Lab Assignment 04

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 Multiclass Classification [10 Marks]

Apply the one-vs-all multiclass 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.

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 one-vs-all multi-class classification algorithm discussed in the class and calculate the optimized weights and training set accuracy for the model (take regularization parameter $\lambda = 0.1$ and use Conjugate Gradient algorithm for optimization). [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]