CSCI 631 Homework 4

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Problem 1:

1. The network parameters of the convolutional neural network developed are as follows:
   Batch size = 20
   Number of epoch = 20
   Learning rate = 0.01
   Training : Validation ratio = 80:20

2. Accuracy Scores:
   a) Average Training accuracy: 63.56%
   b) Average Testing accuracy: 72%

   As we can see that the training and testing accuracies mentioned above are significantly different. This could be mainly because of two reasons:
   (i) The scores calculated are averaged over the dataset and epochs. Therefore, the training accuracy mentioned above is the average accuracy score over all the epochs in training phase. The model might have performed poorly in some of the epochs and that is why it's accuracy score is less than that over the testing dataset.
   (ii) The performance of any neural network depends on its hyperparameters. This neural network has performed in such a way with the hyperparameters mentioned above. An extensive trial and error with hyperparameters might give us some better results than this.

3. Comparison with the networks developed in homework 3
   (i) There is marginal difference between the accuracy scores of logistic regressor from homework 3 which had 70% accuracy while the current convolutional neural network has 72% accuracy score.
   (ii) The neural network developed in homework 3 performed poorer than convolutional network as its accuracy score was just 63% as compared to 70% in this case. Even the neural network with regularization had just 65% accuracy which is still less than current score.
   (iii) Out of all the SVMs developed in homework 3, only the one with 'RBF' kernel performed close to CNN with the score of 70.33%. All the other SVMs had lesser accuracy scores.
   (iv) Even the neural network developed using ReLU activation function in homework 3 couldn't performed as well as this CNN, as its accuracy score was just 64%.