Pattern Recognition
Department of Electrical and Information Engineering
University of Cassino and Southern Latium, Second Semester 2018
Homework Assignment 2
Assigned 23 may 2018; due 11:59pm, 31 May 2018

Problem 2.1 [**60%**] Consider the dataset contained in the file `hw2data.csv` available on the course site. It contains 8,000 samples coming from a two–class problem, each made of 10 numerical features and a binary label (± 1). Split the data into training and test sets by randomly selecting 25% of the examples from each class for the test set. For the classification of the test data, use TFLearn to train a Multi Layer Perceptron with 10 input nodes, 2 hidden layers and 2 output nodes. Consider the following options:

(a) Weight inizialization:

  (a.1) all the weights set to zero
  (a.2) random values from a uniform distribution
  (a.3) uniform Xavier distribution

(b) Batch normalization

  (b.1) yes
  (b.2) no

(c) Activation function for the hidden layers

  (c.1) ReLu
  (c.2) tanh

Evaluate the accuracy obtained on the test set with the various options and discuss the results obtained. Choose reasonable values for the remaining parameters (e.g. learning rate, batch size, number of epochs, ..) and keep them fixed during the experiments.

Problem 2.2 [**40%**] Use the dataset of Problem 2.1 and perform several splits into a training set and a test set (also with different sizes) to determine which combination of options among the ones you considered in Problem 2.1 ensures the best accuracy. Once you picked out the best model, save it by using the method `tflearn.models.dnn.save`. The saved model must be submitted together with your report and will be run on a separate matrix containing new test data. Your grade will be based on the performance of your classifier on the new test data, which will contain a very large number of examples generated from the same distribution.