Homework 3
Due: 11:59pm February 18

1. (20 pts) Program a neural network that allows the user to specify the numbers of inputs, outputs, layers, neurons of each layer. Train your network with at lease one datasets in Homework 2 and report the differences in the results for different number of neurons.

2. (20 pts) Program neural networks that use sigmoid, tanh and ReLu functions as the activation functions. Compare the three neural networks with three different activation functions and report performance change if any.

3. (10 pts) Program a neural network applying Softmax on the outputs and using cross entropy as the loss function for the backpropagation.

4. (10 pts) Modify your gradient descent backpropagation algorithm to stochastic gradient descent algorithm for the neural network training.

5. (10 pts) Preprocess your data before training. Report the training results with different preprocessing approaches. Report performance change if any. (Implement centralization and normalization)

6. (10 pts) Implement regularization for the weights in your neural network training. Report performance change if any.

7. (20 pts) Implement dropout in your neural network. Report performance change if any.