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Problem Set 7

0) a. See ps7.py

b:



- 1) a. See predict.py for implementation
b.

Question 1-B Accuracy: 0.7541538461538462

- 2) a. See nnCost.py for implementation
b.

Question 2-B :

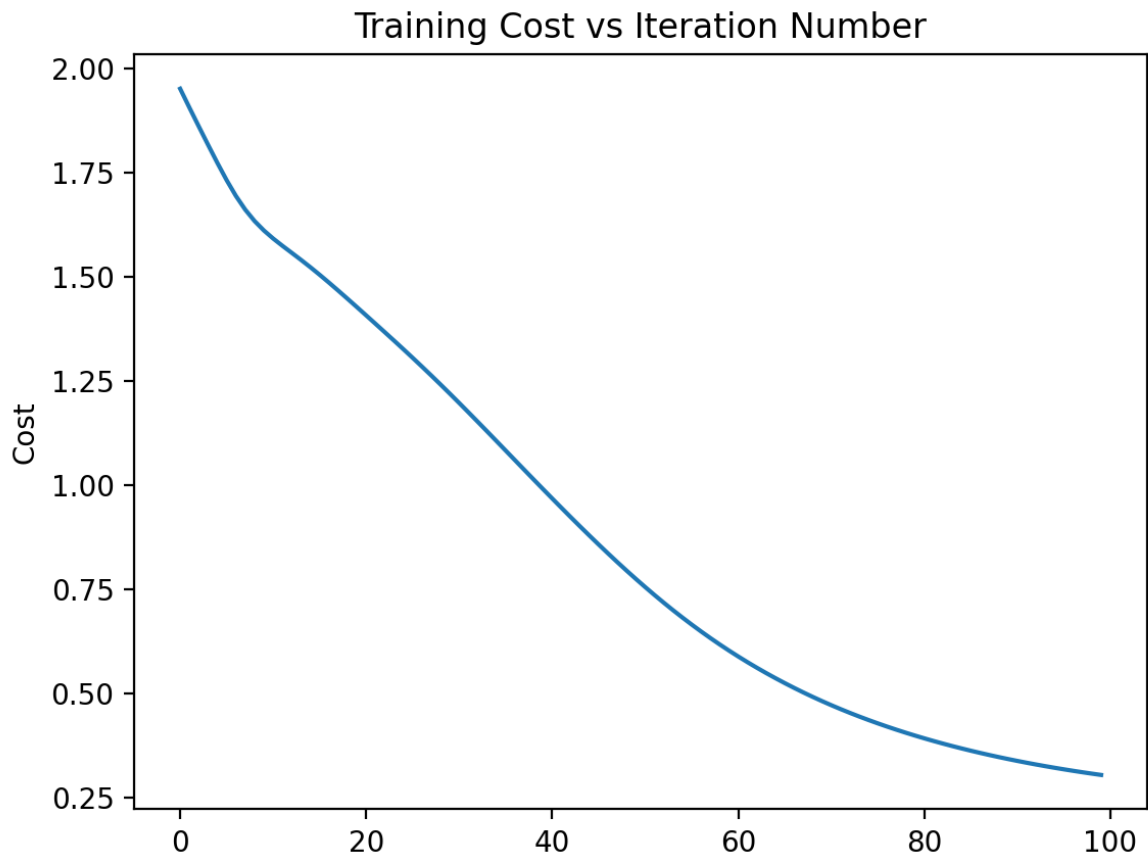
Lambda	Cost
0.1	1.1312
1	1.14756
2	1.16573

3) See sigmoidGradient.py for implementation

Question 3 :

z	g_prime
-10	4.53958e-05
0	0.25
10	4.53958e-05

- 4) a-c: See sGD.py for implementation
d. I used a value of 0.01 for the learning rate (α)
e.



I used 1/52 of the training samples and a value of 0.1 for λ , and ran sGD for 100 epochs.

5)

Lambda	Epochs	Training Data Accuracy	Cost (Training)	Testing Data Accuracy	Cost (Testing)
0.1	50	0.888	0.846767	0.848	1.095
1	50	0.888	2.65984	0.848	2.86277
2	50	0.88	4.68109	0.856	4.81393
0.1	300	1	0.317894	1	0.348807
1	300	1	3.00858	1	3.21905
2	300	1	5.99111	1	6.41394

The accuracies are pretty high. It seems that a lambda value of 2 and an epoch value of 300 improves the accuracy of the labeling outcomes for both training and testing data. Though, unusually, there seems to be no errors after increasing the number of epochs to 300, so it seems that increasing the number of epochs has a larger effect on the accuracy of the nn. As lambda increases, the cost increases. As the number of epochs ran increases, the cost also increases. The best results were obtained with a lambda value of 0.1 and epoch number of 300 (lowest cost with highest accuracy).

6)

The accuracies are not very high, which may be a result of the network not being complex enough. It could be also that not enough epochs were used to train the neural network.