Regression Models for Machine Learning - MTH 5415

Course Description:

This course describes how to make predictions or inference regarding the problem at hand using available data. It presents algorithms, techniques, and applications of machine learning mainly through regression analysis at an advanced level. The main goal of machine learning is extracting and gaining useful information from data for prediction and inference. We study two main problem categories addressed in machine learning:

1. Classification,
2. 2. Regression.

The classification problem is to predict what class an instance of data belongs to, while regression problem is to predict a numeric value of a response variable. Classification deals with predicting the class label, which is a discrete value, whereas regression deals with predicting a continuous value for the response to a set of factors.

Course Objectives:

This course will provide students with the principles of machine learning and its applications. It builds on the knowledge of statistical modeling to gain a deep understanding of regression analysis. This course will focus on understanding statistical modeling concepts, their various applications, and on interpreting and communicating the results of a machine learning task. Emphasis will be placed on understanding the problem, modeling it, implementing an algorithm, identifying the predictors, quantify the goodness of the model, and apply it for predication and inference. We use R, a multipurpose and comprehensive programming language that was first developed for statistical analysis.

At the completion of the course, students will be able to:

- Understand the different types of statistical models.
- Develop an ability to solve problems using machine learning techniques.
- To understand and categorize the problem into Classification or Regression.
- To develop a mathematical model to explain data.
- To use R programming to implement the model.
- To select relevant parameters for the model.
- To quantify the goodness of the model.
- To make prediction and inference using the model and interpret the results.