



# Elements Of Statistics

## Class-BCA III Semester



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**Outline:-**

**UNIT-II**

**Measure Central Tendency :-**

**Concept Of Central Tendency**

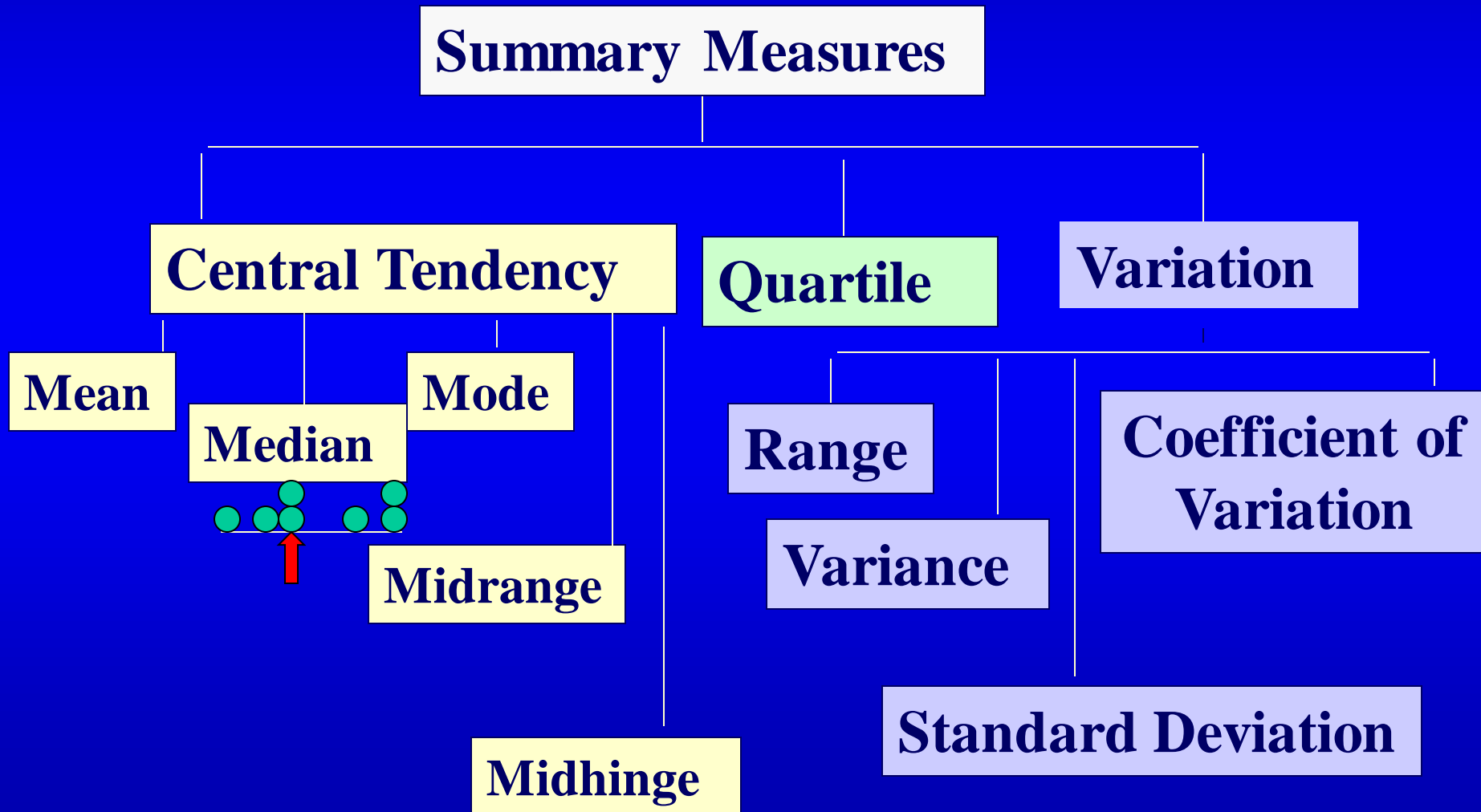
**Arithmetic Mean**

**Median**

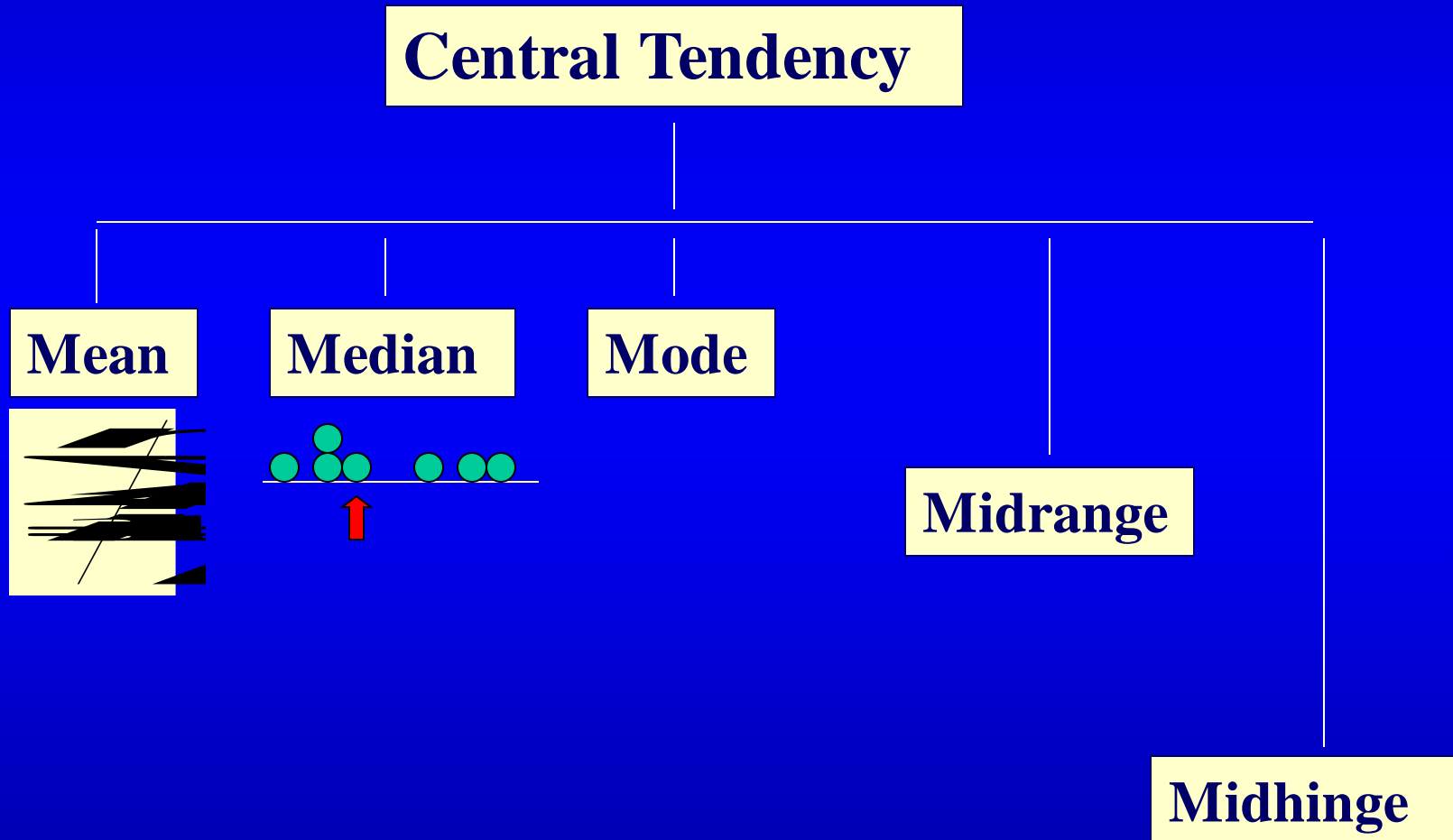
**Mode**

**Quartile, Range**

# Summary Measures



# Measures of Central Tendency




# Measures of Central Tendency

- **What is a measure of central tendency?**
- **Measures of Central Tendency**
  - **Mode**
  - **Median**
  - **Mean**
- **Shape of the Distribution**
- **Considerations for Choosing an Appropriate Measure of Central Tendency**

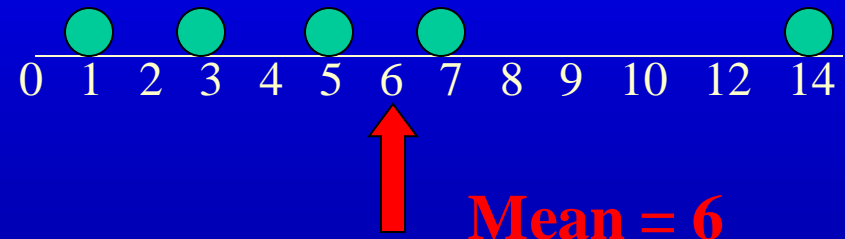
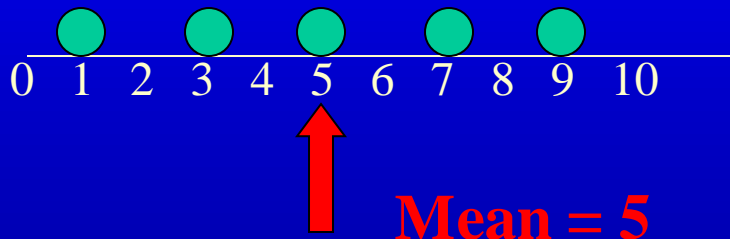
# The Mean (Arithmetic Average)

- The arithmetic average obtained by adding up all the scores and dividing by the total number of scores.
- It is the Arithmetic Average of data values:

Sample Mean  $\frac{\sum_{i=1}^n x_i}{n}$

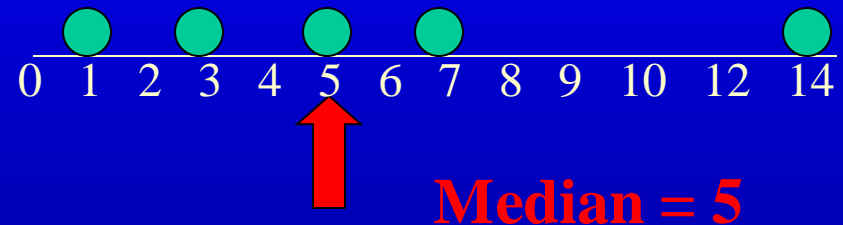
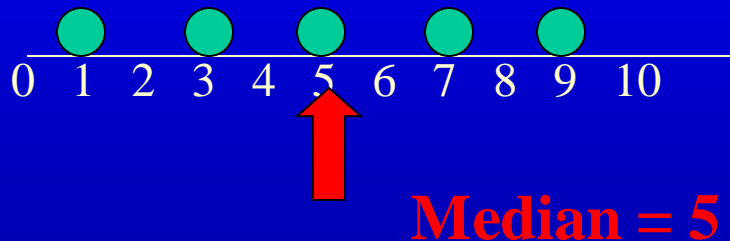


- The Most Common Measure of Central Tendency
- Affected by Extreme Values (Outliers)



# The Median

- Important Measure of Central Tendency
- In an ordered array, the median is the “middle” number.
  - If  $n$  is **odd**, the median is the **middle number**.
  - If  $n$  is **even**, the median is the **average of the 2 middle numbers**.
- Not Affected by Extreme Values



# Finding the Median in Grouped Data

$$\textit{Median} = L + \frac{N(.5) - Cf}{f} \times w$$



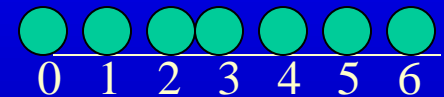
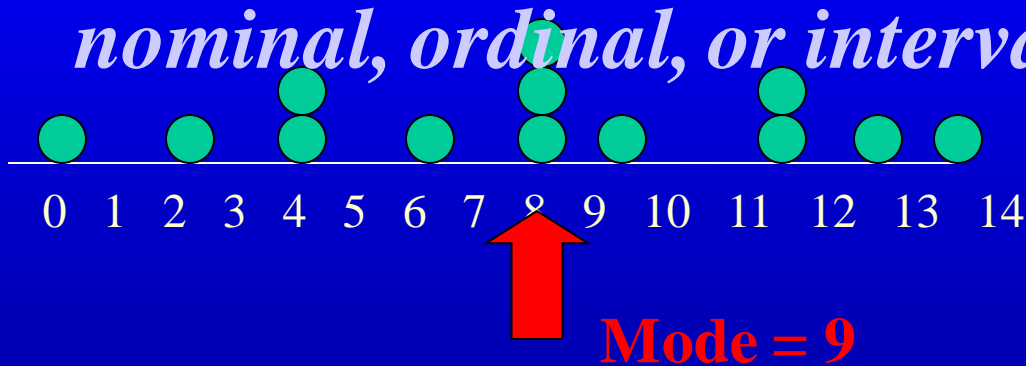
# Percentiles

- A score below which a specific percentage of the distribution falls.
- Finding percentiles in grouped data:

$$25\% = L + \frac{N(.25) - Cf}{f} \times w$$

# The Mode

- The category or score with the largest frequency (or percentage) in the distribution.
- The mode can be calculated for variables with levels of measurement that are: *nominal, ordinal, or interval-ratio.*



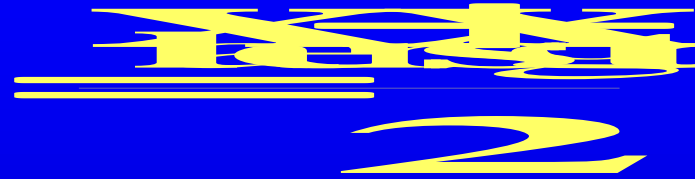
**No Mode**

# Midrange

- A Measure of Central Tendency
- Average of Smallest and Largest

Observation:

Midrange



- Affected by Extreme Value



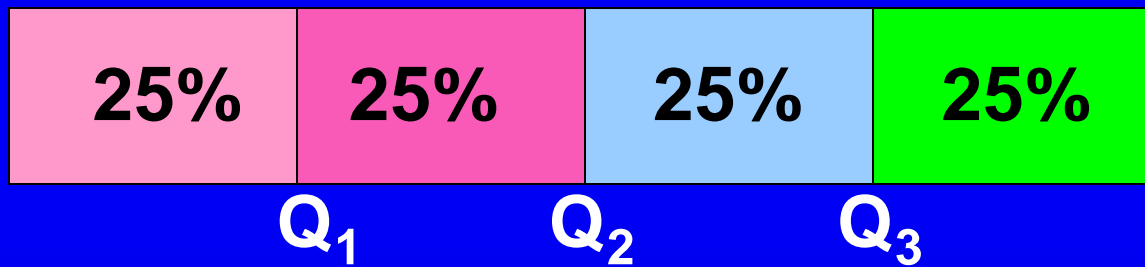
Midrange = 5



Midrange = 5

# Quartiles

- **Not a Measure of Central Tendency**
- **Split Ordered Data into 4 Quarters**



- **Position of i-th Quartile:** position of point  $Q_i = \frac{i(n+1)}{4}$

Data in Ordered Array: 11 12  13 16 16 17 18 21 22

$$\text{Position of } Q_1 = \frac{1 \cdot (9 + 1)}{4} = 2.50 \quad Q_1 = 12.5$$

# Midhinge

- **A Measure of Central Tendency**
- **The Middle point of 1st and 3rd Quarters**

$$\text{Midhinge} = \frac{Q_1 + Q_3}{2}$$

- **Not Affected by Extreme Values**


**Data in Ordered Array: 11 12 13 16 16 17 18 21 22**

**Midhinge =**



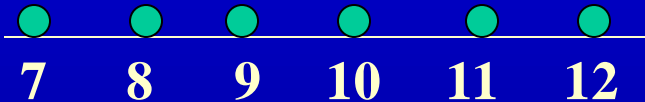
# The Range

- Measure of Variation
- **Difference Between Largest & Smallest Observations:**

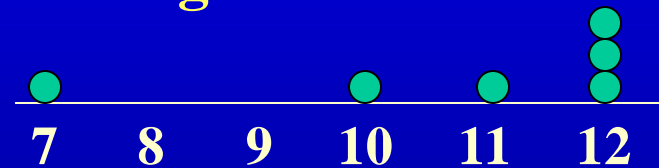
**Range =** 

- **Ignores How Data Are Distributed:**

**Range =  $12 - 7 = 5$**



**Range =  $12 - 7 = 5$**



# Interquartile Range

- Measure of Variation
- Also Known as **Midspread**:  
Spread in the Middle 50%
- Difference Between Third & First

Quartiles: Interquartile Range =  $Q_3 - Q_1$

Data in Ordered Array: 11 12 13 16 16 17 17 18 21

-   $17.5 - 12.5 = 5$   
Not Affected by Extreme Values

# Questions:-

- 1. What is the measure of central Tendency explain ?**
- 2. What is the mean define it and explain?**
- 3. What is the median define and explain it?**
- 4. Define mode in statistical method?**
- 5. What do you Mean by quartile Explain in brief?**



## Reference Books:

1. S.C.Gupta - Fundamentals of Statistics - Sultan Chand & sons , Delhi.
2. D.N.Elhance - Fundamentals of statistics - Kitab Mahal, Allahabad.
3. Montgomery D.C. – Statistical Quality Control - John Wiley and Sons
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5. Hogg R.V. and Craig R.G. – Introduction to mathematical statistics Ed 4 {1989} – Macmillan Pub. Co. New York.
6. Gupta S.P. – Statistical Methods, Sultan Chand and Sons New Delhi

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Thanks