

Coursework Week 5: Deep Discriminant Neural Networks

This exercise requires you to build and train a deep neural network for classifying the MNIST dataset. The MNIST dataset consists of 60000 28-by-28 pixel images of handwritten digits.

Your network must be built using KERAS. Please see the separate instructions that are available on KEATS for a tutorial on using KERAS. This tutorial describes how to build two networks for classifying the MNIST data: a MLP and a CNN. You can use either of these as a starting point and experiment with making modifications to improve performance. Or you may choose to build your own deep network.

Your neural network will be assessed by testing the accuracy with which it classifies unseen test data ("my testset"). This testing data is distinct from the testing and training data provided as part of the MNIST dataset, but like this data also consists of 28x28 pixel images of hand-written digits. These images have pixel values between 0 and 1, just like MNIST after undergoing the preprocessing described in the tutorial on using KERAS.

Your trained neural network must be saved as a .h5 file and submitted via KEATS. Note it should be possible to test your neural network to predict class labels on a standard PC running Linux without the need for special hardware, such as a GPU or RAM in excess of 16GB. Note also, that you are required to build and train your own neural network, anyone who is found to have submitted a model that they have not trained themselves (e.g. a pre-trained network obtained from the internet) will receive a mark of zero.

Marks will be awarded based on how accurately your neural network performs the classification of my testset. Note that the tutorial on using KERAS explains how to build two networks for classifying the MNIST data: the MLP will classify the standard MNIST test set with an accuracy of about 98% and will classify my testset with an accuracy of about 95%; the CNN will classify the standard MNIST test set with an accuracy of about 99% and will classify my testset with an accuracy of about 94%. Hence, 95% accuracy is considered the baseline and will earn 25% of the available marks. Higher marks will be awarded for accuracies greater than 95%.