Deep Learning With Tensor Flow 1 (CSE 3793)

ASSIGNMENT-1: INTRODUCTION TO NEURAL NETWORK

Instruction:

- **Submit one well-structured notebook per task.**

- **Provide brief discussion (2-5 lines) for each experiment and final instruction.**

1. Write a Python code to build a feed-forward neural network for AND, OR, and NAND with a single-layer perceptron from scratch.

2. Write a Python code to show different activation functions with a graphical representation.

3. Write a Python code to implement the binary cross-entropy loss function from scratch.

4. Write a Python code to implement the Stochastic Gradient Descent Optimization technique.

5. Build a multilayer perceptron from scratch using numpy and compare it with Keras.

6. Write a Python code to classify the XOR function and use sigmoid, ReLU, and LeakyReLU in the hidden layer of a neural network. Discuss the accuracy of different activation functions used in the hidden layer. Also, show the comparative analysis in a graph.

7. Write code to define a simple neural network in TensorFlow. Use the MNIST dataset, reshape the data to 610,000 x 784, normalize the input, and build and train the model using the SGD optimizer and categorical cross-entropy as the loss function to compute the accuracy. Also, find the test accuracy.

8. Train the MLP as specified in Q7 with regularization (dropout and L2), different optimizers, and discuss a detailed comparative analysis.