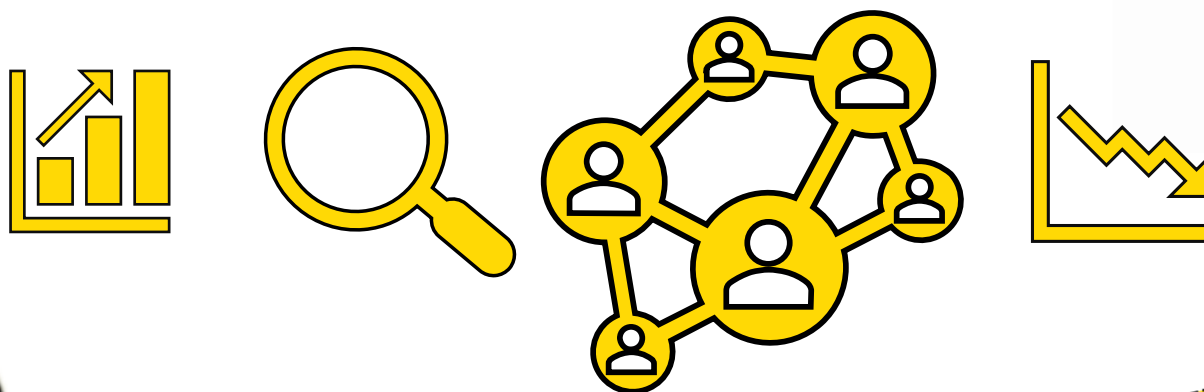
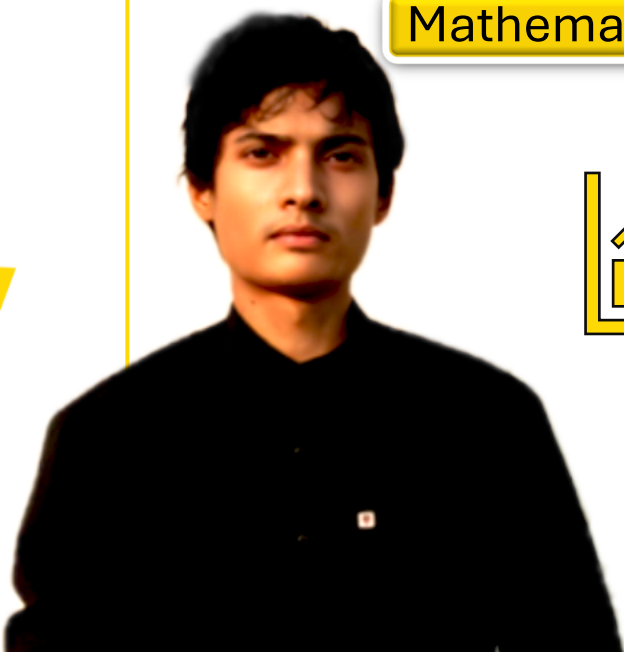


## What you'll learn:

- ➡ Meaning of every chart in Power BI
- ➡ When and why to use each chart
- ➡ Real datasets & industry examples
- ➡ Dashboard building best practices
- ➡ Mathematical intuition behind visuals

### About Your Instructor:

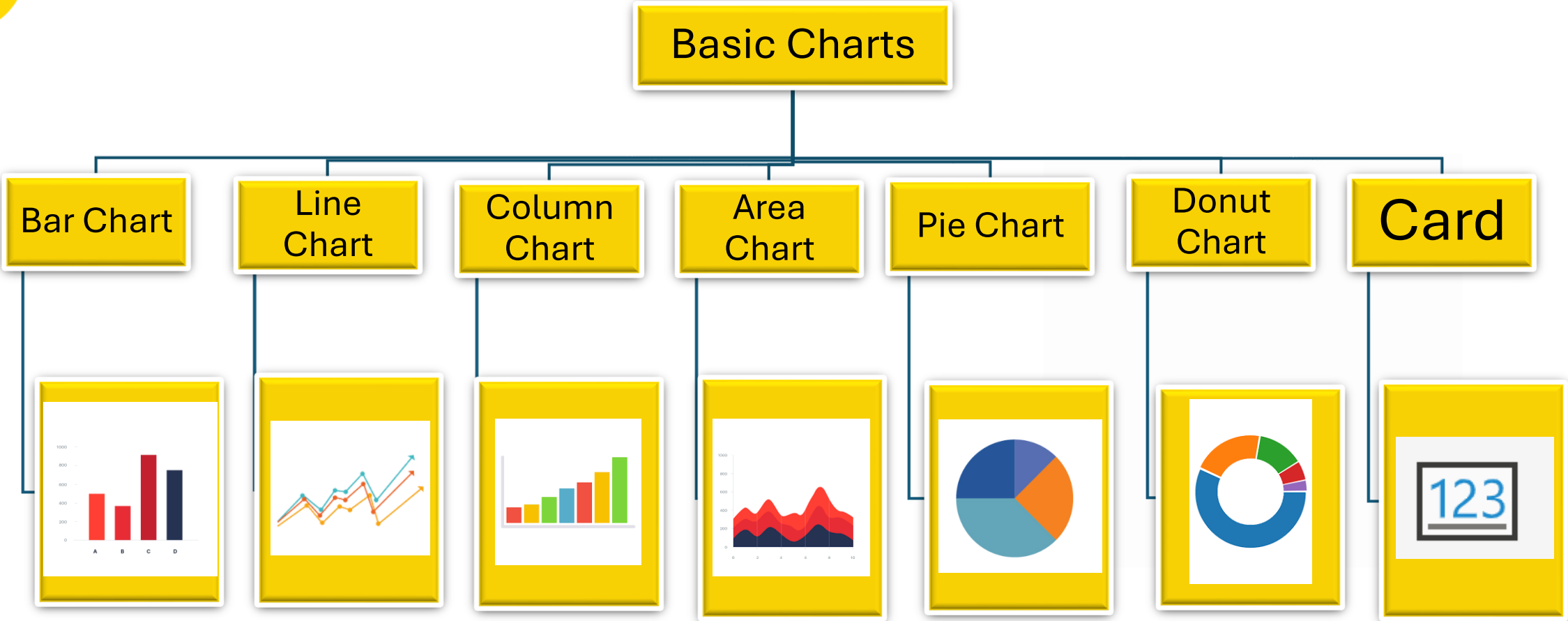
**Himansh Upadhyay**, founder of HiLyst, is a data enthusiast with expertise in **PowerBI, Python, SQL, Excel, Figma, Dashboard Designing**. With **10+ successful projects** and **1+ years** in the analytics field, he now brings his experience to you through this free learning series.

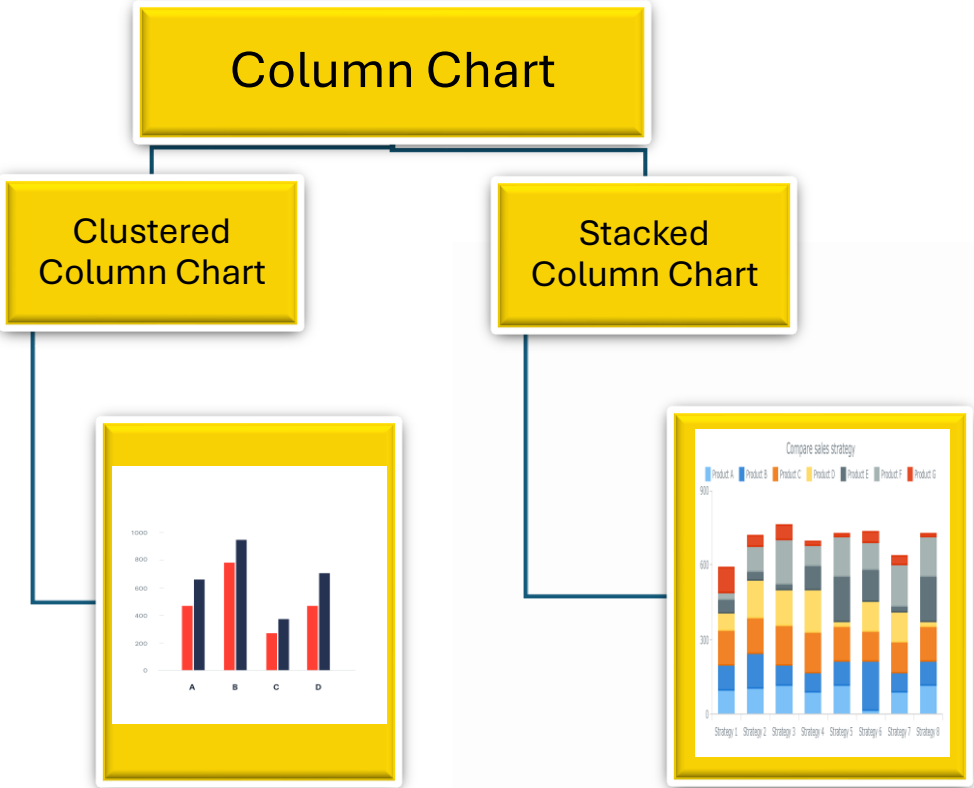
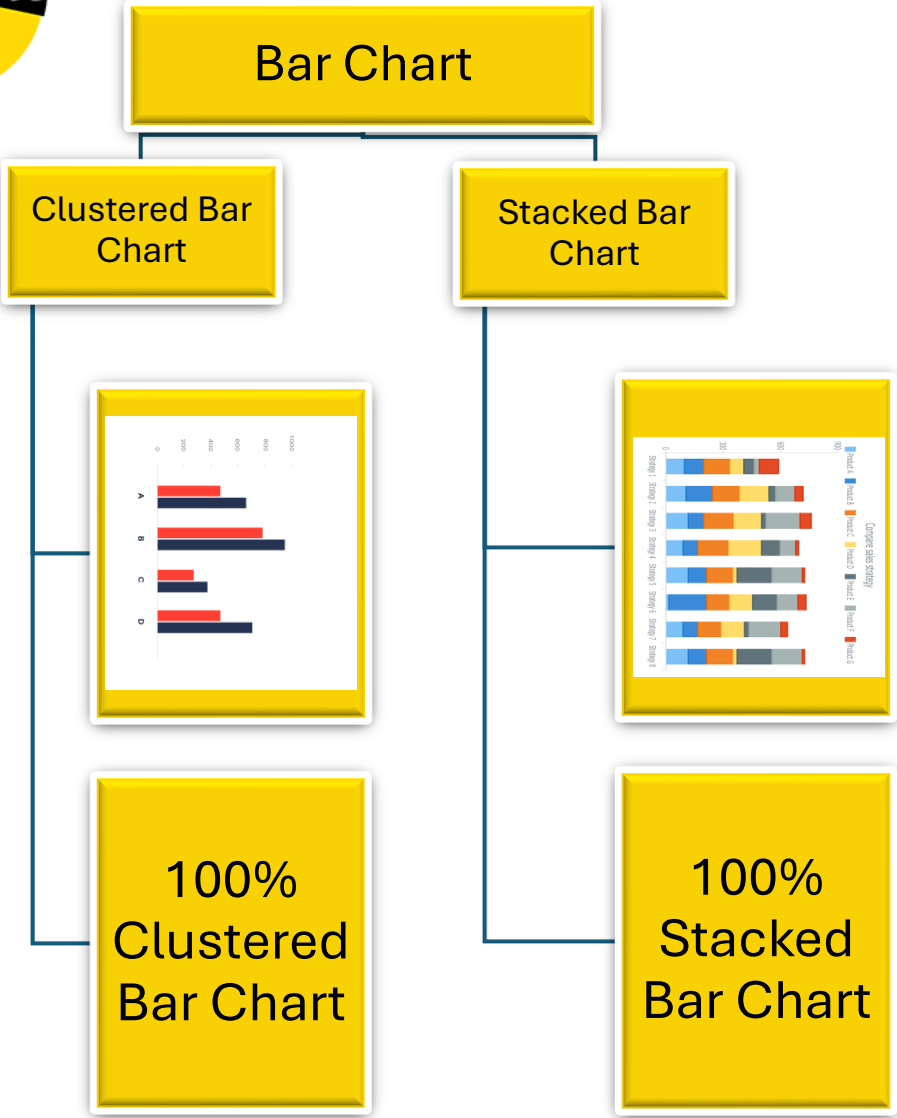


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**“visualize, Analyze, then Decide”**







Bar = Horizontally Aligned

Column = Vertically Aligned

## (1) Bar Chart

### Definition:

A Bar Chart represents categorical data using rectangular bars. The length or height of the bar is proportional to the value it represents.

### When to Use:

- To Compare Categories quickly.
- Good for ranking items (e.g. highest sales, most-used products).

### Example Dataset:

Monthly Sales by Product

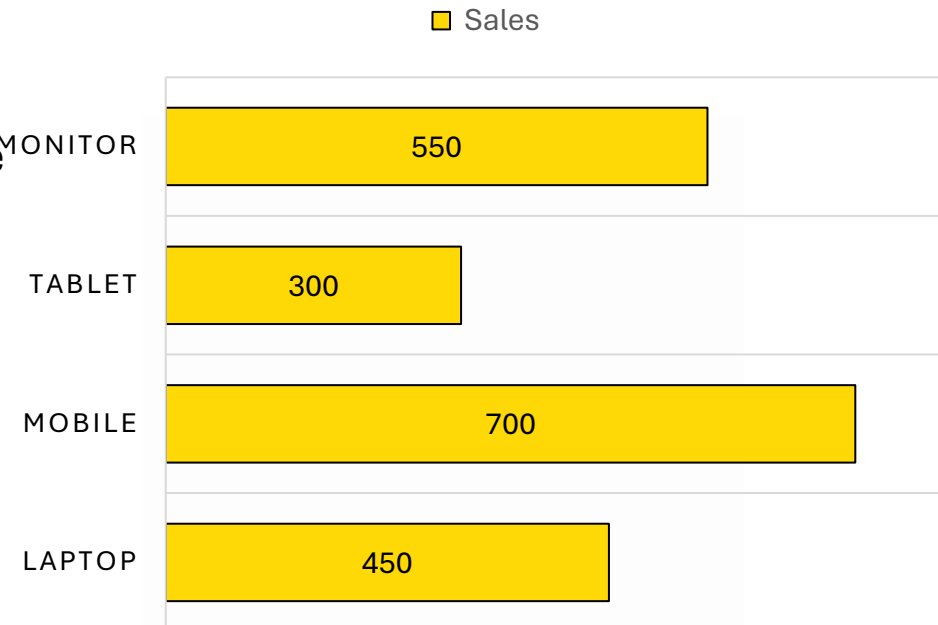


Product	Sales
Laptop	450
Mobile	700
Tablet	300
Monitor	550

### Real-Life Scenario:

A retail store wants to compare sales performance of different product categories in July.

## BAR CHART EXAMPLE



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## (1.1) Clustered Bar Chart

### Definition:

A Clustered Bar Chart shows multiple series of data side-by-side for each category, allowing direct comparison between them.

### When to Use:

- To compare **two or more related data series** across categories.
- Ideal when you want to **compare values within the same category**.

### Example Dataset:

Monthly Sales by Product  
(Store A vs Store B)

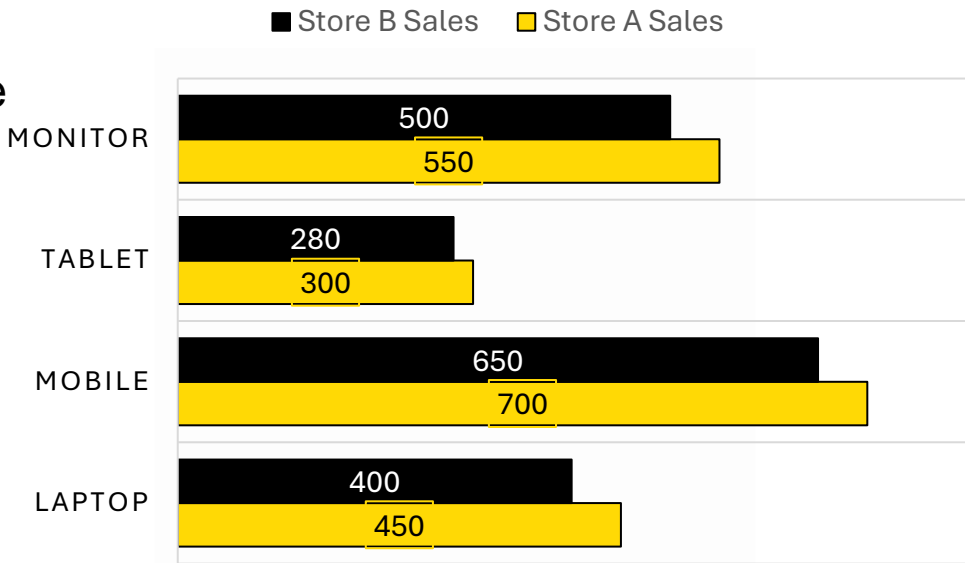


Product	Store A Sales	Store B Sales
Laptop	450	400
Mobile	700	650
Tablet	300	280
Monitor	550	500

### Real-Life Scenario:

Two branches of a retail chain want to compare their monthly sales for each product category.

## CLUSTERED BAR CHART EXAMPLE



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(1.2)Stacked Bar Chart

Definition:

A Bar Chart represents categorical data using rectangular bars. The length or height of the bar is proportional to the value it represents.

When to Use:

- To Compare Categories quickly.
- Good for ranking items (e.g. highest sales, most-used products).

Example Dataset:

Monthly Sales by Product

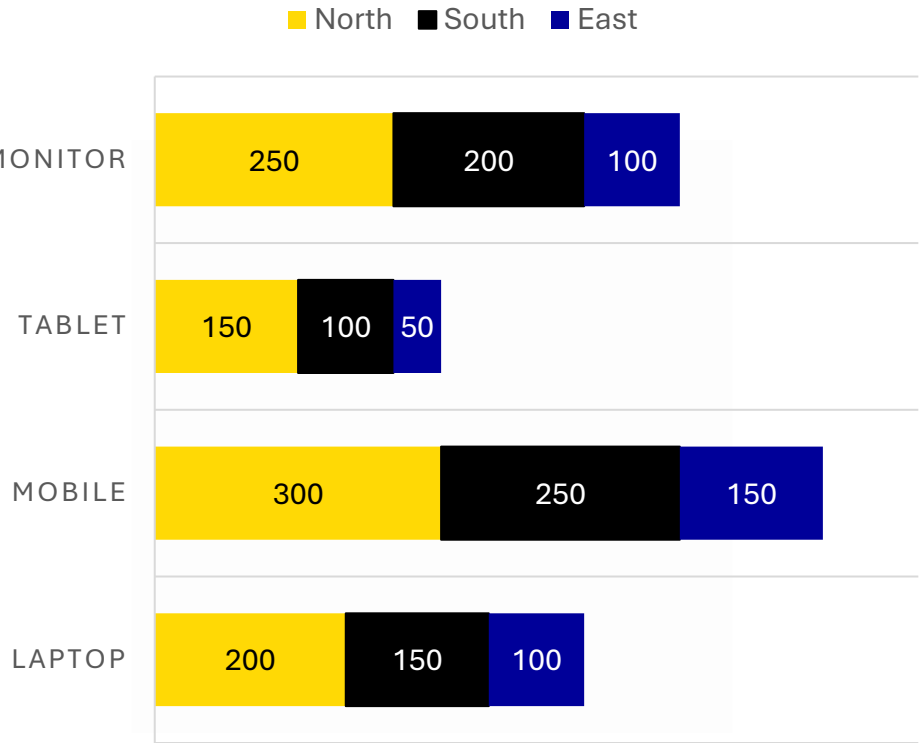


Product	North	South	East
Laptop	200	150	100
Mobile	300	250	150
Tablet	150	100	50
Monitor	250	200	100

Real-Life Scenario:

A retail store wants to compare sales performance of different product categories in July.

STACKED BAR CHART



## (1.3)100% Stacked Bar Chart

### Definition:

A 100% Stacked Bar Chart displays bars where each category’s total is normalized to 100%, showing **percentage contribution** rather than absolute values.

### When to Use:

- To Compare Percentage composition across categories.
- When actual numbers are less important than proportions.

### Example Dataset:

Market Share by Product and Region

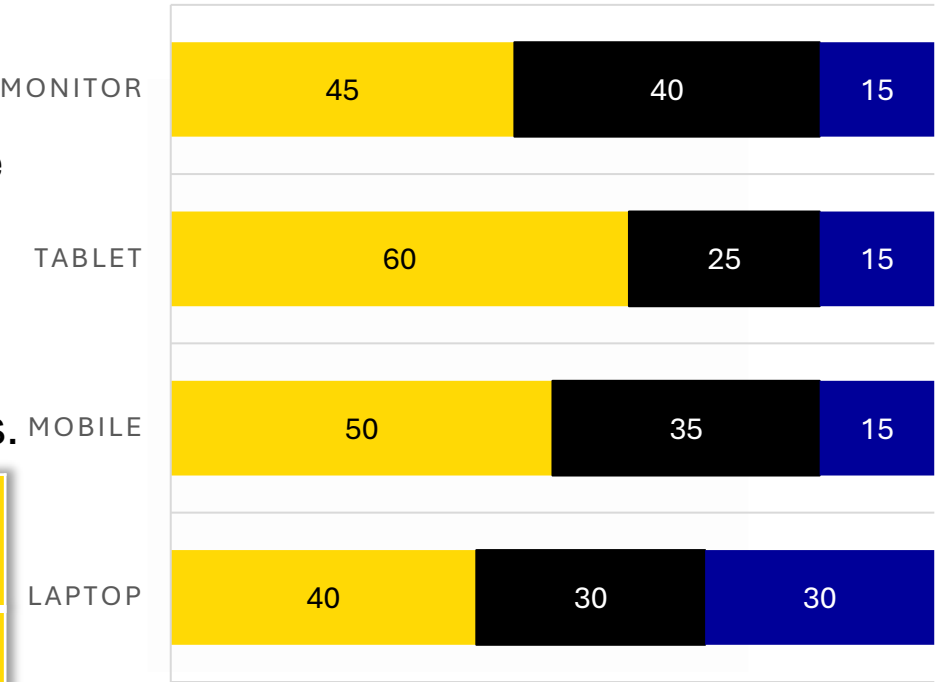
Product	North( %)	South( %)	East( %)
Laptop	40	30	30
Mobile	50	35	15
Tablet	60	25	15
Monitor	45	40	15

### Real-Life Scenario:

A business wants to show the percentage market share of each product across different regions, regardless of the total sales volume.

### 100% STACKED BAR CHART

■ North (%) ■ South (%) ■ East (%)



## (2) Column Chart

### Definition:

A column chart displays data as vertical rectangular bars, where the height of each bar is proportional to the data value. It's one of the most common ways to compare categories over a specific metric.

### When to Use:

- To Compare Categories quickly.
- Easy to read when you have fewer categories
- Showing changes over time (especially when categories are time-based like months, years).

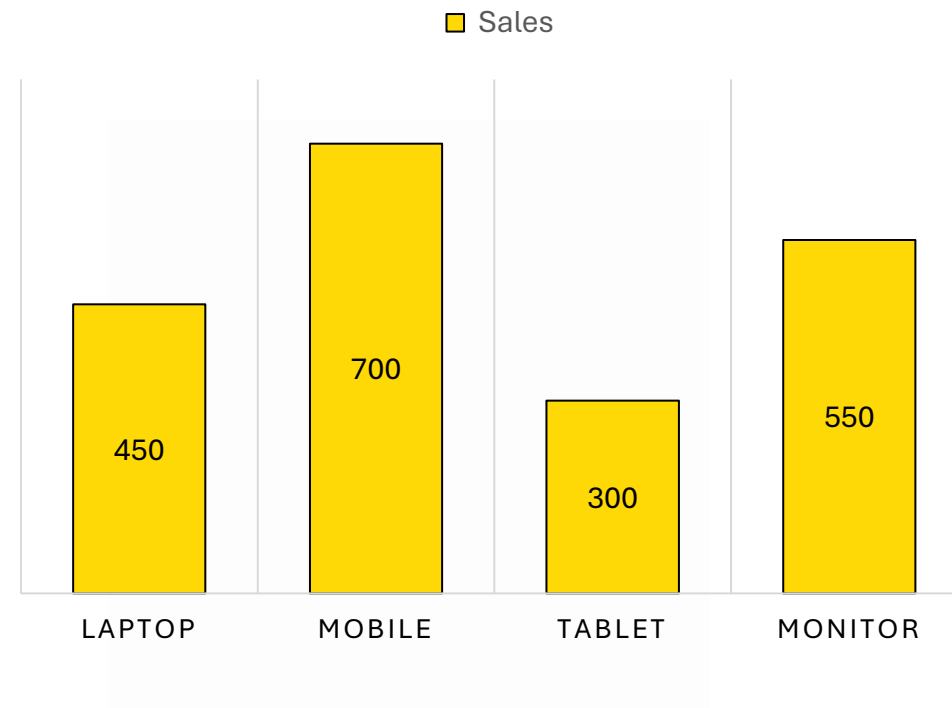
### Example Dataset:

Monthly Sales by Product



Product	Sales
Laptop	450
Mobile	700
Tablet	300
Monitor	550

### BAR CHART EXAMPLE



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## (2.1) Clustered Column Chart

### Definition:

This chart displays multiple data series side-by-side in clusters for each category. It helps compare values between different subcategories in the same main category.

### When to Use:

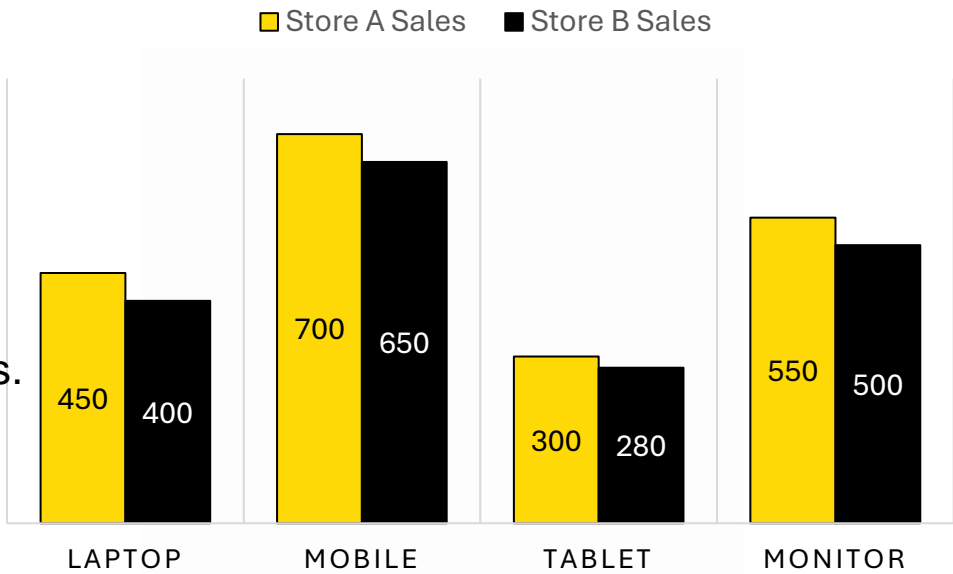
- Comparing multiple related series for the same category.
- Example: Sales comparison of different product types across regions.
- Shows patterns between categories for each series.

### Example Dataset:

Monthly Sales by Product  
(Store A vs Store B)

Product	Store A Sales	Store B Sales
Laptop	450	400
Mobile	700	650
Tablet	300	280
Monitor	550	500

### CLUSTERED COLUMN CHART EXAMPLE





(2.2)Stacked Column Chart

Definition:

In a stacked column chart, data series are stacked vertically on top of one another within a single column for each category. This shows the total value and the contribution of each series to that total.

When to Use:

- Comparing part-to-whole relationships.
- Visualizing total values along with their subcategory contributions.

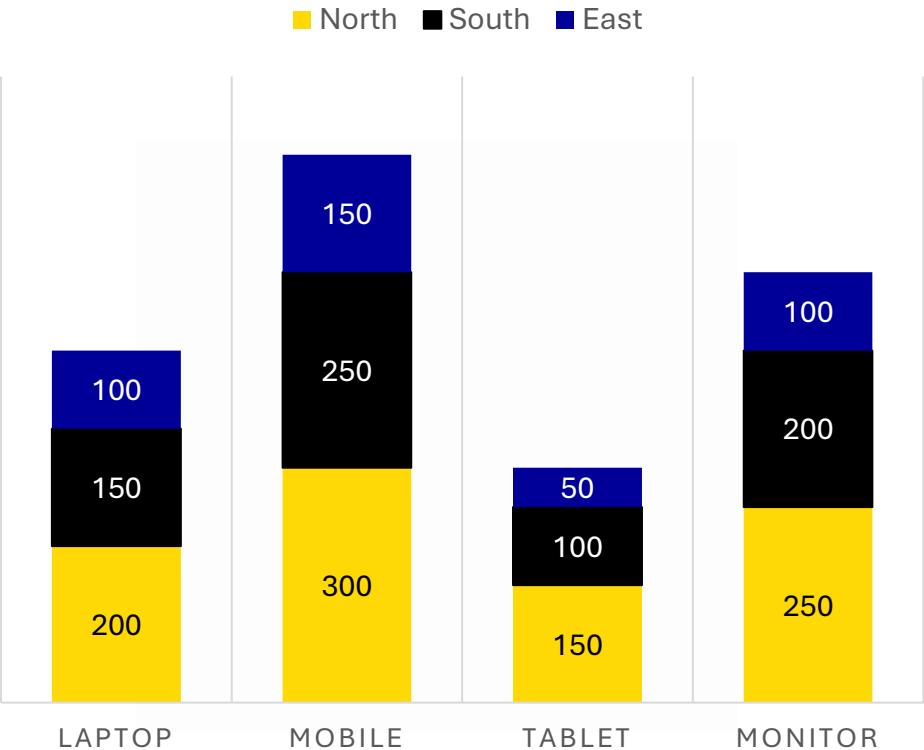
Example Dataset:

Monthly Sales by Product



Product	North	South	East
Laptop	200	150	100
Mobile	300	250	150
Tablet	150	100	50
Monitor	250	200	100

STACKED COLUMN CHART



## (2.3) 100% Stacked Bar Chart

### Definition:

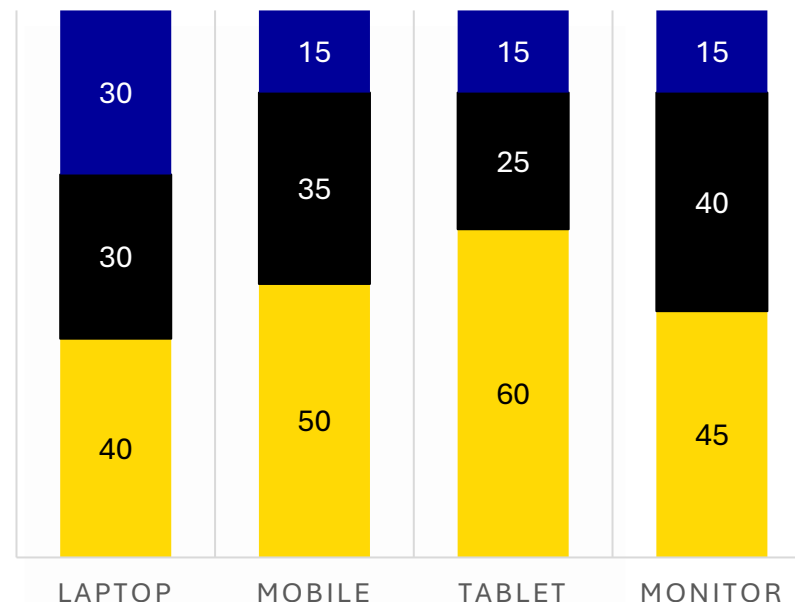
Similar to the stacked column chart, but the columns always have the same height (100%). This shows the percentage contribution of each series rather than the absolute values

### When to Use:

- When the goal is to show percentage distribution rather than totals.
- Comparing the proportion of subcategories.

### 100% STACKED COLUMN CHART

■ North (%) ■ South (%) ■ East (%)



### Example Dataset:

Market Share by Product and Region

Product	North(%)	South(%)	East(%)
Laptop	40	30	30
Mobile	50	35	15
Tablet	60	25	15
Monitor	45	40	15

### Real-Life Scenario:

A business wants to show the percentage market share of each product across different regions, regardless of the total sales volume.



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## (3) Line Chart

### Definition:

A Line Chart Connects individual data points using straight lines to show trends or patterns over a continuous range– most commonly over time

### When to Use:

- Tracking trends over time (day,month,year).
- Showing continuous data changes instead of discrete categories.
- Comparing multiple trends in one chart.
- Identifying patterns like seasonality, peaks, and dips.

### Mathematical Meaning:

- Slope of the line indicates rate of change.
- Useful for detecting trends lines, moving averages, and forecasting.

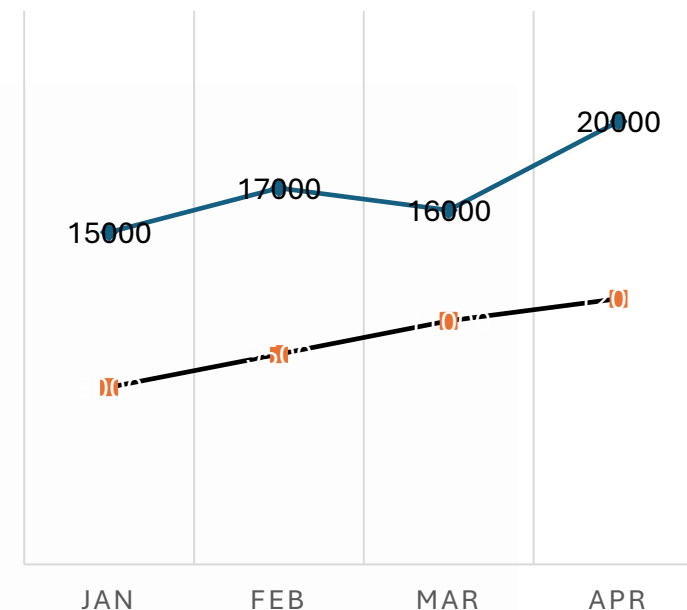
### Power BI Use Cases:

- Revenue Trends month-by-month
- Website traffic daily growth.
- Temperature changes across days.
- Stock market price movements over time.

Month	Electronics Sales	Clothing Sales
Jan	15000	8000
Feb	17000	9500
Mar	16000	11000
Apr	20000	12000

### LINE CHART EXAMPLE

—●— Electronics Sales —■— Clothing Sales



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Similar Charts & Comparisons:

Chart Type	Strengths	Weaknesses
Line Chart	Best for continuous trends; easy to spot patterns.	Not ideal for categorical comparisons without time.
Area Chart	Shows trends and emphasizes total volume visually.	Can be harder to compare overlapping series.
Scatter Chart	Shows relationship between two variables, not trends over time.	Not ideal for pure time-series trends.

Tip:

- Line Chart – Use for trend analysis.
- Area Chart- Use for trend + total volume emphasis.

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## (4) Pie Chart

### Definition:

A circular chart divided into slices where each slice represents a proportion of the whole. The angle of each slice corresponds to its value.

### When to Use:

- Showing percentage share of categories from a total.
- When you have few categories (ideally less than 6).
- For quick visual impression of proportions.

### Mathematical Meaning

- Angle for a category =  $\frac{\text{Value}}{\text{Total}} \times 360^\circ$
- Emphasizes **part-to-whole** relationship.

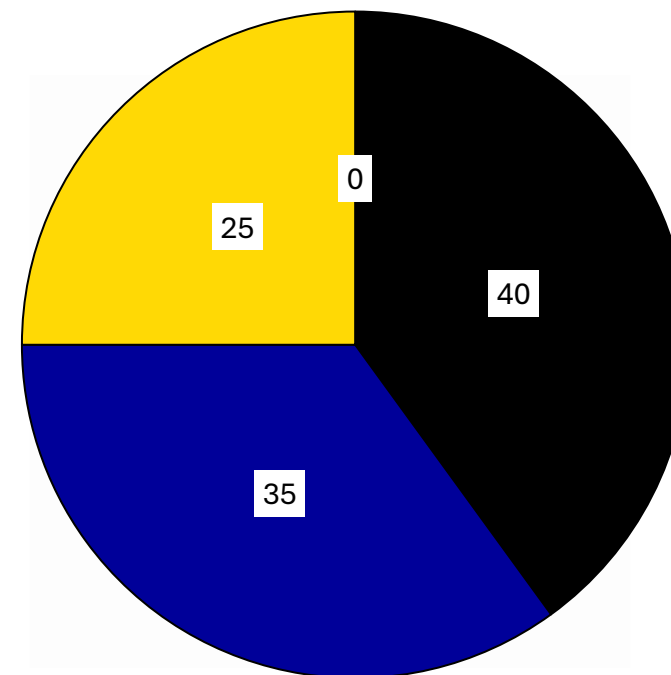
### Power BI Use Case:

- Market share of different brands.
- Department-wise expense share.
- Product category revenue distribution.

Category	Sales
A	40
B	35
C	25

### PIE CHART

Category A B C



### Similar Charts:

- **Donut Chart** – visually similar but with a blank center.
- **Treemap** – for part-to-whole in a rectangular form (better with many categories)



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## (5) Donut Chart

### Definition:

A pie chart with a blank center, allowing space for additional labels or KPIs in the middle.

### When to Use:

- Same as pie chart but more space-efficient for labels.
- When you want to display an extra KPI (like total sales) in the center.

### Mathematical Meaning

- Angle for a category =  $\frac{\text{Value}}{\text{Total}} \times 360^\circ$
- Emphasizes **part-to-whole** relationship.

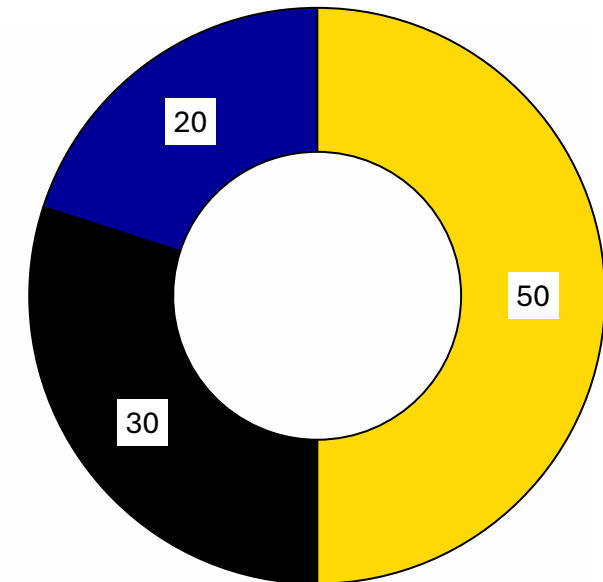
### Power BI Use Case:

- Market share of different brands.
- Department-wise expense share.
- Product category revenue distribution.

Segment	Revenue
X	50
Y	30
Z	20

## DONUT CHART

■ X ■ Y ■ Z ■



### Similar Charts:

**Pie Chart**- simpler but no space for center KPI.  
**Stacked Column Chart(100%)**- for proportion across categories over multiple series.

## (6) Card

Card Visual Look like in Power BI

Total Revenue

**45K**

### Definition:

A single visual that displays one big number– a KPI (Key Performance Indicator) or metric.

### When to Use:

- To highlight one important figure at a glance.
- For dashboards where certain metrics need quick attention.

### Mathematical Meaning

- Can display totals, averages, counts, or any aggregated metric from your data.

### Power BI Use Case:

- Total Revenue.
- Number of Customers.
- Conversion Rate(%).

Month	Revenue
Jan	10000
Feb	15000
Mar	20000

A **Card** visual could show: "**Total Revenue: ₹45,000**".

- Single Number Card
- Multi-row Card

### Similar Charts:

- Multi-row Card** → shows multiple KPIs side-by-side.
- Gauge** → shows a KPI against a target instead of just a raw value.



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## (7) Waterfall Chart

### Definition:

A Waterfall Chart shows how an initial value increases or decreases through a series of changes until it reaches a final value. Each bar represents a change (positive or negative), and intermediate subtotals can be shown.

It's often called a “**Bridge Chart**” because it bridges the gap between a start and end value.

### When to Use:

- To analyze step-by-step changes in a value.
- To explain how a final figure is reached from a starting point.
- Best for profit/loss statements, budget tracking, and variance analysis.

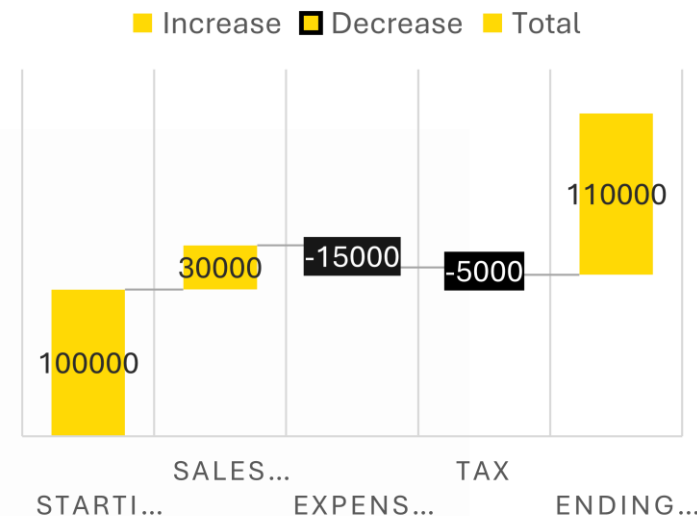
### Mathematical Meaning

- Each step = Previous value  $\pm$  Change value.
- Positive changes are shown in **green** (or another positive color).
- Negative changes are shown in **red** (or another negative color).
- The final bar is the **net result** of all changes.

### Power BI Use Case:

- Financial Analysis:** Showing revenue  $\rightarrow$  expenses  $\rightarrow$  net profit.
- Sales Pipeline:** Leads  $\rightarrow$  qualified leads  $\rightarrow$  closed deals.
- Operational Analysis:** Inventory start  $\rightarrow$  additions  $\rightarrow$  reductions  $\rightarrow$  ending stock.

## WATERFALL CHART



Category	Amount
Starting Balance	10000
Sales Revenue	30000
Expenses	-15000
Tax	-5000
Ending Balance	110000

“visualize, Analyze, then Decide”



(7) Waterfall Chart

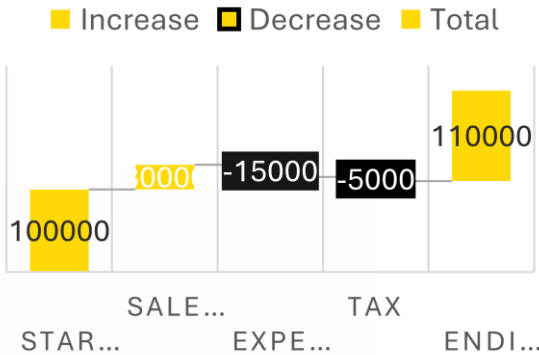
Interpretation:

- Start at ₹100,000.
- Add ₹30,000 (Sales Revenue).
- Subtract ₹15,000 (Expenses).
- Subtract ₹5,000 (Tax).
- End at ₹110,000.

Similar Charts & Comparisons:

Chart Type	Strengths	Weaknesses
Waterfall Chart	Clearly shows contribution of each change to the total.	Best with sequential steps, not complex category comparisons.
Stacked Bar Chart	Shows composition at one point in time.	Lacks step-by-step progression view.
Line Chart	Shows continuous trend over time.	Doesn't break down individual contributors to change.

WATERFALL CHART



Tip:

In Power BI, **Waterfall Charts** can also display **subtotals** at intermediate stages, helping viewers quickly understand grouped impacts.

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## (8) Funnel Chart

### Definition:

A Funnel Chart represents data values across multiple stages in a process, where each stage is represented, the width narrows to reflect a drop-off or filtering effect.

### When to Use:

- Tracking **conversion rates** in a multi-step process.
- Visualizing **progressive filtering** of data.
- Identifying **bottlenecks** in a process.
- Showing **drop-off rates** in customer journeys.

### Mathematical Meaning

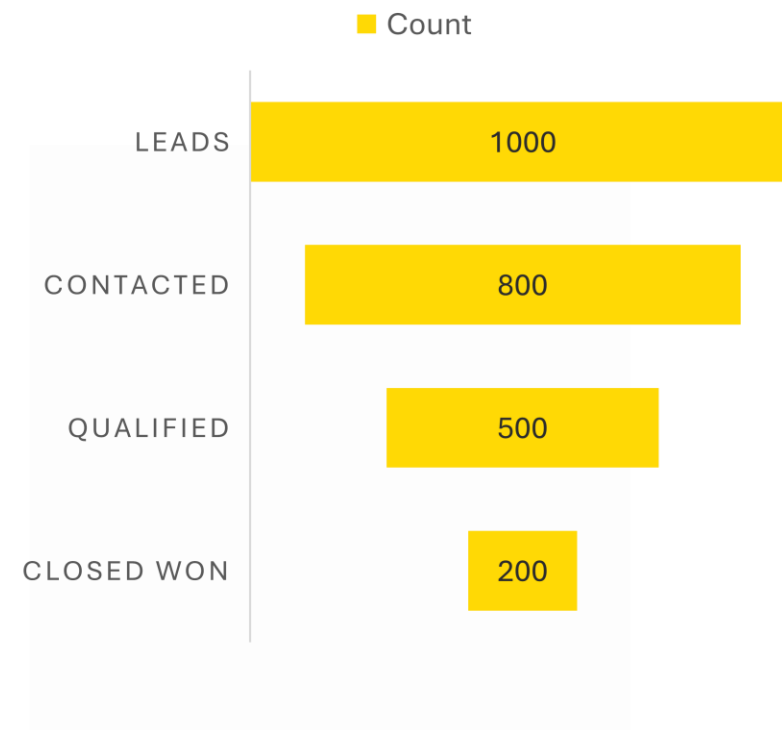
- Width of stage = proportional to value at that stage.
- Conversion rate from stage  $n$  to  $n + 1$ :

$$\text{Conversion Rate} = \frac{\text{Value at Stage (n+1)}}{\text{Value at Stage (n)}} \times 100\%$$

- Drop-off rate =  $100\% - \text{Conversion Rate}$ .

Stage	Count
Leads	1000
Contacted	800
Qualified	500
Closed Won	200

## FUNNEL CHART



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(8) Funnel Chart

Interpretation:

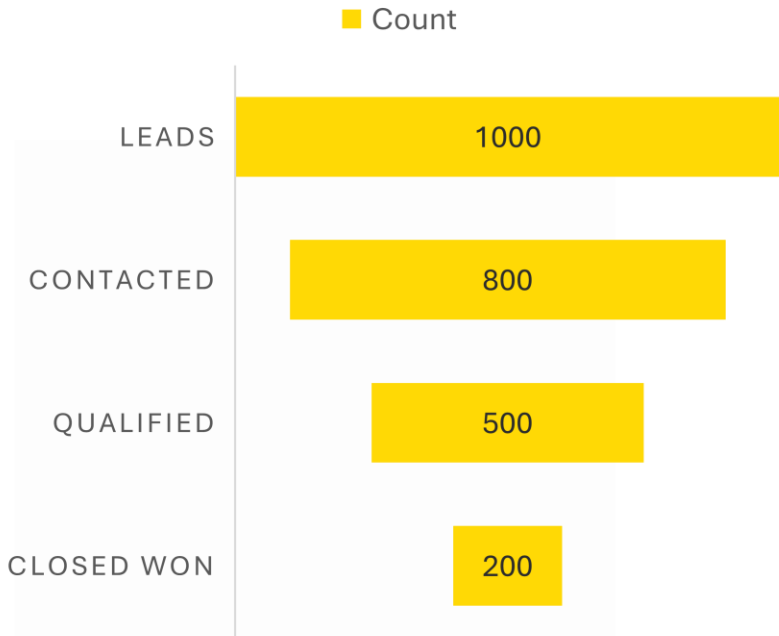
- Start with **1,000 leads**.
- 800 contacted (80% conversion).
- 500 qualified (62.5% conversion from contacted).
- 200 closed (40% conversion from qualified).

Stage	Count
Leads	1000
Contacted	800
Qualified	500
Closed Won	200

Power BI Use Case:

- Sales Pipeline:** Leads → Contacted → Qualified → Closed.
- Website Analytics:** Page visits → Signups → Purchases.
- Recruitment:** Applicants → Shortlisted → Interviewed → Hired.
- Manufacturing:** Raw material → Processed → Approved → Shipped.

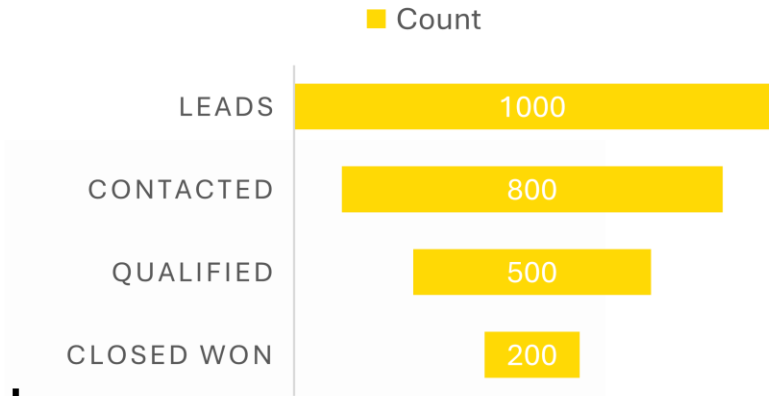
FUNNEL CHART





(8) Funnel Chart

FUNNEL CHART



Similar Charts & Comparisons:

Chart Type

Funnel Chart

Stacked Column Chart

Waterfall Chart

Strengths

Perfect for stage-wise drop-off visualization.

Can compare values per stage with more details.

Shows sequential additions/subtractions, not just filtering.

Weaknesses

Not for showing time trends or category comparisons.

Less intuitive for showing drop-offs visually.

Harder to grasp stage conversion percentages quickly.

Tip:

In Power BI, you can combine Funnel Chart + Tooltip Drillthrough to allow viewers to click on a stage and explore detailed records for that stage.



(9) Scatter Chart

Definition:

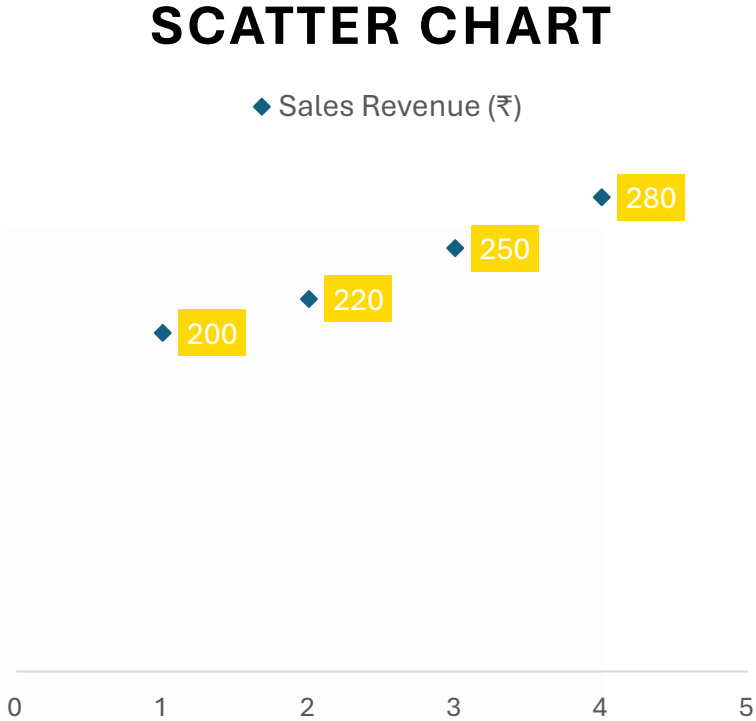
A Scatter Chart plots data points on an X-Y axis to show the relationship between two numerical variables.

- Each point represents a data item.
- Optional: A third variable can be represented by **bubble size** or **color** (called a **Bubble Chart** variation).

Advertising Spend (in rupees)	Sales Revenue (in rupees)
20	200
25	220
30	250
35	280
40	310

Interpretation:

- Higher ad spend → Higher sales (positive correlation).
- Points form an upward trend line.





(9) Scatter Chart

Similar Charts & Comparisons:

Chart Type

Scatter Chart

Line Chart

Bubble Chart

Tip:

In Power BI, you can combine **Funnel Chart + Tooltip Drillthrough** to allow viewers to click on a stage and explore detailed records for that stage.

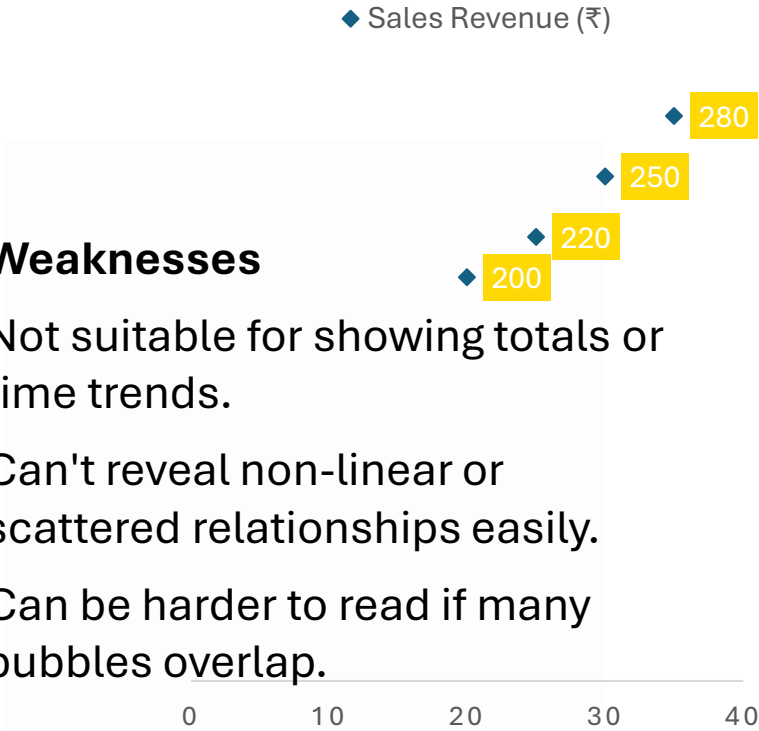
Strengths

- Best for analyzing relationships & distributions.
- Shows trends over time (ordered data).
- Adds third variable to scatter chart for more insight.

Weaknesses

- Not suitable for showing totals or time trends.
- Can't reveal non-linear or scattered relationships easily.
- Can be harder to read if many bubbles overlap.

SCATTER CHART



## (10) Histogram Chart

### Definition:

A Histogram is a type of column chart that shows the distribution of a continuous variable by dividing it into equal intervals (called bins) and counting the number of values that fall into each bin.

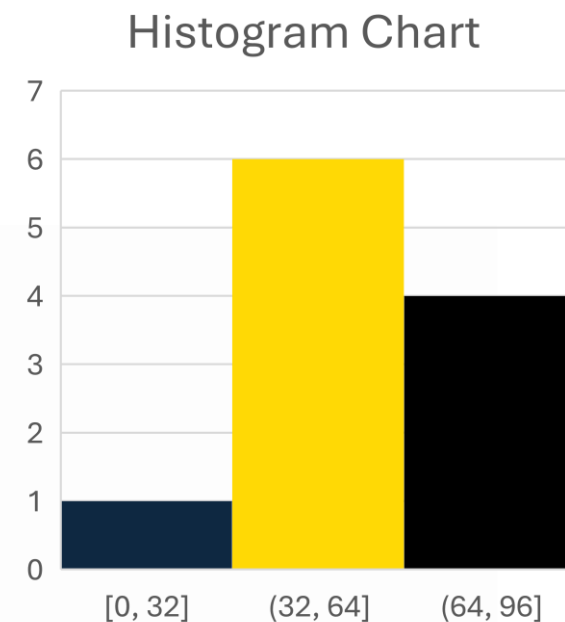
It's **different from a bar chart** because:

- Bar chart → compares categories.
- Histogram → analyzes **frequency distribution** of numerical data.

### Example Interpretation:

- If bin width = 10, bins are 40–50, 51–60, 61–70, 71–80.
- Count values in each bin:
  - 40–50 → 2 students
  - 51–60 → 3 students
  - 61–70 → 3 students
  - 71–80 → 2 students

Score
45
50
52
55
58
60
65
70
72
75



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## (10) Histogram Chart

### Mathematical Meaning:

- Bin Width: Range size for each bar.

$$\text{Bin Width} = \frac{\text{Max Value} - \text{Min Value}}{\text{Number of Bins}}$$

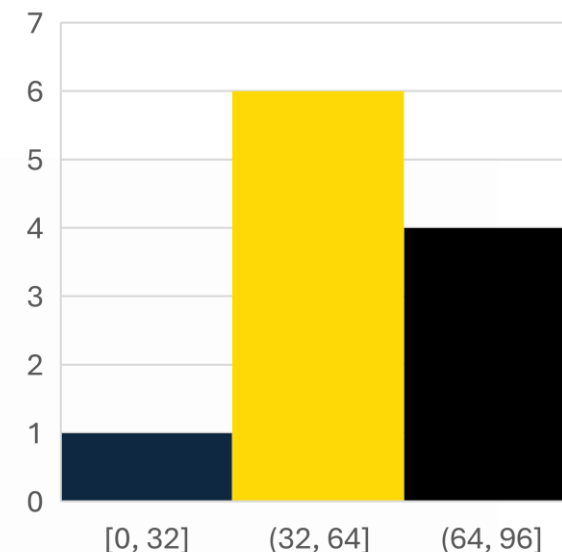
- Frequency: Count of data points in each bin.
- Mean, Median, Mode can be visually estimated from the distribution.
- Standard Deviation ( $\sigma$ ): Spread of values from the mean.

### Power BI Use Cases:

- Sales Analysis:** Order amount distribution.
- Manufacturing:** Product weight variation check.
- Finance:** Distribution of returns in a portfolio.
- Education:** Student score distribution.

Score
45
50
52
55
58
60
65
70
72
75

Histogram Chart



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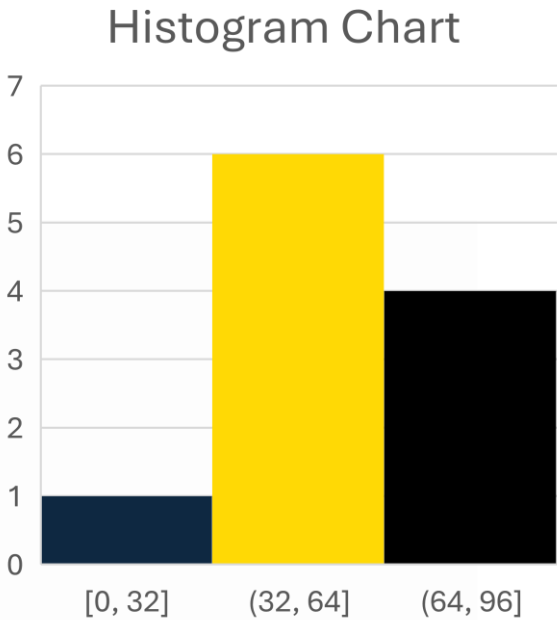
(10) Histogram Chart

Similar Charts & Comparisons:

Chart Type	Strengths	Weaknesses
Histogram	Perfect for statistical distribution analysis.	Only for numerical continuous data.
Column Chart	Great for comparing categories.	Not for frequency distributions.
Box Plot	Summarizes distribution with quartiles and outliers.	Doesn't show frequency shape like histogram.

Tip:

In Power BI, histograms are built by using a **Column Chart + Bin field** in **Power Query** or by using the **Histogram visual** from AppSource for direct creation.





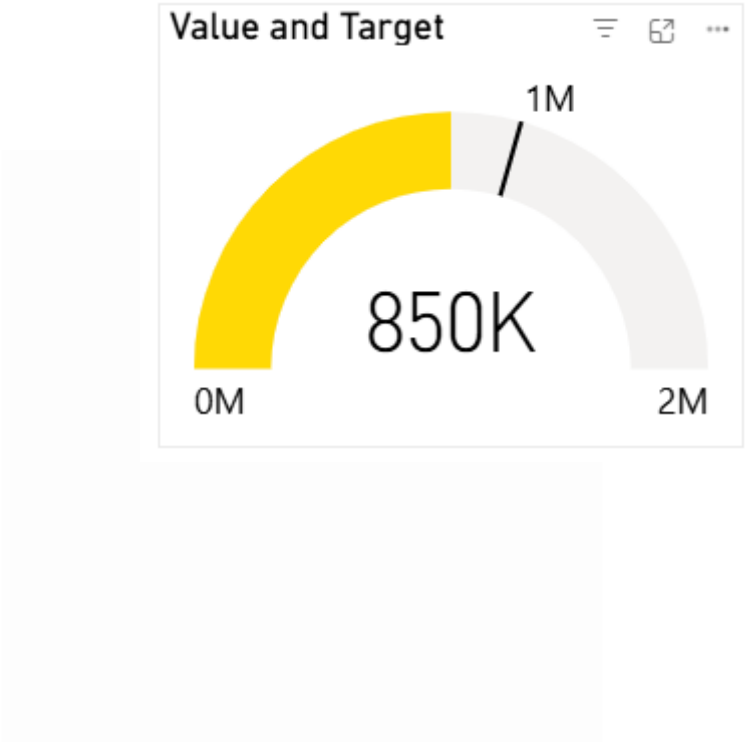
(11) Gauge Chart

Power BI Use Cases:

- Sales:** Monthly sales vs target.
- Customer Service:** Average response time vs SLA target.
- Production:** Units produced vs planned.
- Finance:** Budget utilization rate.

Similar Charts & Comparisons:

Chart Type	Strengths	Weaknesses
Gauge Chart	Very easy to understand progress vs target.	Not suitable for showing trends or comparisons.
KPI Card	Shows target and current value in numbers.	Less visual impact than gauge.
Bullet Chart	More compact, adds comparative ranges.	Less visually appealing for public dashboards.



## (12) KPI Chart

### Definition:

A KPI visual shows a single performance metric against a defined target, often with an indicator (arrow or color) showing if the goal is met.

### When to Use:

- To quickly track progress toward a measurable goal.
- Perfect for executive dashboards.

Mathematical Meaning:

$$\text{Performance (\%)} = \frac{\text{Current Value}}{\text{Target}} \times 100$$

Shows **95% achievement** with an upward arrow if improving.

**Similar Charts:** Gauge Chart (more visual), Bullet Chart (more compact).

Sum of Value (Revenue) and Sum of Target by Target

95!

Goal: 100 (-5%)

Metric	Value	Target
Revenue	95	100



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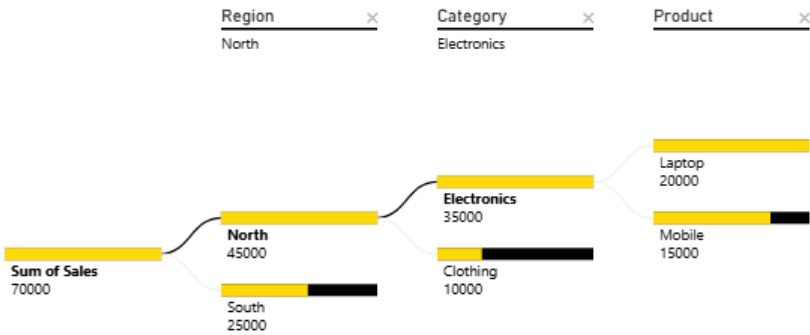




(13) Decomposition Tree

Definition:

The Decomposition Tree in Power BI is an interactive visual that allows you to break down a measure (like sales or profit) step-by-step into contributing factors. You can expand and dynamically, making it ideal for root cause analysis or performance investigation.



Region	Category	Product	Sales
North	Electronics	Laptop	20,000
North	Electronics	Mobile	15,000
North	Clothing	T-Shirt	10,000
South	Electronics	Laptop	12,000
South	Furniture	Chair	8,000
South	Clothing	Jacket	5,000

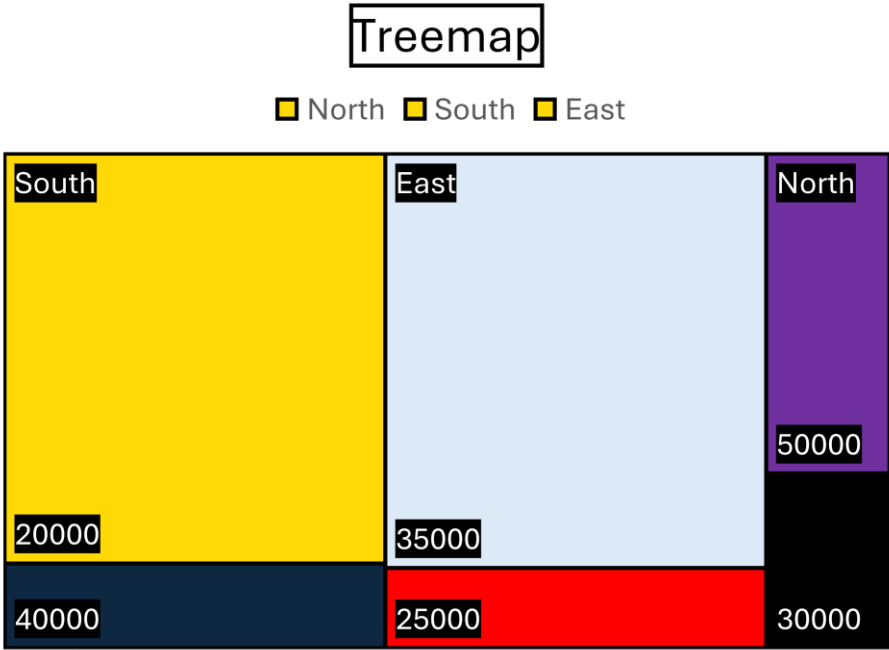


(14) Treemap

Definition:

A Treemap is a hierarchical visualization that displays data as nested rectangles. Each rectangle's size is proportional to its value, and colors are used to differentiate between categories or subcategories. It is ideal for quickly understanding part-to-whole relationships in large datasets.

Region	Category	Sales
North	Furniture	50000
North	OfficeSup	30000
South	Furniture	40000
South	OfficeSup	20000
East	Furniture	35000
East	OfficeSup	25000



## (15) Matrix

### Definition:

A Matrix displays data in a table format with rows and columns, allowing grouping, drill-down, and subtotal calculations. It's like an Excel Pivot Table inside Power BI.

### Mathematical Meaning

- Organizes data by two or more dimensions
- Supports aggregation (sum, average, count, etc.)
- Useful for cross-tab analysis

### Power BI Uses

- Sales by Region and Product Category
- Year-over-Year comparison
- Department expense breakdown by month

Region	Chair	Table	Total
North	5000	3000	8000
South	4000	2000	6000
<b>Total</b>	<b>9000</b>	<b>5000</b>	<b>14000</b>

Region	Product	Sales
North	Chair	5000
North	Table	3000
South	Chari	4000
South	Table	2000



(15) Matrix

Similar Charts & Comparison

Chart Type	Difference from Matrix	Matrix Advantage
Table	Flat list, no grouping or pivoting	Matrix allows grouping & totals
Heatmap	Uses color scale for values	Matrix shows exact numbers

Region	Chair	Table	Total
North	5000	3000	8000
South	4000	2000	6000
Total	9000	5000	14000

Region	Product	Sales
North	Chair	5000
North	Table	3000
South	Chari	4000
South	Table	2000



## (16) Heatmap

### Definition:

A Heatmap visualizes data in a grid where cell colors represent values, making patterns, trends, and outliers easy to spot.

### Mathematical Meaning

- Color intensity  $\propto$  Value
- Often uses conditional formatting or a color scale
- Helps in correlation and density analysis

### Power BI Uses

- Sales by Region and Month (color shows performance)
- Website visits by Day and Hour
- Customer feedback score distribution

### Example of a color-coded heat map



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## Comparison & Trend Analysis

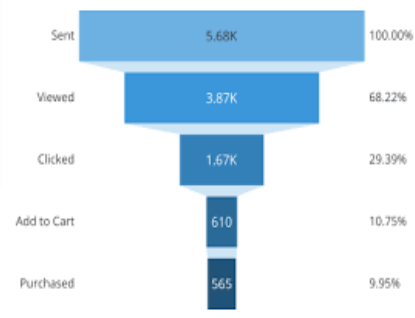
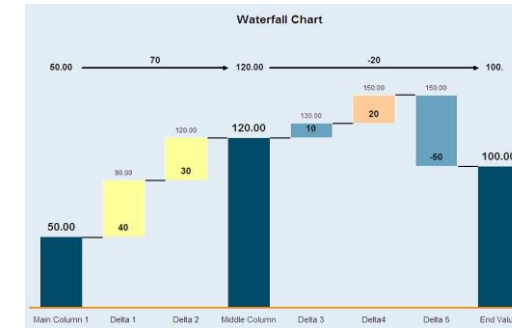
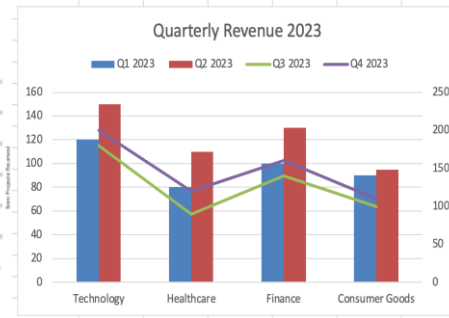
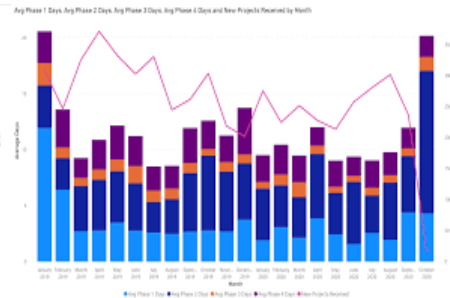
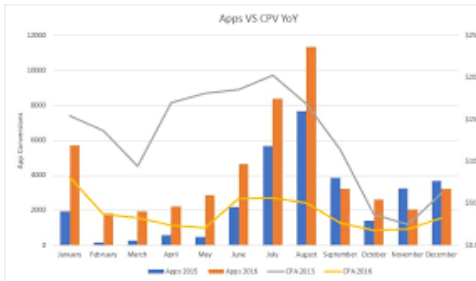
Line and Clustered Column chart

Line and Stacked Column Chart

Combo Chart

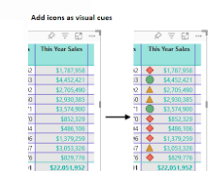
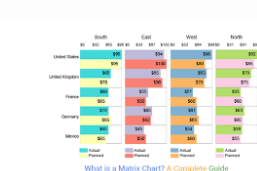
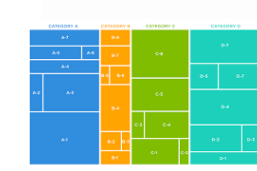
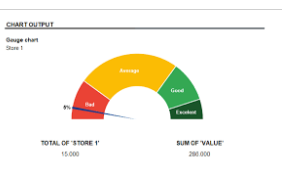
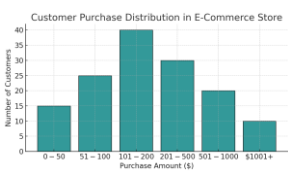
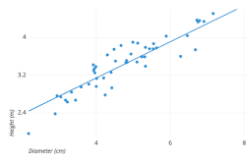
Waterfall Chart

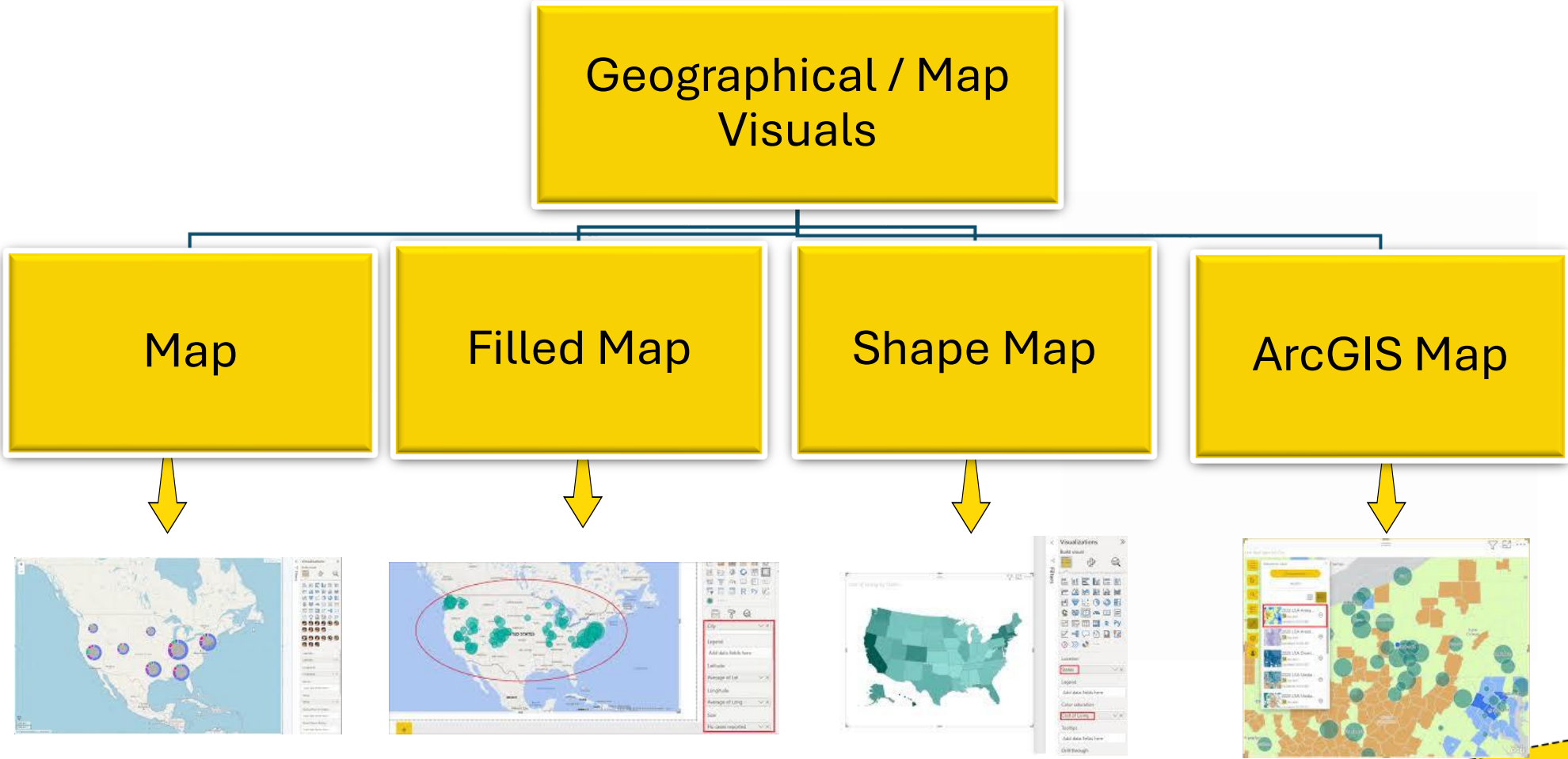
Funnel Chart

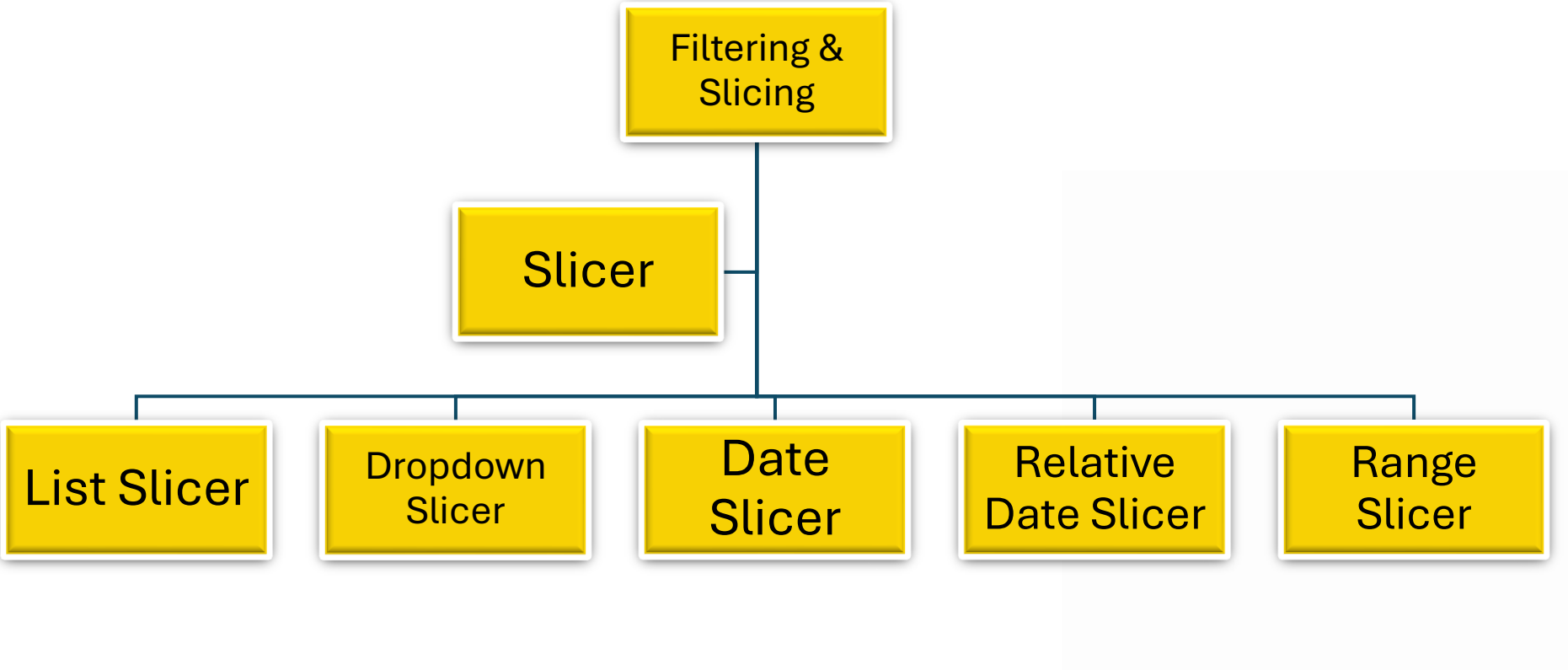




## Advanced Analytical Visuals



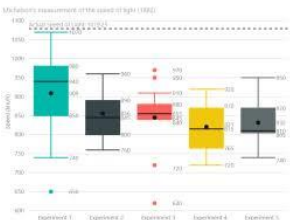




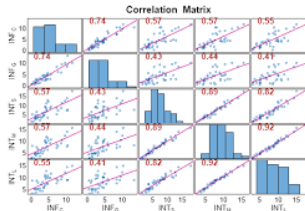


Statistical Visuals

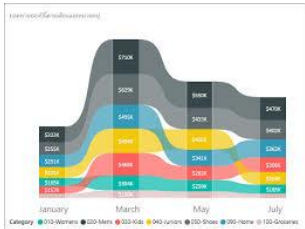
Box and Whisker Plot



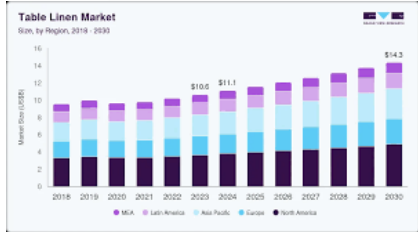
Correlation Plot



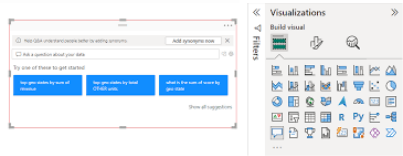
Ribbon Chart



Forecast Line

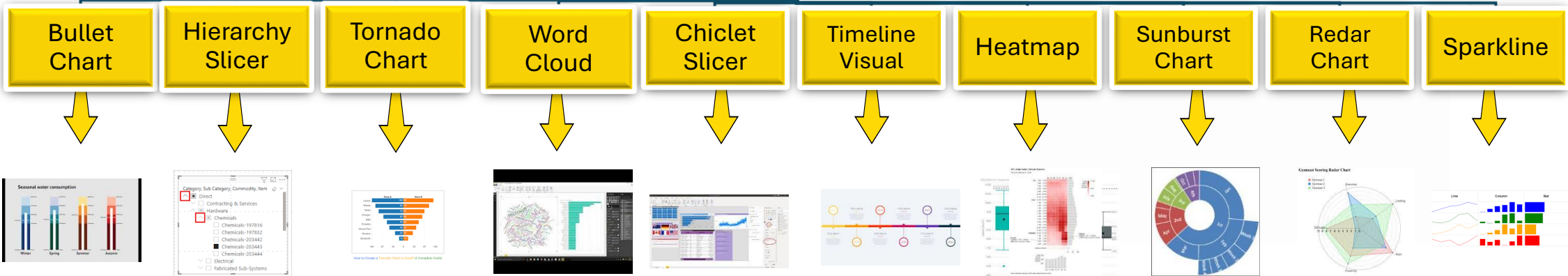


Q&A Visual





Custom Visuals  
(From MarketPlace)



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“visualize, Analyze, then Decide”