ASSIGNMENT 2

Due Date: 16 September 2021

QUESTION 1

You have to create a multilayer neural network with one hidden layer and train it using the gradient decent algorithm. You have to submit your code and your findings on the completed template. Here is the case study you should use:

Character classification: Provide the network with a vector of length n x m which contains data of an n x m grid representing a letter. For example, the letter F would have a grid:

11111
10000
11100
10000
10000

and corresponding vector: **11111**0000**111**00**1**0000**1**0000.

Train your neuron to recognize each letter of the alphabet and output a 5 digit binary number corresponding to each letter, i.e. when presented with the letter A it should output 00001, for F it should output 00110 and for Z it should output 11010. The output layer should thus have 5 neurons.

You are required to investigate the generalization ability of the network. For example, a character classification network should be able to correctly classify letters that are formed slightly differently:

11111
10000
11000
10000
10000

11111

10000
11111
10000
10000

0**111**0
10000
11100
10000
10000

You should further investigate how the training time and generalization ability of the network can be improved by making use of at least 3 of the following techniques: Prevention of overfitting, noise injection, appropriate weight initialization, dynamic learning rate, momentum and network architecture.

Clearly compare the performance of the various approaches in your report. A text file that contains character profiles for the uppercase roman alphabet is provided. However, feel free to create your own vectors if you prefer.