Learning from Data

Lab Task 2

Banknote Authentication Problem

Posted on December 16, 2022

Due on December 23, 2022

Develop computer program coded by python that detects the genuine banknote using Multilayer layer neural network (MLNN) using scikit-learn.

The online data set of banknote authentication that will be used for your programming task is available at:

http://archive.ics.uci.edu/ml/datasets/banknote+authentication#

Report should include the following:

(i) ML structure design: In your design you should indicate what is the structure of the designed network, i.e., how many neurons in network layer(s), what are the activation functions for each layer, initial set of weights.

(ii) Experimental Design and analysis of the results: To evaluate the performance of your perceptron network, run 50 epochs of training on the training set. After each epoch, compute the network error (proportion of misclassifications) on the test set, without adjusting any weights. Also, compute the error for the training samples in each epoch. Then draw a chart with a horizontal axis titled “Epoch” ranging from 1 to 50, and a vertical axis titled “Error (%).” Then add a line graph showing the network error for the training set as a function of the epoch. Finally, add another line graph showing the error for the test set, also across epochs 1 to 50.

(iii) Draw ROC curve for the above experiments and recommend the best weights of the suggested architecture in (i). (Give explanation)