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**PRN:20240150012**

**BATCH: CC2**

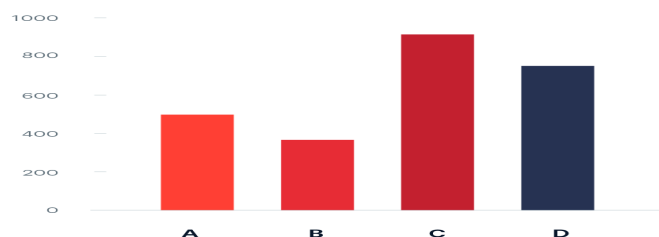
**ROLL NO: 27**

Data visualization plays a crucial role in making data more understandable and insightful. Below are the basic graphs that are commonly used for data visualization, along with their significance:

### **1. Bar Graph / Bar Chart**

**Significance:** Bar graphs represent categorical data with bars whose lengths are proportional to the values they represent. They allow easy comparison across different categories or groups.

- **Best for:** Comparing quantities or frequencies across distinct categories.
- **Why it's important:** Provides a clear, visual way to compare data across categories quickly, allowing the audience to grasp differences in magnitude at a **glance**.

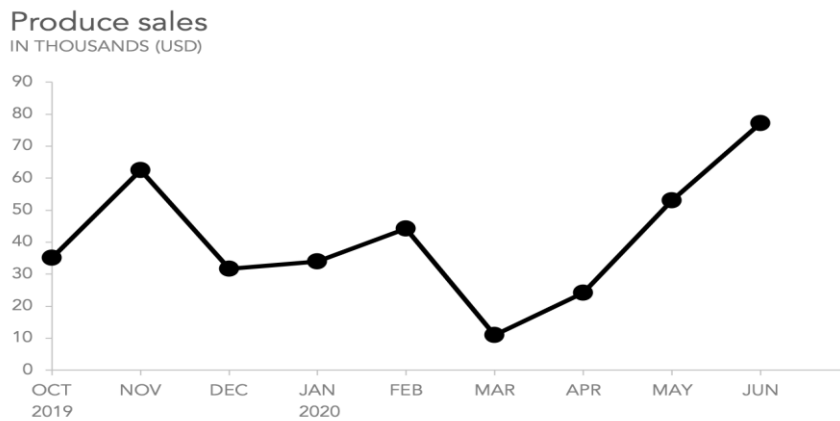


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### **2. Line Graph**

**Significance:** Line graphs connect data points with a line to visualize trends over time or continuous data. They reveal patterns, trends, and fluctuations.

- **Best for:** Tracking changes over time (e.g., stock prices, temperature changes, etc.).
- **Why it's important:** Line graphs highlight the relationship between variables and help in identifying trends, seasonality, or correlations over a continuous period.

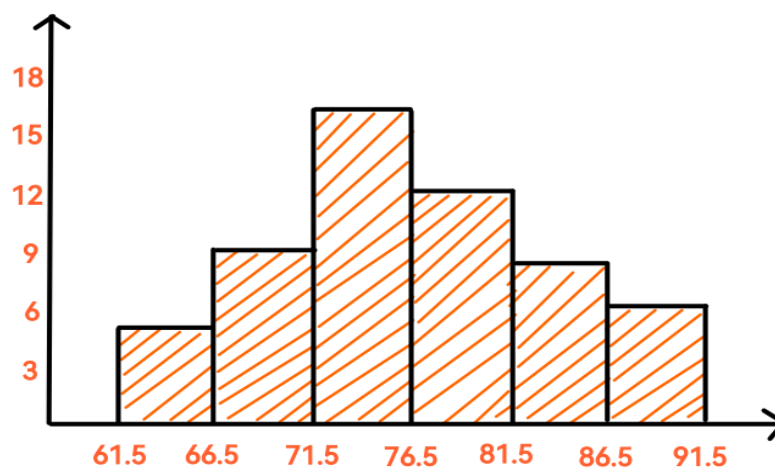


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### 3. Histogram

**Significance:** Histograms show the distribution of a dataset by grouping data into bins or intervals, with the frequency of data in each interval represented by the height of bars.

- **Best for:** Understanding the frequency distribution of continuous data (e.g., age, income, exam scores).
- **Why it's important:** It helps in recognizing patterns like normal distribution, skewness, and outliers in large datasets, facilitating statistical analysis.

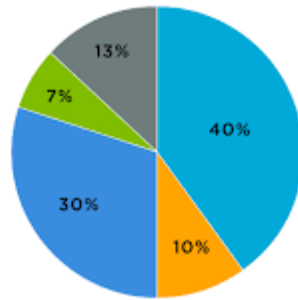


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### 4. Pie Chart

**Significance:** Pie charts display proportions of a whole as slices of a circle. Each slice corresponds to a percentage or fraction of the total.

- **Best for:** Showing how a whole is divided into parts (e.g., market share, budget distribution).
- **Why it's important:** It gives a quick, intuitive understanding of the relative proportions between categories, though it works best with fewer categories.

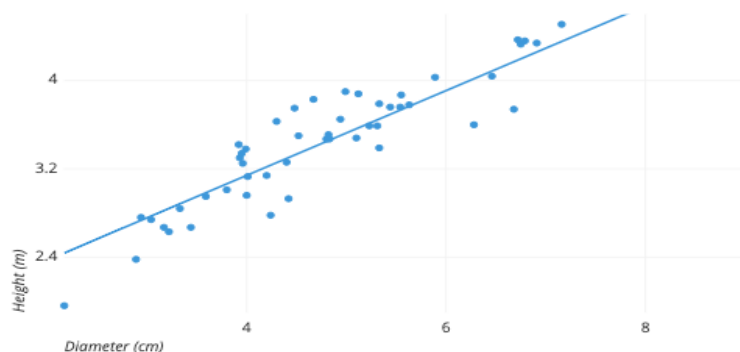



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## 5. Scatter Plot

**Significance:** Scatter plots visualize the relationship between two continuous variables. Each point represents a pair of values, plotted on the x and y axes.

- **Best for:** Identifying correlations, relationships, and patterns between two variables (e.g., height vs. weight, hours studied vs. exam scores).
- **Why it's important:** It helps detect correlations (positive, negative, or no correlation) and outliers in the data, providing insights for regression or predictive modeling.

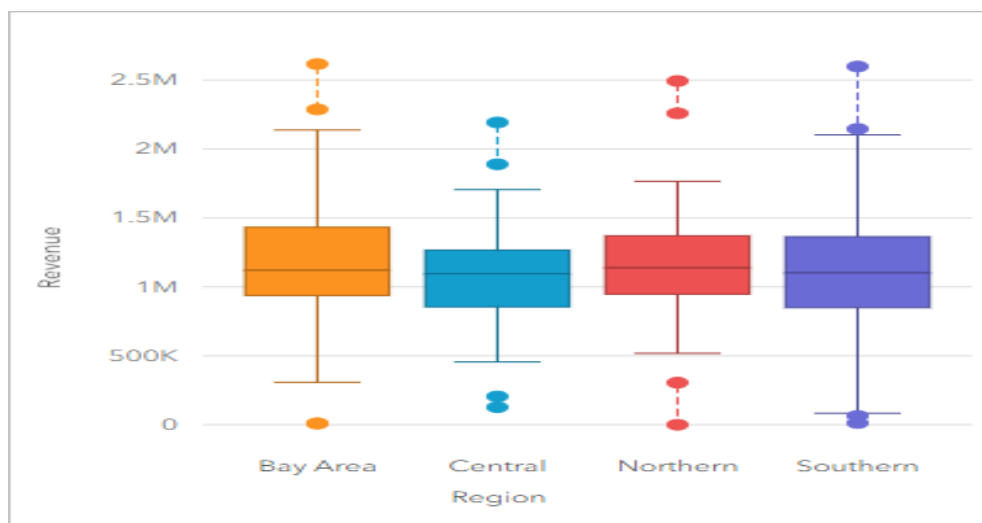



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## 6. Box Plot (Box-and-Whisker Plot)

**Significance:** Box plots summarize data distribution, showing the median, quartiles, and any outliers. The "whiskers" show the range of data, and the "box" shows the interquartile range.

- **Best for:** Visualizing the spread, skewness, and identifying outliers in a dataset.
- **Why it's important:** It provides a high-level summary of data distribution, making it easy to compare multiple groups and detect outliers or abnormalities.

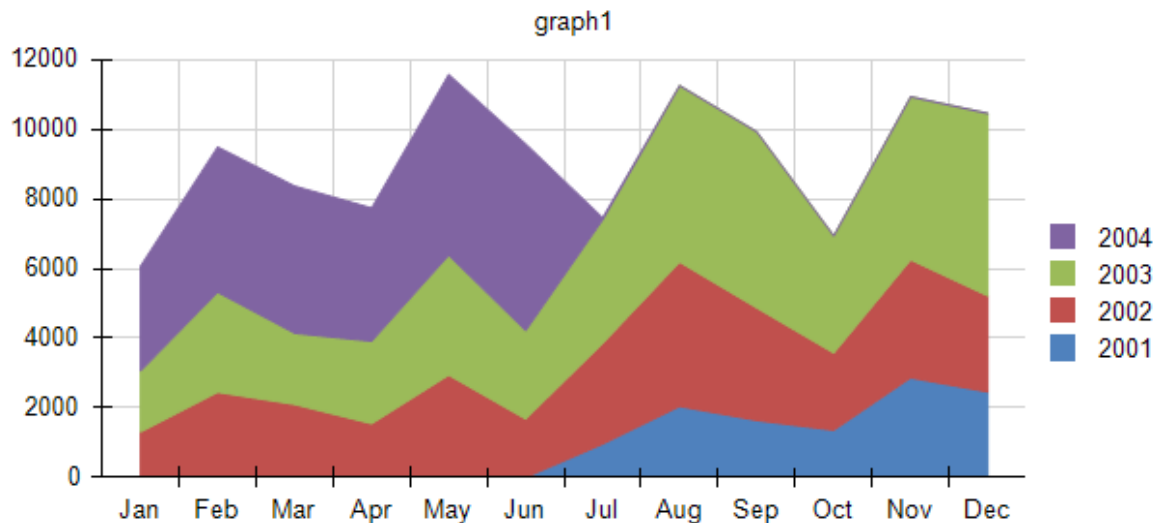


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## 7. Area Chart

**Significance:** Similar to a line graph, but with the area under the line filled. It emphasizes the magnitude of change over time, particularly when multiple data series are being compared.

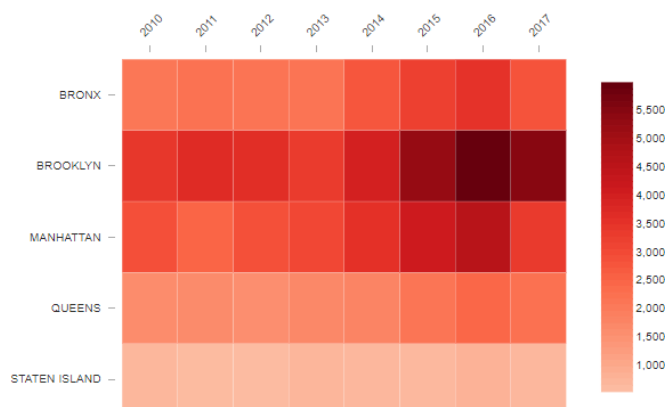
- **Best for:** Showing cumulative data or multiple variables over time (e.g., total sales, cumulative profits).
- **Why it's important:** It provides a clear visual of volume or magnitude changes over time, which is crucial for understanding growth patterns or comparing multiple datasets.



## 8. Heatmap

**Significance:** Heatmaps use color gradients to represent the magnitude of data values in a matrix. The color intensity represents the data value.

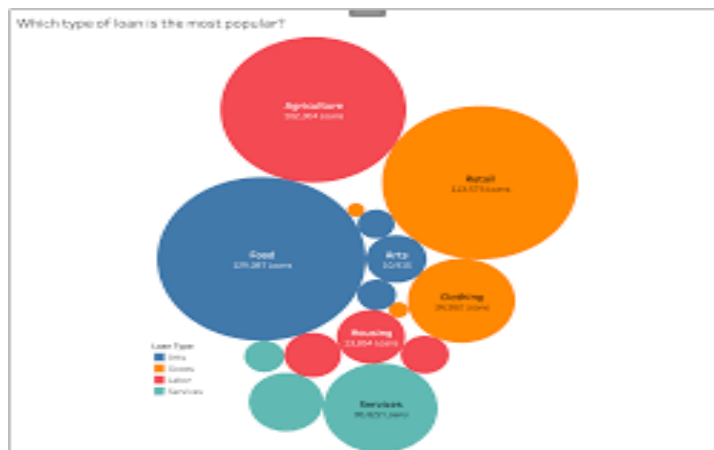
- **Best for:** Visualizing correlations or patterns in large datasets, especially in matrix form (e.g., correlation matrices, website click heatmaps).
- **Why it's important:** Heatmaps are effective for spotting trends and correlations in complex datasets, helping to highlight high or low values quickly.



## 9. Bubble Chart

**Significance:** A variation of the scatter plot where the size of each data point (bubble) represents a third dimension of data.

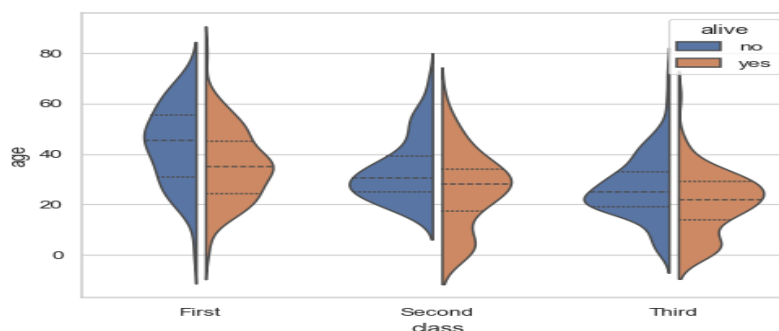
- **Best for:** Visualizing the relationship between three variables (e.g., sales over years with bubble size representing customer base).
- **Why it's important:** It enables the visualization of an additional variable, enhancing the understanding of multi-dimensional relationships in datasets.



## 10. Violin Plot

**Significance:** A violin plot combines the features of a box plot and a density plot, showing data distribution, density, and spread.

- **Best for:** Comparing the distribution of data across different categories or groups (e.g., comparing exam scores for different student groups).
- **Why it's important:** Provides a more detailed view of data distribution, including modality and density, which helps understand complex data patterns beyond a box plot.

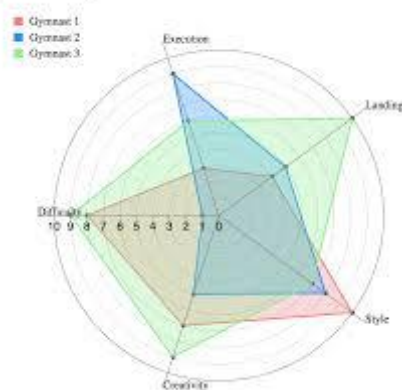


## 11. Radar Chart (Spider Chart)

**Significance:** A radar chart displays data along multiple axes originating from a central point. Each axis represents a variable, making it ideal for comparing multiple entities across multiple attributes.

- **Best for:** Comparing the performance or attributes of multiple entities across multiple variables (e.g., comparing products on attributes like price, quality, and durability).
- **Why it's important:** It visually represents multidimensional data, enabling comparisons across a wide range of categories or features for a holistic view.

Gymnast Scoring Radar Chart

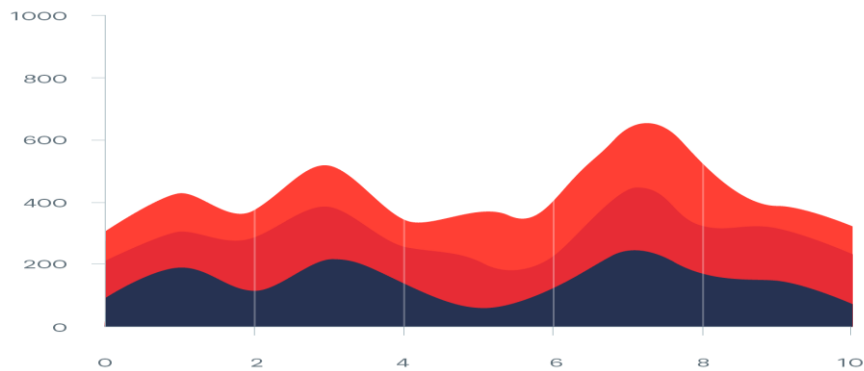


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## 12. Stacked Bar / Stacked Area Chart

**Significance:** These charts show parts of a whole, stacking different data segments over time or categories. Each segment represents a subcategory.

- **Best for:** Displaying how different components contribute to the total across time or categories (e.g., sales by product category across months).
- **Why it's important:** It helps to visualize how proportions of different categories change over time, revealing trends and shifts in the makeup of a whole.

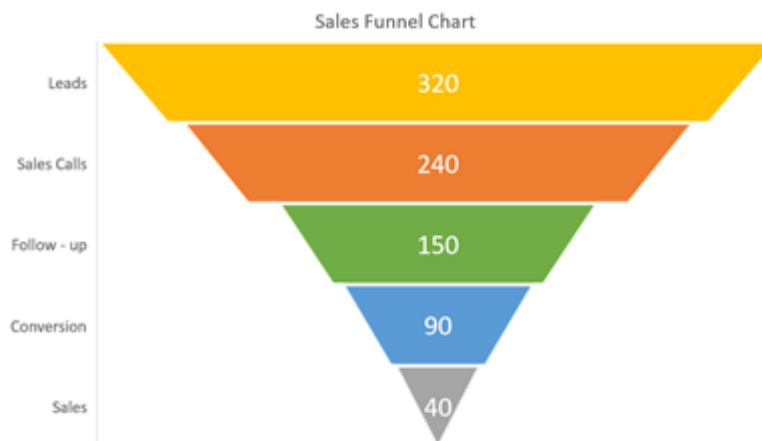


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## 14. Funnel Chart

**Significance:** Funnel charts visualize stages in a process, illustrating how data progressively narrows down at each stage.

- **Best for:** Showing progressive reduction in data across a sequence of steps (e.g., sales conversion rates, lead-to-customer pipeline).
- **Why it's important:** It helps identify where the biggest losses occur in a process and where improvements may be necessary.



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## 15. Waterfall Chart

**Significance:** Waterfall charts display sequential data, showing how positive and negative values affect a starting value to arrive at a final result.



- **Best for:** Visualizing the incremental impact of factors on a final outcome (e.g., profit breakdowns, financial analysis).
- **Why it's important:** It helps to understand the cumulative effect of sequential changes on a key metric, making it easier to analyze financials or other business metrics.

