School of Computer Science and Applied Mathematics
University of the Witwatersrand, Johannesburg

ADAPTIVE COMPUTATION AND MACHINE LEARNING (COMS4030A/COMS7047A)

Assignment II

Submission due date: 22nd May, 2022, EOD

May 5, 2022

1 Description

Assignment II will consist of (only) a programming exercise on the topic: Neural Networks. Tasks include implementing a neural network from first principles and exploring use of different activation functions and different network architectures. You are free to use the same dataset from assignment 1B if its still applicable. Note that this assessment will count 10% towards your final mark.

1.1 Submissions:

1. jupyter python notebook containing your neural network implementation along with other components

Submission link will be posted on Ulwazi.

1.2 Grading:

Grading for implementation will be based on the following exercises:

1. Basic implementation of neural network trained using back-propagation (15 points)
   - Provide clear comments for each sections/phases of your code. eg: If your are initializing the network weights between [0,1] clearly state it in your comments.
2. Exploring the effect of different activation functions (eg. linear, sigmoid, tanh and ReLU) (10 points)
   - You are required to implement at least two activation functions and provide visualizations to help understand their impact/use.
3. Exploring the effect of network size on generalizability (eg. number of hidden layers, number of hidden neurons) (10 points)
   - You are required to explore at least two options (eg. two hidden layers vs one hidden layer, x neurons vs y neurons in the hidden layer/layers.
4. Effective use of data visualization and analysis of the results to understand the working of algorithm and other steps (15 points)
   - This is applicable to all the above stages. eg. learning curves, no. of hidden layers/neurons vs convergence, activation functions etc. 5 points will be allocated to each of the above 3 stages.