Homework 2

Due, Monday, December 11, 2017

1. Linear discriminant analysis

(1) (20 points) Implement your own LDA algorithm in Python based on the theory presented in class.

(2) (10 points) Apply your own LDA algorithm to the cell line data in

`SCLC_study_output_filtered_2.csv`

and compare your results with results from

`sklearn.discriminant_analysis.LinearDiscriminantAnalysis`.

2. (70 points) Implement your own neural network for regression purpose in Python. Use the mean squared error as the cost function.

The neural network has two input units (not counting the bias unit), one hidden layer with two units (not counting the bias unit), and two output units. Assume that there is only one sample being

$$x = \begin{bmatrix} 0.05 \\ 0.1 \end{bmatrix}, \quad y = \begin{bmatrix} 0.01 \\ 0.99 \end{bmatrix}$$

Initialize values in $\Theta^{(1)}$ and $\Theta^{(2)}$ to be uniformly distributed random numbers between 0.0 and 1.0.

Implement your algorithm based on the theory presented in class. Plot the total cost vs the iterations as well as every parameter θ vs the iterations.