Pabna University of Science and Technology

Faculty of Engineering and Technology

Department of Information and Communication Engineering

Presentation on: Sampling Distribution of the Median and Range.

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Title: "Sampling Distribution of the Medians and Range"

Subtitle: "Understanding Key Concepts in Statistics"

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Introduction

- **What is a sampling distribution?**

- Sampling distribution refers to the probability distribution of a given statistic based on repeated random samples from a population.

- The median is the middle value of an ordered dataset.

- The range is the difference between the maximum and minimum values in a dataset.

- This presentation focuses on how the medians and range vary when repeatedly sampling from a population.

Understanding Sampling Distributions

- A sampling distribution is derived by taking multiple samples of the same size from a population.

- Each sample yields a statistic (e.g., median or range), and their values across samples form a distribution.

- The central limit theorem (CLT) mainly applies to means but has implications for medians as well.

Sampling Distribution of the Median

- **Define the median:** The middle value in an ordered data set.

- The median is less affected by extreme values compared to the mean.

- **As sample size increases:**
  - The sampling distribution of the median becomes approximately normal.
  - The standard error of the median decreases.

- The shape of the sampling distribution depends on the population distribution.

Sampling Distribution of the Range

- The range is highly sensitive to outliers and extreme values.

- As sample size increases:
  - The expected range increases because larger samples are more likely to capture extreme values.
  - The variability of the range is greater compared to the median.

Comparing Median and Range in Sampling Distributions

Statistic	Sensitivity to Outliers	Convergence to Normality	Variability
Median	Low	High for large samples	Moderate
Range	High	Low	High

Applications

- **Quality Control**: Understanding the variability of medians and ranges helps in process monitoring.

- **Medical Studies**: Medians are often used in clinical research to describe central tendencies without being affected by extreme values.

- **Environmental Science**: Ranges help in studying temperature fluctuations and other natural variations.

Summary

- The sampling distribution of the median is more stable and resistant to outliers compared to the mean.

- The range is highly variable and influenced by extreme values.

- Understanding these distributions helps in better statistical decision-making.

Thank you!