts
- **Trend over time** - Use line or area charts
- **Distribution** - Use histograms or scatter plots
- **Composition** - Use pie charts, stacked bars, treemaps
- **Relationship** - Use scatter or bubble charts

2. Type of Data

- **Categorical data** (e.g., region, product) - Best suited for bar/column charts or donut charts
- **Numerical data** (e.g., sales, profit) - Works well with line charts, cards, or KPIs
- **Time series data** - Ideal for line charts or area charts

3. Number of Variables

- **Single variable** - Card, Gauge, or KPI visual
- **Two variables** - Column chart, Line chart, Scatter plot
- **Three or more** - Matrix, Bubble chart, or custom visuals

4. Data Volume & Granularity

- If you have **too many categories**, bar charts may become cluttered-use filters or slicers.
- For **highly granular data**, consider **aggregating** or using **drill-through features**.

5. Business Users

- Consider the level of data literacy of your users/stakeholders.
- Use **simpler visuals** (like bar and line charts) for general users.
- Use **advanced visuals** (like scatter plots or decomposition trees) for analytical users.

6. Interactivity

- Use **slicers**, **tooltips**, and **drill-throughs** to allow users to explore data themselves.
- Consider using **bookmarks**, **filters**, and **dynamic titles** for better navigation.

Best Practices

- **Avoid overusing pie charts** - they're hard to read with too many slices.
- **Always label axes** and use **data labels** where appropriate.
- **Use color meaningfully -** highlight key insights, not everything.
- **Keep it clean** - don’t make your visuals messy with unnecessary elements.


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Common Power BI Visuals & Their Best Use Cases

Visual Type	Best For
Bar/Column Chart	Comparing categories
Line Chart	Trends over time
Pie/Donut Chart	Showing part-to-whole composition
Table/Matrix	Displaying raw data or detailed info
Card/KPI	Highlighting single metrics
Scatter Chart	Relationship between two numeric values
Treemap	Hierarchical composition
Gauge Chart	Performance against a target
Waterfall Chart	Visualizing incremental changes
Map Chart	Geographical data insights

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