

# Unit 3: Introduction to Central Tendency

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## 3.1 What is Central Tendency?

- **Central Tendency** refers to the statistical measure that identifies a single value as representative of an entire distribution. It aims to provide an accurate description of the entire data. This value shows where most data points tend to cluster, thus "central" to the distribution.
  - **Three Main Measures of Central Tendency:**
    - **Mean**
    - **Median** (covered in the previous lecture)
    - **Mode**
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## 3.2: Understanding the Mean

### Definition of Mean

- The **mean** (often called the **average**) is the sum of all values in a data set divided by the number of values. It is the most common measure of central tendency and is used to describe the overall level of a data set.

**Formula:** 
$$\text{Mean } (\bar{x}) = \frac{\sum x_i}{n}$$

Where:

- $\sum x_i$  is the sum of all data points.
- $n$  is the number of data points.

### Interpretation of Mean

- The mean provides a single value that represents the "typical" value in a data set. It's useful for comparing different data sets or determining trends.
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## Real-Life Example: Mean in Sport Business

### Example: Calculating the Mean Points Scored by a Basketball Team

Consider a basketball team that scored the following points in 8 games:

Points: [90,85,92,88,94,89,95,91]

- **Step 1:** Sum all the points:  
 $90+85+92+88+94+89+95+91=724$
- **Step 2:** Divide by the number of games ( $n = 8$ ):

$$\text{Mean} = \frac{724}{8} = 90.5 \text{ points}$$

## Interpretation:

The mean score of 90.5 points represents the average performance of the team across these 8 games. This value can be used by coaches and analysts to assess overall team performance.

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### Try-It Problem: Calculating the Mean

A football team scored the following goals in 7 matches: [2, 1, 3, 2, 4, 2, 3]. Calculate the mean number of goals scored per match.

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## 3.3: Understanding the Mode

### Definition of Mode

- The **mode** is the value that appears most frequently in a data set. Unlike the mean, the mode does not necessarily reflect the central location of all data points, but it indicates the most common value.

### Interpretation of Mode

- The mode is particularly useful in situations where the most common or popular item, choice, or score is of interest. It is less affected by outliers and skewed data than the mean.
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### Real-Life Example: Mode in Sport Business

#### Example: Determining the Most Common Ticket Price at a Sports Event

Consider the following ticket prices (in dollars) for a football match, sold in different categories:

Ticket Prices: [50,50,75,75,75,100,100,100,100,125]

#### Identify the Mode:

Mode=100 dollars

#### Interpretation:

- The mode of 100 dollars represents the most frequently occurring ticket price for the match. This can help the management understand the most popular price point and make pricing decisions for future events.
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### Try-It Problem: Finding the Mode

A cricket stadium sold the following numbers of tickets at various prices (in dollars): [30, 50, 50, 30, 30, 70, 50]. Identify the mode of the ticket prices.

### 3.4 : Comparison Between Mean and Mode

#### When to Use the Mean:

- **Symmetric Distributions:** The mean is most appropriate when data is symmetrically distributed without outliers.
- **Quantitative Data:** Use the mean for numerical data where the calculation of an average makes sense.

#### When to Use the Mode:

- **Categorical Data:** The mode is ideal for categorical data where you want to identify the most common category.
- **Skewed Distributions:** The mode is useful when dealing with skewed distributions where the mean might be misleading.

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#### Real-Life Example: Mean vs. Mode in Sport Business

##### Example: Analyzing Player Performance

Consider a situation where a football analyst wants to assess a player's scoring pattern over 10 matches. The player's goals scored in each match are as follows:

[1,2,2,3,5,7,2,2,9,2]

##### Mean:

Mean =  $\frac{1+2+2+3+5+7+2+2+9+2}{10} = \frac{35}{10} = 3.5$  goals

##### Mode:

Mode = 2 goals

##### Interpretation:

- The mean of 3.5 goals suggests that the player scores, on average, 3.5 goals per match. However, the mode of 2 goals indicates that the most common number of goals scored in any given match is 2, which might be a more meaningful statistic if the analyst is interested in typical performance.

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#### Try-It Problem: Analyzing Sports Data Using Mean and Mode

A baseball player's home runs in 12 games are recorded as follows: [0, 1, 2, 3, 2, 1, 1, 4, 2, 2, 1, 0]. Calculate the mean and mode of home runs and interpret the results.

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### 3.5: Summary and Conclusions

#### Recap of Key Points

- The **mean** is the average of a data set and is useful for summarizing overall performance or trends.
- The **mode** is the most frequent value in a data set and is useful for identifying the most common occurrence or preference.
- Both measures provide valuable insights depending on the nature of the data and the specific question being asked.

#### Practical Application in Sports Business

- Understanding how to use mean and mode helps in making informed decisions in sports management, such as pricing strategies, performance evaluations, and fan engagement activities.

### 3.6 Home Work

- Solve the try-it problems given in the lecture and submit your answers. Additionally, identify a sport-related data set of your choice, calculate the mean and mode, and interpret the results in the context of sports management.