

Statistical Inference

Course Outcome:

Upon completion of this course, students will be able to:

Unit 1: Parametric Methods

1. Define and explain the Method of Moments and Maximum Likelihood Estimators.
2. Apply Likelihood Ratio, Rao's Score, and Wald Tests in statistical inference.
3. Identify and analyze the large sample properties of various estimators.
4. Understand the Pearsonian Chi-square test and its applications in statistical analysis.

Unit 2: Bayesian Inferential Methods and Resampling Techniques

5. Compare and contrast Classical statistical analysis and Bayesian analysis paradigms.
6. Describe and utilize the Beta-Bernoulli, Gamma-Exponential, and Gamma-Poisson models.
7. Explain the concepts of Prior and posterior distributions in Bayesian analysis.
8. Apply Jackknife and Bootstrap resampling techniques for estimation and confidence interval calculation.
9. Perform Cross-validation studies using resampling methods in statistical analysis.

Module-2 Unit 1: Nonparametric Methods

10. Conduct basic tests of location and scale and tests of Goodness of fit, Homogeneity, and Associations using nonparametric methods.

Unit 2: Linear Models

11. Understand the Gauss-Markov Model and Least Square Estimators.
12. Solve Normal Equations and determine Best Linear Unbiased Estimators.
13. Evaluate the Gauss Markov Theorem and its implications on estimation.
14. Apply linear models such as ANOVA, Regression, and ANOCOVA models in statistical analysis.
15. Calculate Simultaneous confidence intervals using Bonferroni, Scheffe, Tukey, HSU, and Duncan's Methods and compare their effectiveness.

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