Comp3220 Machine Learning Assignment

Due Date: November 27th 2020

Time: 11:00 pm

Marks - 100

MNIST dataset is a popular dataset of hand written digits that is used very frequently for Machine Learning exercises. http://yann.lecun.com/exdb/mnist/

Your group has been tasked with creating a neural network classifier that can classify images of written binary digits (1 or 0). This data has all numbers (0 to 9) but for this exercise we will filter out only 0s and 1s.

You have been provided a python notebook and you have been asked to do certain tasks.

1. Filter 0s and 1s for test dataset.
2. For most machine learning algorithms the values need to be transformed. In the dataset every x value is a pixel which can contain numbers in the range 0-255. You need to scale these numbers between 0-1 (0 will be converted to 0, 255 to 1 and 250 to 0.98).
3. The shape of you data is (N, 28, 28) and you want to convert it to (N, 784). Use the reshape command to convert 2D to 1D.
4. Create the Neural Network model. Set up the number of layers, number of node and activation functions.
5. Compile the model with the following hyper parameters, Optimizer – SGD, loss function – binary cross entropy, metrics – accuracy.
6. Fit the model on the relevant data.
7. Evaluate the model and print the accuracy.

[90 marks]

8. A bonus question has been included in the notebook. On the same datset try using logistic regression instead of neutral network.

[10 marks]

This assignment is to be done in pairs (group size of 2). On Ourvle one student should submit the completed notebook (ipynb). Make sure the id numbers of both persons are included in the file as a comment in the first line.