

CST 476-2 Deep Learning

Lab Sheet 02

Activity: Boston Housing Prices Prediction with a Simple Perceptron Network

Aim:

The aim of this lab sheet is to implement a perceptron-based neural network for predicting the median value of owner-occupied homes in Boston using the Boston Housing Prices dataset. This exercise will cover data loading, preprocessing, model building, training, and evaluation.

Dataset:

Boston Housing Dataset

Description of the Dataset:

The dataset describes 13 numerical properties of houses in Boston suburbs and is concerned with modeling the price of houses in those suburbs in thousands of dollars. Input attributes include CRIM: Per capita crime rate by town, ZN: Proportion of residential land zoned for large lots, INDUS: Proportion of non-retail business acres per town, CHAS: Charles River dummy variable (1 if tract bounds river; 0 otherwise), NOX: Nitric oxides concentration (parts per 10 million), RM: Average number of rooms per dwelling, AGE: Proportion of owner-occupied units built prior to 1940, DIS: Weighted distances to employment centers, RAD: Index of accessibility to radial highways, TAX: Full-value property tax rate per \$10,000, PTRATIO: Pupil-teacher ratio by town, B: $1000(B_k - 0.63)^2$ where B_k is the proportion of Black residents, LSTAT: Percentage of lower status of the population.

Tasks:

- Download the dataset from the VLE.
- Open your Jupyter Notebook environment and import the necessary libraries.
- Load the dataset into your Jupyter Notebook environment.
- Split the dataset into training and testing sets.
- Standardize the features using StandardScaler.
- Build a perceptron-based neural network model.
- Compile the model specifying the optimizer and loss function.
- Train the model using the training dataset.
- Evaluate the model's performance on the test set.
- Experiment with model training by changing the activation function, adjusting the learning rate, or exploring other hyperparameters.