Welcome to

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The Session Will Begin Shortly

START

Statistics in R with Tidyverse

Session 9: Estimation via Bootstrapping Methods

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Bootstrapping Fundamentals

- Introduced by Brad Efron in 1979

- Bootstrap samples created by resampling with replacement

- Used to estimate population parameters like the mean

- Allows constructing confidence intervals, hypothesis testing, and more

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The Bootstrap Method

- Random sample of size n taken from the population

- Bootstrap samples are created by resampling with replacement

- Some values appear multiple times, while others may not appear at all

- Repeat this process to generate many bootstrap samples

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Why Use Bootstrapping?

- Allows estimation without knowing population distribution

- Provides insights even when traditional methods fail

- Works well with modern computing power

- Helps construct confidence intervals using resampled data

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Bootstrap Sample Mean Distribution

- Create many bootstrap samples, calculate sample means

- Distribution of these means forms the **bootstrap distribution**

- Resampling captures sampling variability

- Useful for constructing confidence intervals

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Bootstrap Confidence Intervals

- Percentile method: Use the middle 95% of the bootstrap sample means

- Standard-error method: Use the bootstrap distribution standard error for confidence interval width

- Resampling allows constructing accurate intervals even with limited data

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Advantages of Bootstrapping

- Does not require assumptions about population distribution

- Flexible for various statistical estimations

- Can be applied to other parameters like medians or variances

- Widely used in fields with limited sample sizes

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Demo & Exercises

Q & A

STOP