COMP 4107 Assignment #2

Due: 29th October 2017 at 11:55 pm

Objective

The primary objective of this assignment is to have the student develop feed forward neural network solutions for the MNIST dataset.

Submission

Submission should be to cuLearn. You are to upload a zip file containing python files and a single PDF file containing experimental results for accuracy and explaining your methodology. Submission is in pairs. One partner should upload a zip file, the other a readme.txt file containing the names and student numbers of both partners.

Description

NOTE: perform your K-fold cross correlation on the training data provided. Provide statistics on the mean classification accuracy. Using a trained neural network, provide accuracy measures on the testing data set provided. You may also want to start by testing your code with a small set of images before training on the full set.

Question 1

Develop a feed forward neural network in python that classifies the images found in the MNIST dataset. You are to train your neural network using backpropagation. You must show that you have:

1. Performed K-fold cross correlation.
2. Used weight decay for regularization.
3. Investigated the performance of your neural network for different (a) numbers of hidden layers and (b) size of hidden layers.

Question 2

Develop a feed forward RBF neural network in python that classifies the images found in the MNIST dataset. You are to train your neural network using backpropagation. You should use gaussian functions as your radial basis functions. You must show that you have:

1. Used K-means to design the hidden layer in your network.
2. Performed K-fold cross correlation.
3. Investigated the performance of your neural network for different sizes of hidden layer.