EEL 4810 Homework 2

1. Deep Neural Network Implementation (50 pts)

Set up Python and PyTorch, then implement a deep neural network with 5 layers. Use the dataset's second, third, and fourth columns as input to predict the label in the fifth column. Randomly split the data, allocating 90% for training and 10% for testing.

Submission requirements:

- Source code for training the neural network and export the model as .pt/.pth (30 pts).

- A test script that loads the trained model and evaluates it on the test dataset (10 pts).

- Visualization of training and validation losses per epoch using matplotlib or Tensor-Board (10 pts).

2. Experimental Analysis (50 pts)

Provide comparative analyses by experimenting with the following configurations:

1. With and without normalization (standard scaling) (10 pts).

2. With two different mini-batch sizes (5 pts).

3. With two different learning rates (5 pts).

4. Using different optimizers: compare Momentum, Adam, RMSProp, and SGD (10 pts).

5. Using two different weight initialization approaches: random initialization and Xavier (Glorot) initialization (10 pts).

6. With and without L2 regularization (weight decay) (5 pts).

Additional Instructions:

- Provide clearly commented code demonstrating each configuration option (commenting out alternative configurations).

Note:

- Do not copy anyone else's work.

- Do not allow anyone to copy your work.

- Submissions will be checked thoroughly.