Lab Assignment 05

Total marks: 10

Instructions:

1. For questions 1, 3, 4 and 5, compile into a single PDF (Figures.pdf) the relevant code snippets along with the displayed portion of data and submit in the gradescope.

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.

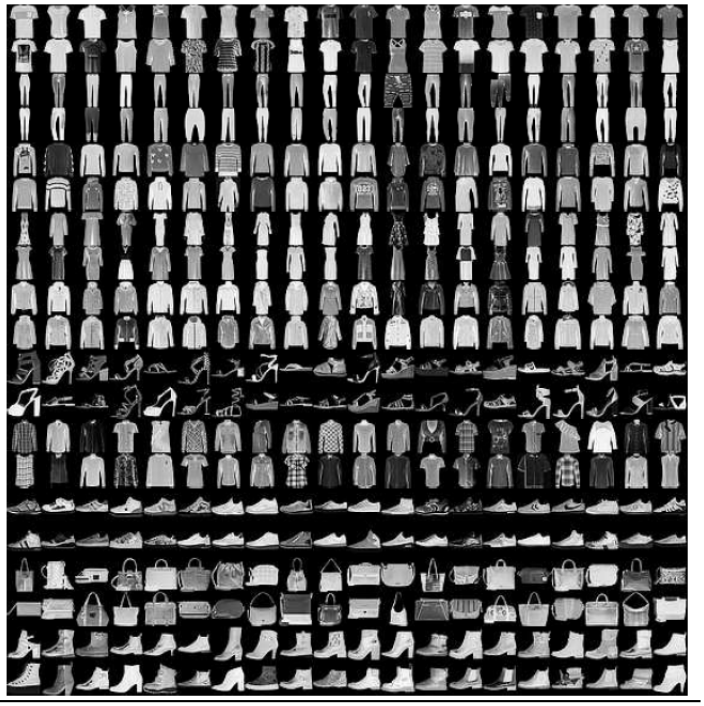
Label	Description	Examples
0	T-Shirt/Top	
1	Trouser	
2	Pullover	
3	Dress	
4	Coat	
5	Sandals	
6	Shirt	
7	Sneaker	
8	Bag	
9	Ankle boots	

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 dataset using neural network based logistic regression algorithm discussed in the class and calculate the optimized weights and biases and training set accuracy for the model (take regularization parameter $\lambda = 0.1$. [4 Marks]

3. Plot the cost history (J) vs number of iterations for all the class labels in a single plot. [2 Marks]

4. 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]

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