Lab Assignment 05

Total marks: 10

Instructions:

1. Complete the entire code provided in the template, make sure everything runs and the desired plots show up. You will be expected to submit this IPython notebook during submission.

1 Neural Networks [10 Marks]

Apply the forward and backward propagation algorithm discussed in the lab session to classify the Fashion-MNIST image data. Fashion-MNIST is a fashion product image dataset comprising of $10{,}000 - 28 \times 28$ training images with 10 categories of fashion products. Figure 1 shows all the labels and some images of each label in the Fashion-MNIST dataset.

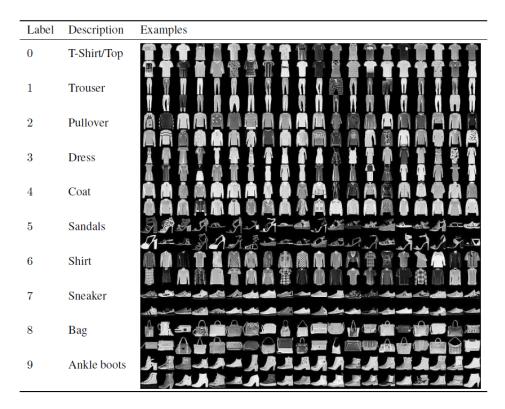| Label	Description	Examples
0	T-Shirt/Top	
1	Trouser	
2	Pullover	
3	Dress	
4	Coat	
5	Sandals	
6	Shirt	
7	Sneaker	
8	Bag	
9	Ankle boots	

Figure 1: Fashion-MNIST dataset.

The training and testing datasets are provided in the files titled 'fashion-mnist_train.csv' & 'fashion-mnist_test.csv' respectively. Carry out following tasks as assignment problems:

1. Inspect and plot some portion of the training data. Segregate the data into two separate variables consisting of 'feature matrix' and corresponding 'labels' (first column of the data). Normalize the feature matrix data (same way as you did in Assignment 3). Plot some example images along with their descriptive labels. [1 Marks]

2. Classify the data-set using two neural networks, the first with a single hidden layer, and the next with two hidden layers. The number of nodes in the hidden layer/s is your choice discussed in the class and calculate the optimized weights and biases and training set accuracy for the model (take regularization parameter $\lambda = 0.1$. [5 Marks]

3. Apply the trained model algorithm on the normalized test dataset and predict the testing accuracy of the model (Use the optimized weights calculated using training data). [2 Marks]

4. Use the test data to plot few images along with the model predicted labels/classes. [1 Marks]

5. Compare how the two NNs fare in terms of prediction accuracy for the same number of optimisation iterations and comment what you can conclude from that. [1 Marks]