

Advanced Regression Techniques

Upon completion of the Advanced Regression Techniques course with focus on Smoothing Techniques, students will be able to:

1. Remembering:

- Define and differentiate between different types of smoothers used in scatterplot smoothing.
- Recall the concept of kernel smoothing and explain the selection of smoothing parameters.

2. Understanding:

- Explain the concept of Regression Splines and distinguish between simple knot selection schemes and adaptive knot selection schemes.
- Understand the principles behind Adaptive regression splines and MARS (Multivariate Adaptive Regression Splines).

3. Applying:

- Apply Generalized Additive Models (GAM) and scoring techniques to analyze complex data sets.
- Select and estimate the link function in generalized additive models and perform analysis of deviance.

4. Analyzing:

- Demonstrate the ability to transform response variables using the ACE algorithm and generalize the Box Cox transformation for better model fit.
- Analyze the performance of nonlinear regression models and identify and address identifiability and ill conditioning problems.

5. Evaluating:

- Evaluate the results of bootstrapping techniques, including parametric and nonparametric bootstrapping, in linear regression models.
- Critically assess the outcomes of various smoothing techniques and regression models through residual analysis.

6. Creating:

- Develop expertise in selecting appropriate smoothing techniques for different types of data and research questions.
- Create advanced regression models using techniques such as Regression Splines, Generalized Additive Models, and Nonlinear Regression to address complex real-world problems.

By the end of the course, students will have the skills and knowledge necessary to apply advanced regression techniques and smoothing methods to analyze data, make informed decisions, and communicate results effectively.

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