Inferential Statistics for Data Analysis

Develop the ability to draw valid conclusions and make predictions from sample data using inferential statistical methods.

Group classes in Live Online and onsite training is available for this course. For more information, email onsite@graduateschool.edu or visit: https://www.graduateschool.edu/courses/inferential-statistics-for-data-analysis

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Course Outline

Module 1: Review of Statistical Symbols and Descriptive Statistics

- Refresh understanding of statistical notation used in formulas and analysis.
- Review descriptive statistics including measures of center and spread.
- Reinforce how descriptive statistics support inferential techniques.

Module 2: The Conceptual Framework for Statistical Thinking

- Understand the logic of inferential statistics and its role in decision-making.
- Distinguish between populations, samples, and sampling distributions.
- Recognize the importance of variability and uncertainty in statistical analysis.

Module 3: Determining Minimal Sample Size

- Calculate the minimum sample size for reliable estimation and hypothesis testing.
- Consider factors such as confidence level, margin of error, and population variability.
- Apply formulas and tools to determine required sample sizes.

Module 4: Estimating a Population Mean from a Sample

- Compute point and interval estimates for a population mean.
- Interpret confidence intervals and their relationship to sampling error.
- Understand assumptions for accurate estimation.

Module 5: The Central Limit Theorem

- Explain the central role of the Central Limit Theorem in inferential statistics.
- Understand how sample size affects the shape of the sampling distribution.
- Apply the theorem to make inferences about population parameters.

Module 6: Estimating a Population Proportion from a Sample

- Calculate point and interval estimates for a population proportion.
- Interpret results in the context of sampling variability and confidence levels.

- Understand conditions for valid estimation of proportions.

Module 7: Hypothesis Testing – Statistical Significance of a Large Sample Mean

- Formulate null and alternative hypotheses for mean testing.
- Calculate test statistics and p-values for large samples.
- Interpret statistical significance in practical terms.

Module 8: One-tailed and Two-tailed Tests of Statistical Significance

- Differentiate between one-tailed and two-tailed hypothesis tests.
- Select the appropriate test type based on research objectives.
- Interpret results for directional and non-directional hypotheses.

Module 9: Hypothesis Testing – Statistical Significance of a Sample Proportion

- Conduct hypothesis tests for proportions using sample data.
- Calculate and interpret p-values in the context of proportion testing.
- Understand limitations of small sample proportion tests.

Module 10: Hypothesis Testing – The t Distribution for a Small Sample Mean

- Use the t distribution for inference with small sample sizes.
- Understand degrees of freedom and their impact on test results.
- Apply t-tests to real-world data analysis scenarios.

Module 11: Goodness of Fit – The Chi-Square Test for Frequencies

- Test whether observed frequencies differ from expected frequencies.
- Calculate chi-square statistics and interpret results.
- Recognize assumptions and conditions for valid chi-square testing.

Module 12: Comparing Two Sample Means

- Conduct hypothesis tests to compare means from two independent samples.
- Interpret results in terms of statistical and practical significance.
- Address assumptions for valid comparison testing.

Module 13: Comparing Two Sample Proportions

- Perform tests to compare proportions from two groups.
- Calculate differences and assess significance levels.
- Interpret findings in the context of the research question.

Module 14: Constructing a Scatter Diagram for Two Variables

- Plot data to visualize the relationship between two quantitative variables.
- Identify possible patterns, trends, and outliers.
- Use scatter diagrams as a precursor to correlation and regression analysis.

Module 15: Determining the Correlation between Two Variables

- Calculate correlation coefficients to measure strength and direction of relationships.
- Interpret correlation values in real-world contexts.
- Recognize the difference between correlation and causation.

Module 16: Linear Regression for Two Variables

- Fit and interpret a simple linear regression model.
- Assess model fit using R-squared and residual analysis.

- Use regression results to make predictions and guide decision-making.