Applied Statistical Analysis – MTH 5401

Course Objectives

This course will provide students with the principles of multivariate modeling, analysis of variance (anova), unsupervised learning, and their applications. It builds on the knowledge of regression modeling to gain a deep understanding of multivariate analysis. This course will focus on understanding statistical modeling concept, its various applications, and on interpreting and communicating the results of a multivariate modeling task. Emphasis will be placed on understanding the problem, identifying dependent and independent variables, use a multivariate model to explain the problem, estimate the model parameters, and apply the model for predication and inference. We use R, a multipurpose and comprehensive programming language that was first developed for statistical analysis.

Course Topics

Discrete and continuous probability distributions (Review)
Estimation
Confidence Interval
Hypotheses Testing
Maximum Likelihood and Least Square
Regression Analysis
Linear Regression
Correlation Coefficient and Linear Regression
Multiple Regression
Hypothesis Testing in Multiple Regression
Multiple and Partial Correlations
Analysis of Variance (ANOVA)
One-way ANOVA
Two-way ANOVA
Test of Interaction using ANOVA
Randomized Blocks
Nonparametric ANOVA - Kruskal-Wallis
Regression - Nonlinear in Factors
Regression - Nonlinear in Parameters
Intrinsically Linear Regression
Supervised vs. Unsupervised Learning
Clustering
K-means Clustering
Data Dimensionality Reduction