

# Graphs and Charts

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## Definition of Graphs and Charts

**Graphs and charts** are visual representations of data used to display information clearly and efficiently. They use visual elements such as bars, lines, points, and slices to illustrate patterns, trends, distributions, and relationships within datasets.

Graphs and charts help simplify complex data, making it easier to compare values, identify trends, and interpret statistical results quickly. They are widely used in statistics, data analysis, research reporting, and machine learning.

## Examples of Common Graphs and Charts

### 1. Bar Chart

A **bar chart** represents categorical data using rectangular bars, where the length of each bar corresponds to the value of a category.

**Example:** Number of students in each department:

- Computer Science: 120
- Mathematics: 80
- Physics: 60

Bar charts are mainly used to compare values across different categories.

### 2. Line Chart

A **line chart** displays data points connected by straight lines and is commonly used to show changes over time.

**Example:** Temperature changes during a week:

- Saturday: 18°C
- Sunday: 20°C
- Monday: 22°C
- Tuesday: 25°C

Line charts are ideal for identifying trends and patterns over time.

### 3. Pie Chart

A **pie chart** shows how a whole is divided into proportional parts, with each slice representing a percentage of the total.

**Example:** Transportation methods:

- Bus: 40%
- Car: 35%
- Walking: 15%
- Bicycle: 10%

Pie charts are best suited for visualizing proportions and percentages.

### 4. Scatter Plot

A **scatter plot** displays individual data points on a two-dimensional plane to show the relationship between two numerical variables.

**Example:** Relationship between study hours and exam score:

- 2 hours → score 10
- 4 hours → score 13
- 6 hours → score 16

Scatter plots are useful for detecting correlations and potential linear relationships.

### 5. Histogram

A **histogram** groups continuous data into intervals (bins) and displays the frequency of values within each interval.

**Example:** Distribution of ages in a group:

- 18–20
- 21–23
- 24–26

Histograms help analyze the shape of data distributions, such as normal or skewed distributions.

### 6. Box Plot

A **box plot** (or box-and-whisker plot) summarizes a dataset using the minimum, first quartile, median, third quartile, and maximum values.

**Example:** Comparing exam score distributions between two classes.

Box plots are particularly useful for identifying variability and detecting outliers.

## Conclusion

Graphs and charts play a crucial role in descriptive statistics by transforming numerical data into visual formats. They improve data interpretation, support comparison, and provide insight into trends, distributions, and relationships between variables.