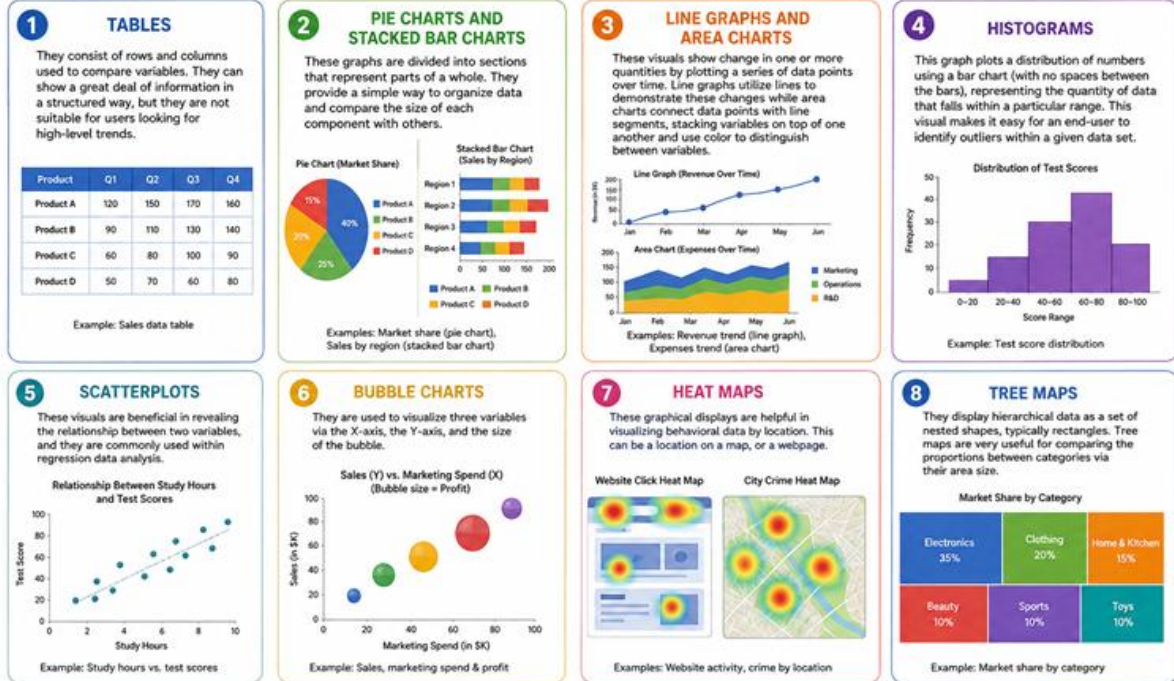


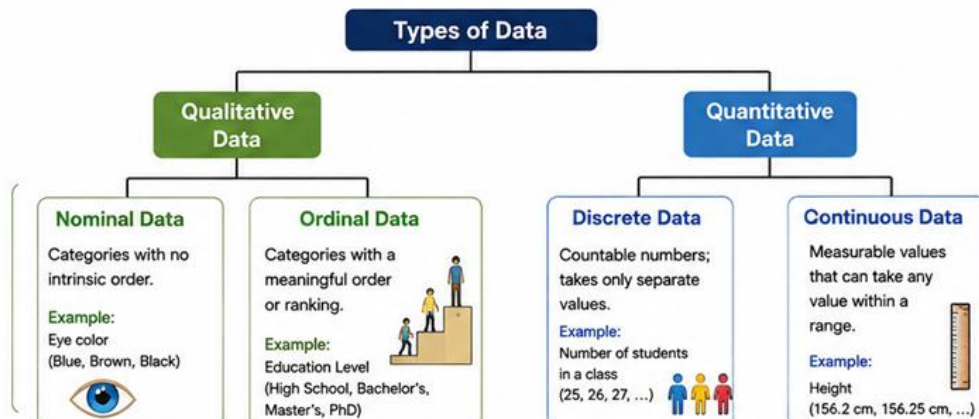
Data Visualization: Data Visualization is the representation of data through use of common graphics such as charts, plots, infographics and animations. These visual displays of information communicate complex data relationships and data-driven insights in a way that is easy to understand.

TYPES OF DATA VISUALIZATIONS



TYPES OF DATA

There are two types of data: **Qualitative** and **Quantitative** data, which are further classified into four types of data.



DIFFERENCE BETWEEN GRAPHS AND CHARTS

Basis	Graphs	Charts
 Meaning	A graph is a chart used to show the mathematical relationship between varied data sets by plotting horizontal (X-axis) and vertical (Y-axis).	A chart represents information that can be in the form of a diagram, table, or graph. It comprises various methods for presenting large information.
 Subset	All graphs are charts. It means that no matter which type of graph one uses to display the data, it will always be a type of chart subset.	All charts are not graphs. It means there can be other types of charts that are not graphs.
 Usage	Graphs find their usage more when analyzing raw data and exact numbers, and as such, shows accurate numerical figures plotted on its axes.	Charts are used excessively in business presentations and in showing survey results. Example pie charts are the most popular ones used in business presentations.
 Data Analyzed	Graphs can be used for raw data and provide a visual representation of trends and changes in the data.	Ideal for those forms of data which can be easily structured or categorized into small subsets of simple and easily understandable figures.
 Trend Analysis	A graph is an ideal choice for those data which depicts some trend or relation between variables described on the graph.	We can also use charts in those cases where the data shown does not depict any trend or relationship.
 Common Types	Line graph and bar graph.	Popular chart types are pie charts, histograms, and vertical and horizontal bar chart.

4. CATEGORICAL DATA

When we record information that categorizes the observations, we are dealing with qualitative data. There are three types of qualitative variables — categorical, binary, and ordinal. With this kind of data, we are interested in the proportions of each category. Consequently, bar charts and pie charts are conventional methods for graphing qualitative variables because they are useful for displaying the relative percentage of each group out of the entire sample. The most common techniques for displaying categorical data are **Bar Charts, Pie Charts and Frequency tables.**

Types of Qualitative Variables

- **Categorical** Places data into categories
- **Binary** Two possible outcomes
- **Ordinal** Categories with a natural order



BIVARIATE DISTRIBUTION & DATA VISUALIZATION

Data visualization is the graphical representation of data. Bivariate distribution involves **two variables** and helps us understand the relationship between them.

1. BIVARIATE DATA

Bivariate data contains two variables for each observation.

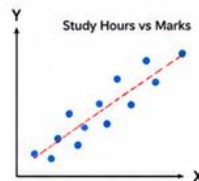
Example: Study Hours (X) and Marks (Y)

Student	Study Hours (X)	Marks (Y)
A	1	45
B	2	50
C	3	60
D	4	65
E	5	75

Purpose: To study the relationship between two variables.

2. INDEPENDENT & DEPENDENT VARIABLES

- Independent Variable (X):**
The variable that influences another variable.
Example: Study Hours
- Dependent Variable (Y):**
The variable whose value changes.
Example: Marks



As study hours (X) increase, marks (Y) also increase.

3. BIVARIATE DISTRIBUTION

It shows how two variables are related.

- Positive Correlation:** Both variables increase together.
- Negative Correlation:** One increases while the other decreases.
- No Correlation:** No clear relationship between the variables.

Time Series Data in Data Visualization

Time Series Data is data collected or recorded at different points in time. It is used to study trends, patterns, changes, and variations over time.

Types of Continuous Data:

- ❖ Histogram
- ❖ Line Graph
- ❖ Scatterplot

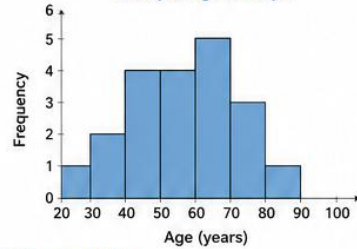
1. HISTOGRAMS

A histogram is a bar chart used to show the frequency distribution of a continuous numeric variable.

Key Points

- Bars touch each other (no gaps).
- X-axis → data ranges (bins/classes).
- Y-axis → frequency (number of occurrences).
- Area of bar shows frequency.

Example: Age of People



Example: Age Data and Histogram Table

Bin (Age)	Frequency	Values Included in Bin
20 – 30	2	25, 22
30 – 40	4	36, 38, 36, 38
40 – 50	4	46, 45, 48, 46
50 – 60	5	55, 55, 52, 58, 55
60 – 70	3	68, 67, 61
70 – 80	1	72
80 – 90	0	–
90 – 100	1	91

Note: There are no gaps between bars in a histogram because it shows continuous data.

2. LINE CHARTS (LINE GRAPH)

A line chart shows the change in a continuous variable over time.



Components of a Line Chart

- ✓ Title – tells what the chart is about.
- ✓ X-axis (Independent) – usually time.
- ✓ Y-axis (Dependent) – values measured.
- ✓ Labels – what each axis represents.
- ✓ Scale – equal intervals.
- ✓ Points – show data values.
- ✓ Line – connects the points.

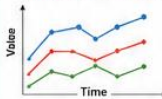
Types of Line Charts

(a) Simple Line Chart



Shows one variable over time.

(b) Multiple Line Chart



Shows two or more variables to compare.

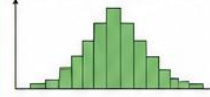
(c) Compound Line Chart



Combination of line chart and bar chart.

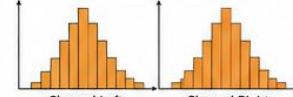
TYPES OF HISTOGRAMS

(a) Normal Distribution



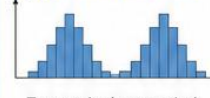
Bell-shaped & symmetric around the center.

(b) Skewed Distribution



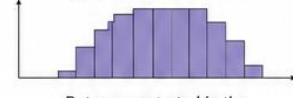
Long tail on the left / right side.

(c) Bimodal Distribution



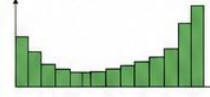
Two peaks (two modes) in the data.

(d) Plateau Distribution



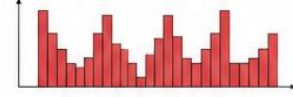
Data concentrated in the middle (flat top).

(e) Edge Peak Distribution



Peak at one end due to faulty construction.

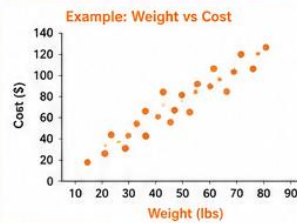
(f) Comb Distribution



Tall & short bars alternate like a comb.

3. SCATTER PLOTS (SCATTER CHARTS)

A scatter plot shows the relationship between two numeric variables.

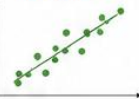


Uses

- Find relationships between variables.
- Detect patterns, trends and correlations.
- Identify outliers (odd points).

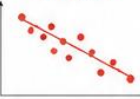
Types of Correlation

(a) Positive



As one increases, the other increases.

(b) Negative



As one increases, the other decreases.

(c) Non-linear



Pattern exists but not a straight line.