Guidelines for Project #4

Neural Networks for Regression and Classification

An Optional Bonus Project

Contents

Objective

Select a new dataset that meets the following criteria:

- Includes both **numerical and categorical** response variables.
- Contains at **least 10 feature variables** (response variables are not counted as features).

Using this dataset, apply Neural Networks to address practical questions derived from the data.

Reporting Format

Follow the same format as previous projects completed this semester.

Analytic Tasks

- **Common Analytic Tasks**
  - Formulate analytic questions based on meaningful practical problems.
  - Assess whether the dataset contains the necessary information.
  - Perform exploratory data analysis (EDA).
  - Conduct necessary feature engineering.
  - Summarize existing methods (e.g., regression models, SVM, CART, ensembles) that could address the formulated questions.
- **Implementation of Neural Networks**
  - Perceptron Regression
  - Perceptron Classification
  - Multilayer Neural Networks
  - Implementation Process
    - Feature encoding and scaling
    - Two-way data splitting
    - Hyperparameter tuning
    - Final model training
    - Prediction and performance evaluation
    - Comparisons with base models
    - Recommendations

Due: Wednesday, 5/7/2025