Bilkent University

Department of Computer Engineering

CS 464 Introduction to Machine

Learning

Homework 2 Report
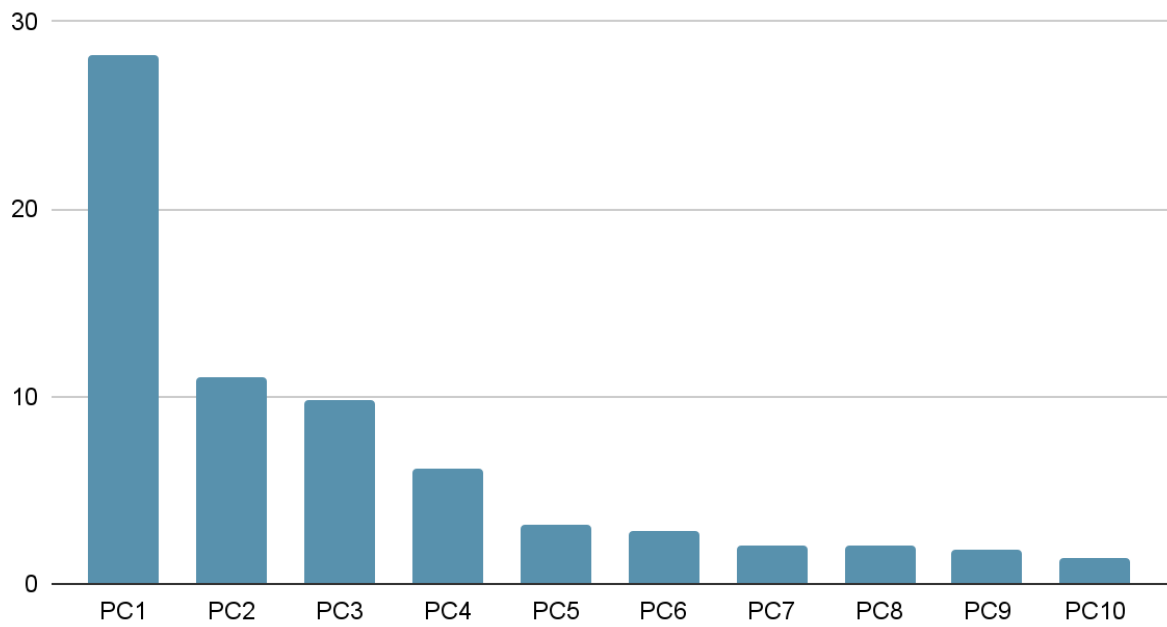
Berdan Akyürek 21600904

Section 2
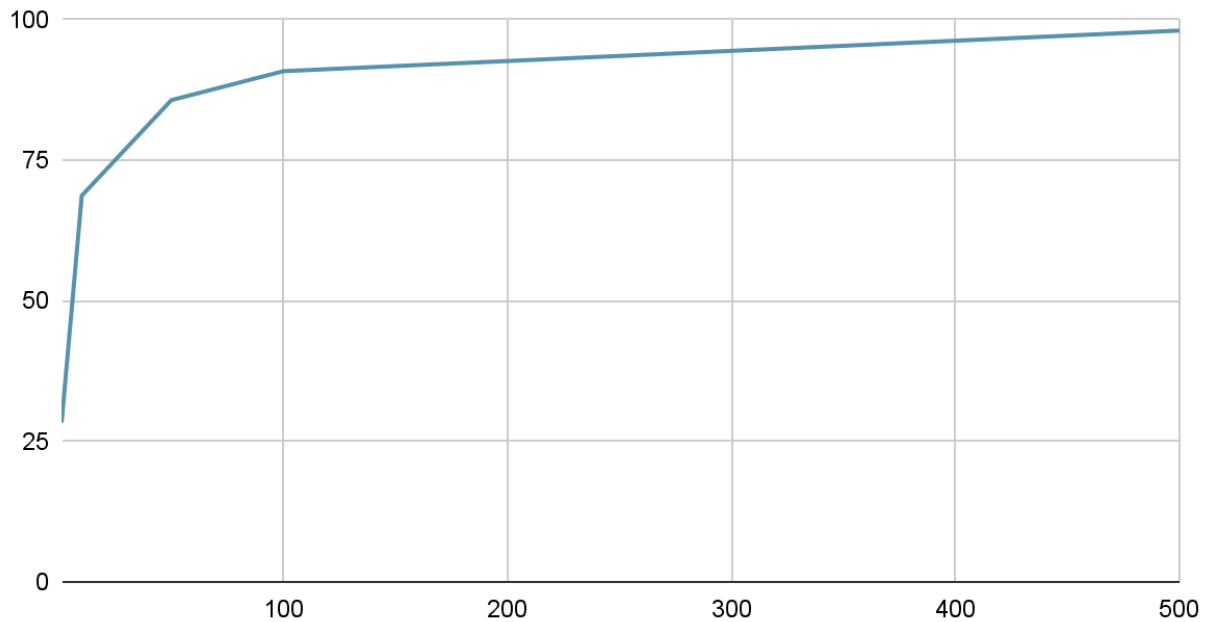
1. PCA

1.1.   PCA with 10 Principal Components

PVE for first 10 PCs

Here are the first principal components. First 10 PC's create a total of 68% PVE.

1.2. k vs PVE

k vs %PVE

As shown above, the increase of PVE with k is high in low k values. The increase gets slower with the increasing k. This is because first PCs are more significant and as k increase, new PCs are less significant.

1.3. Reconstruction of Images

Reconstruction can be done by multiplying the compressed dataset with the feature vector . The images below show the reconstructed images for different numbers of eigenfaces. As the number of eigenfaces increase, the image gets better.
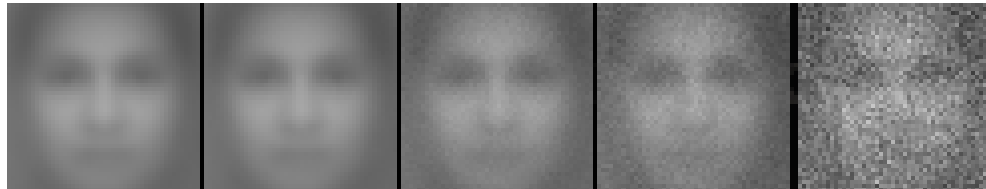
2. Linear & Polynomial Regression

The linear regression is implemented. Here is the data and the model prediction shown by matplotlib.

Price vs LSTAT and the model prediction Plot
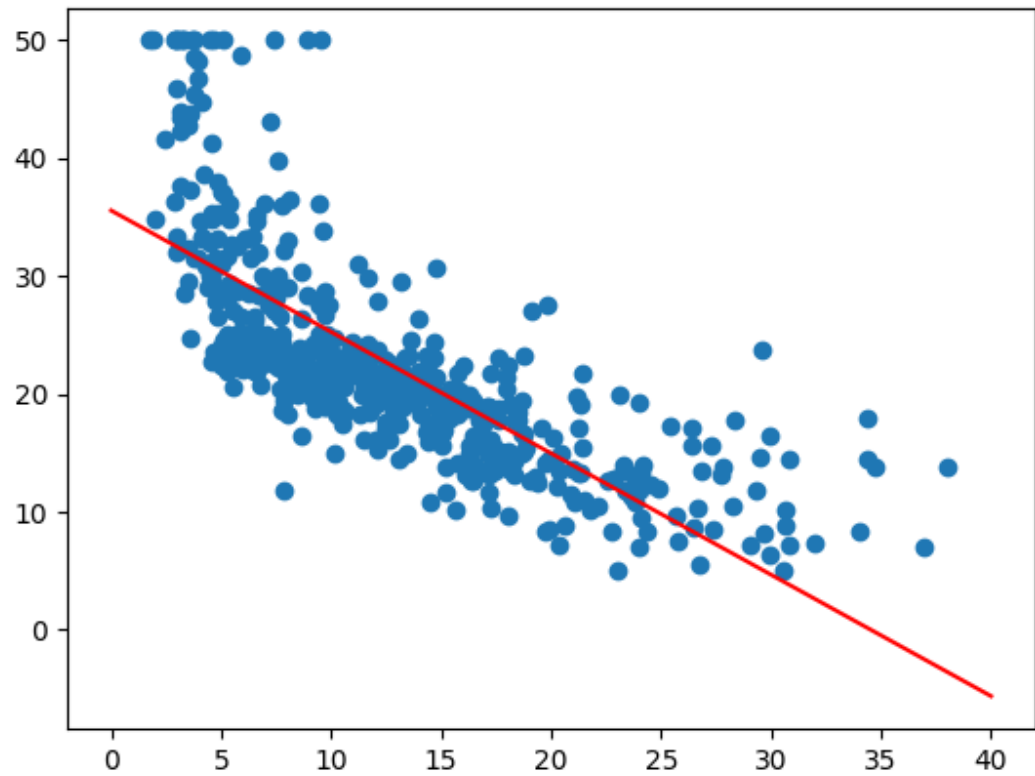
As shown, the model makes a reasonable prediction. At the end of training, the equation for the prediction line is -1.029639x-y+35.560888=0 line.