

Machine Learning

Assignment Report (2B)

Team members:

Nipun Wahi Hrithik Kulkarni Mir Ameen Mohideen
2018A7PS0966H 2018A7PS0278H 2018A7PS0487H

ANN (Artificial Neural Network)

Data pre-processing:

Reading the data as a pandas data frame was followed by separating the rows based on the target variable and storing those indices in a NumPy array. The data was normalised to make each column to one scale.

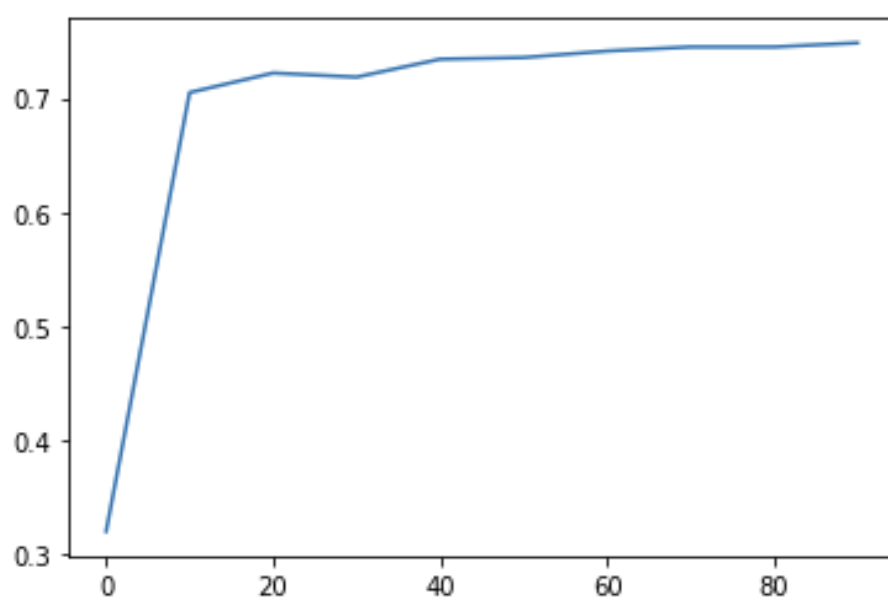
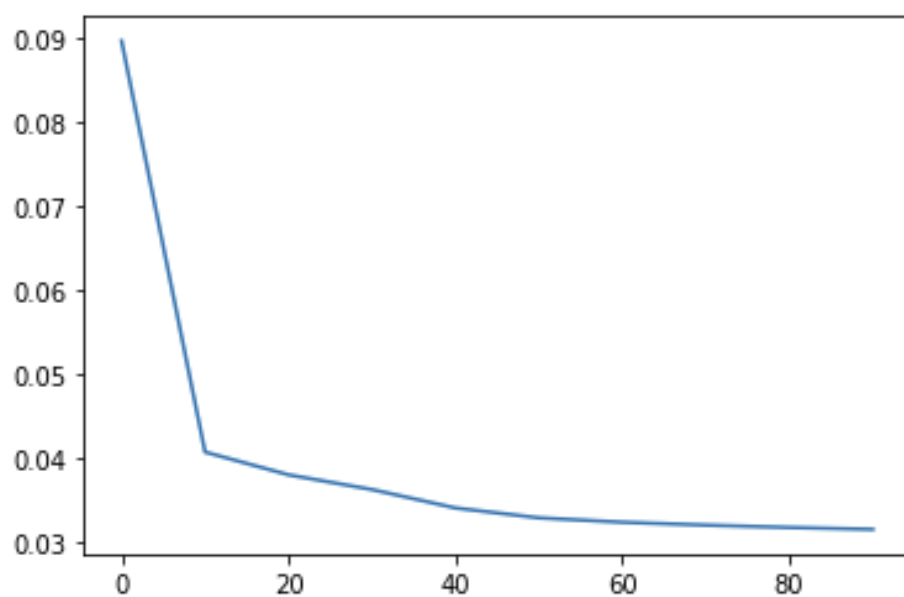
Model and Implementation details:

First, we have the input layer and it's shape is 6 dimensional vector as input and 30 dimensional vector as output. Then we have used 1 or 2 layers , the first hidden layer in 1 layer model is 30x10 with sigmoid as activation and then the output layer which is passed to sigmoid and softmax for 10 categories output. In 2 hidden layer model the first layer is 30x20 and second is 20x10 , both outputs are passed by a sigmoid also. The output layer is same as the 1 hidden layer model. We used 0.1 ,0.05,0.01 as different LR.

Plots

```
run(trX,trainY,tX,testY,100,0.1)
```

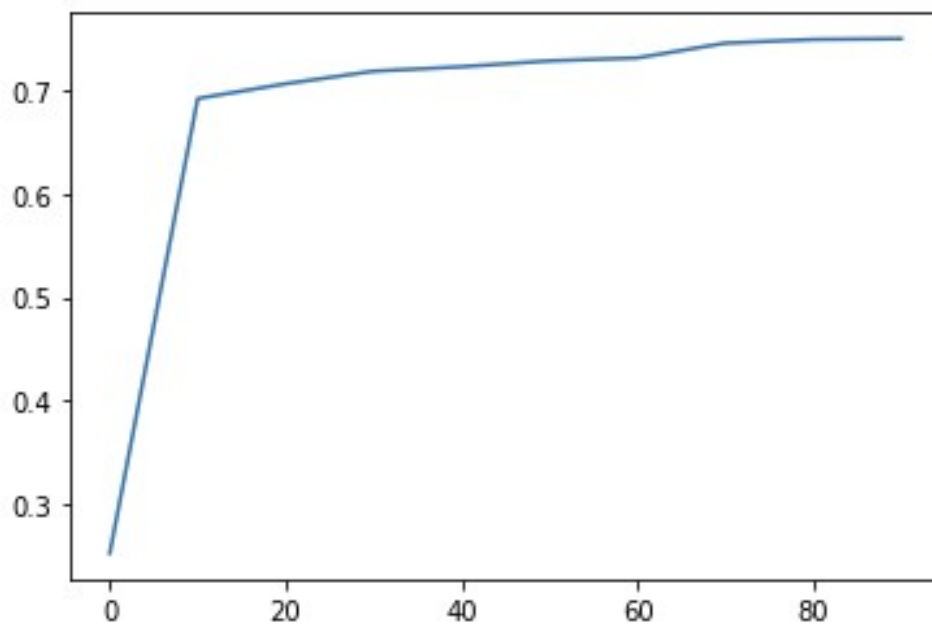
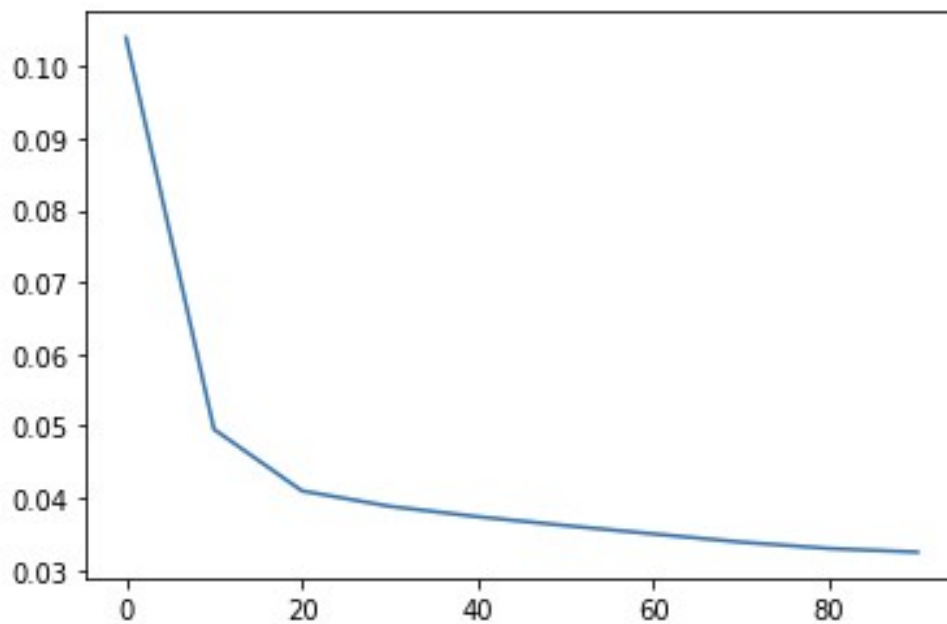
```
0.08977104091783078  
0.040670614943717945  
0.03795232819251344  
0.036195114117482045  
0.0339910783274482  
0.03281114945830165  
0.03229046440088791  
0.03194361269177718  
0.03166431921439728  
0.031441934607333535
```



```
0.7383333333333333
```

```
run(trX,trainY,tX,testY,100,0.05)
```

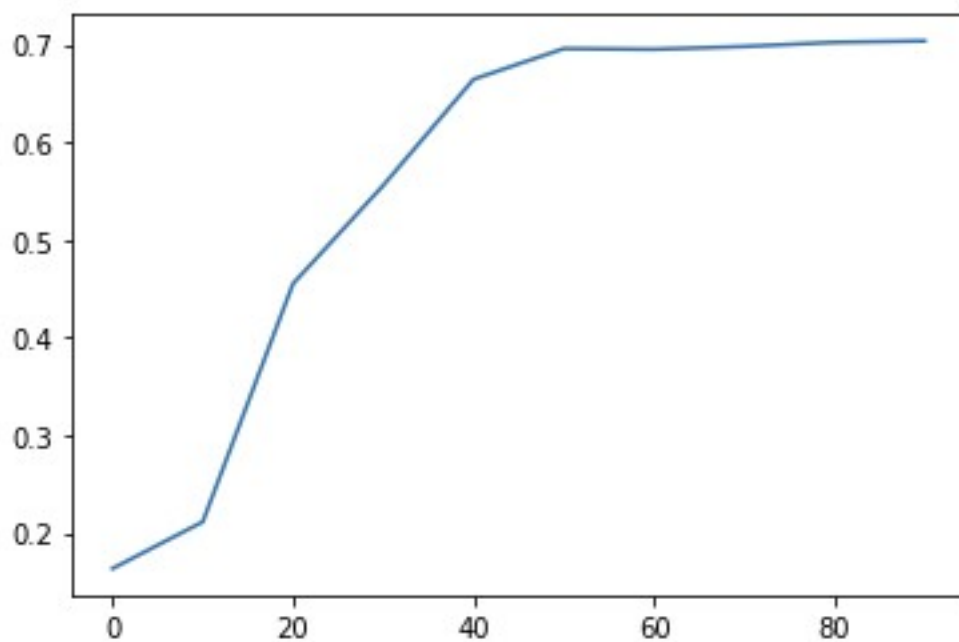
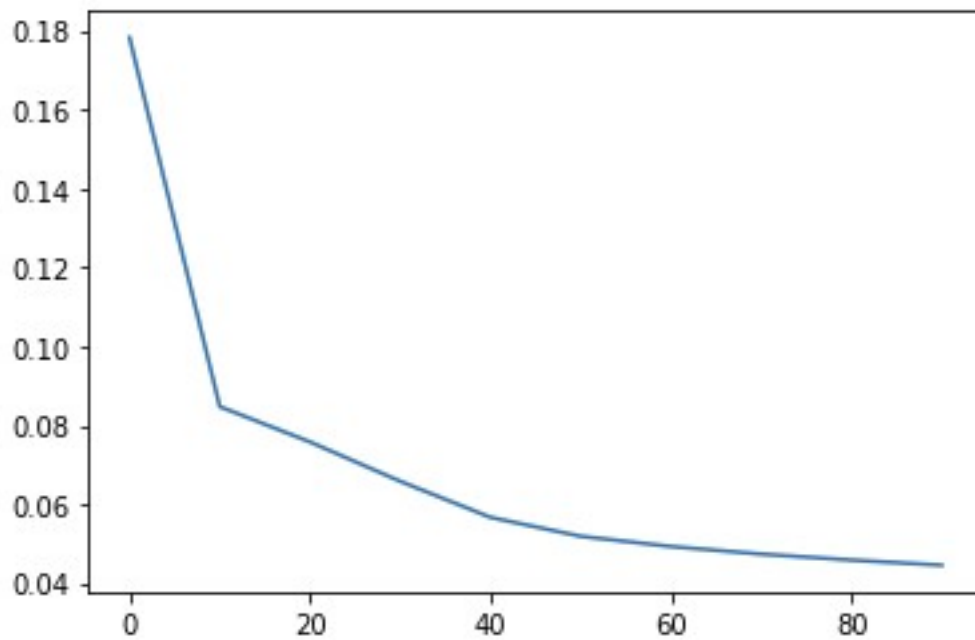
```
0.10398847205041306  
0.0495539331838162  
0.04099073442537945  
0.03883997217317099  
0.037394949668268875  
0.03616741944831442  
0.03500386030632301  
0.033863645090670365  
0.03297326265460779  
0.0324774990524688
```



0.75

```
run(trX,trainY,tX,testY,100,0.01)
```

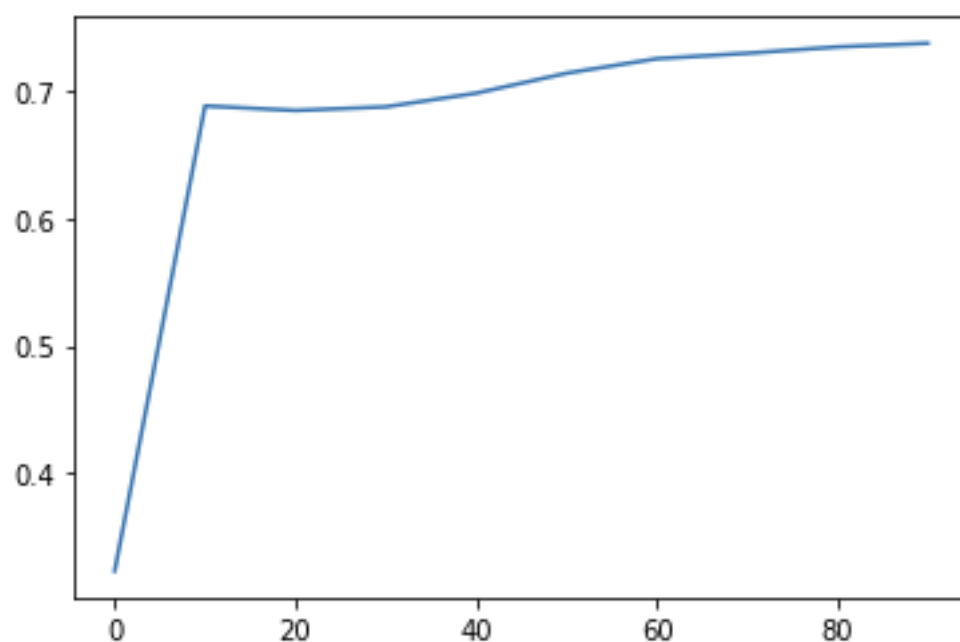
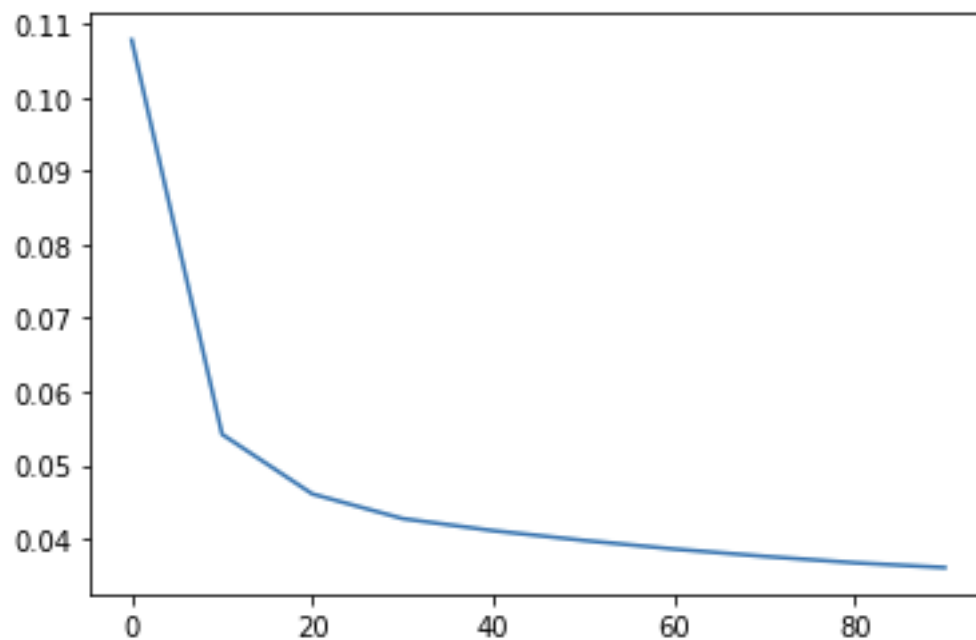
```
0.17822774298047842  
0.08473558636932076  
0.07579176279663404  
0.06581829407535024  
0.05667952513521921  
0.051887953574636214  
0.04930160776281043  
0.04738055247960308  
0.045866708827573946  
0.044555795715244165
```



0.66

```
runsingle(trX,trainY,tX,testY,100,0.1)
```

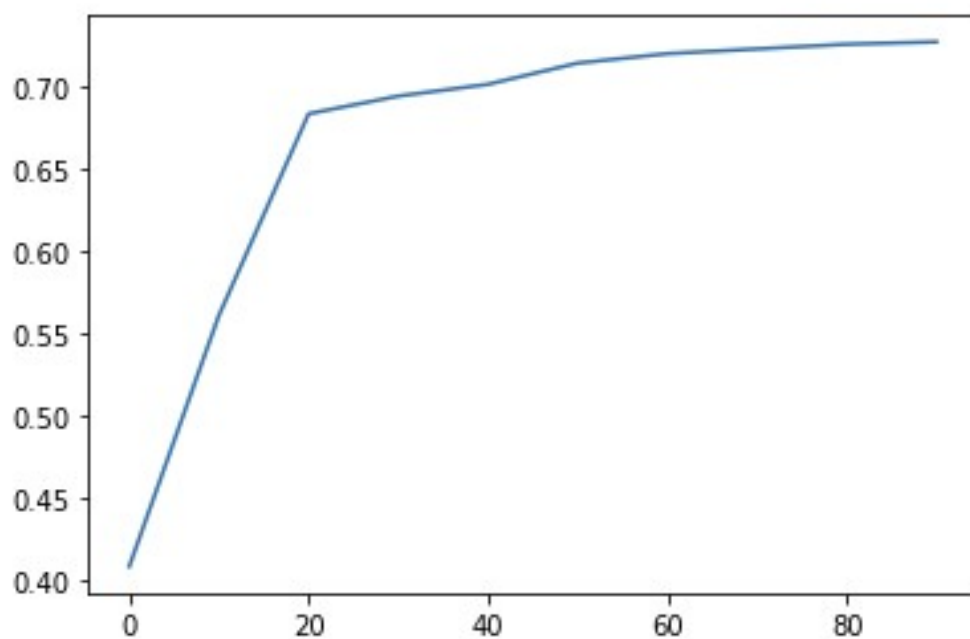
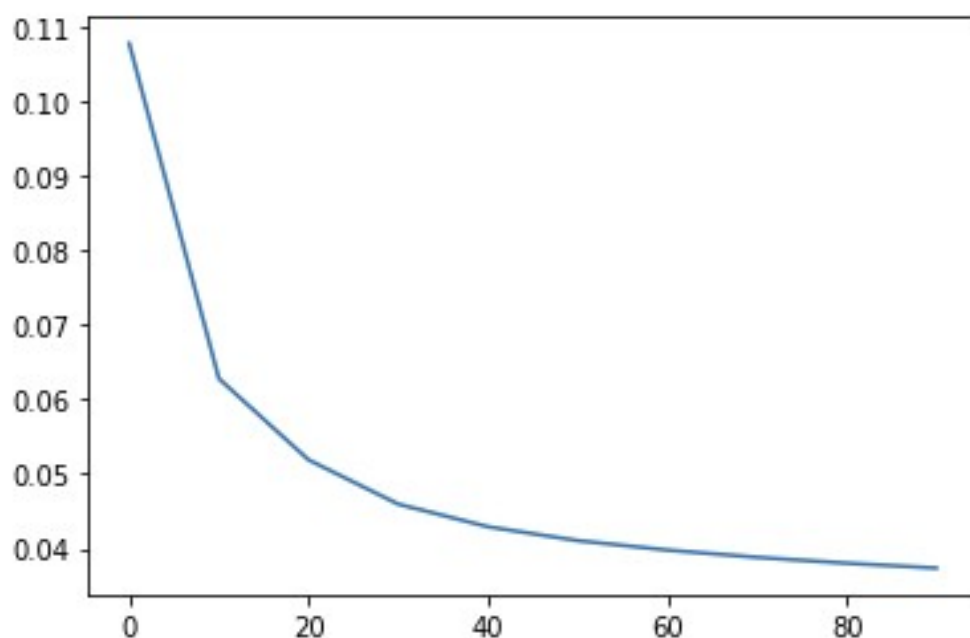
```
0.10785783721941525  
0.05419005697090375  
0.04606522019893379  
0.042709804733955914  
0.041070869561241646  
0.03974921712780163  
0.038576757241826604  
0.03758075441084069  
0.03670523967981442  
0.03605093490755506
```



```
0.7116666666666667
```

```
runsingle(trX,trainY,tX,testY,100,0.05)
```

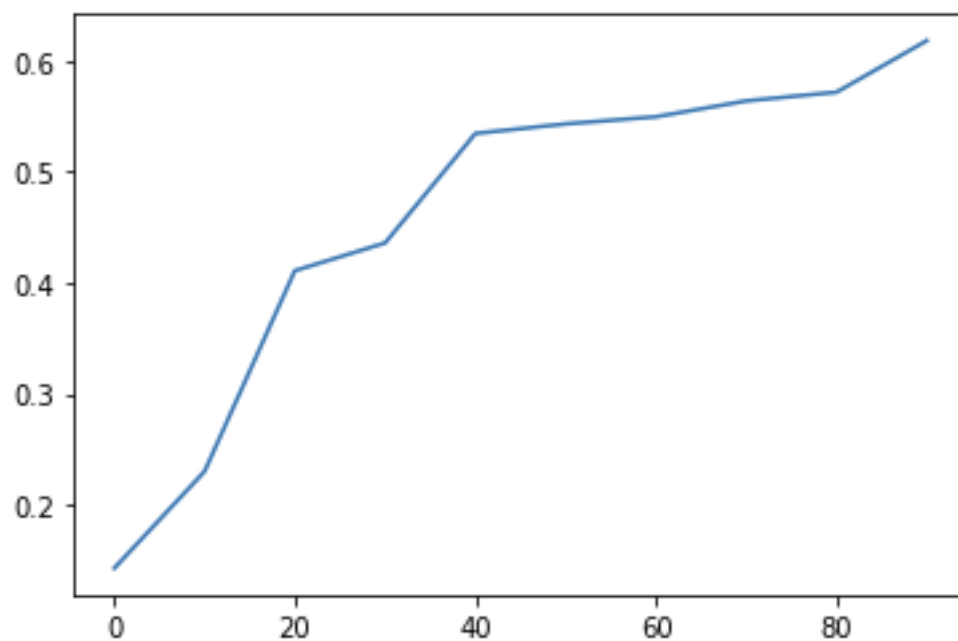
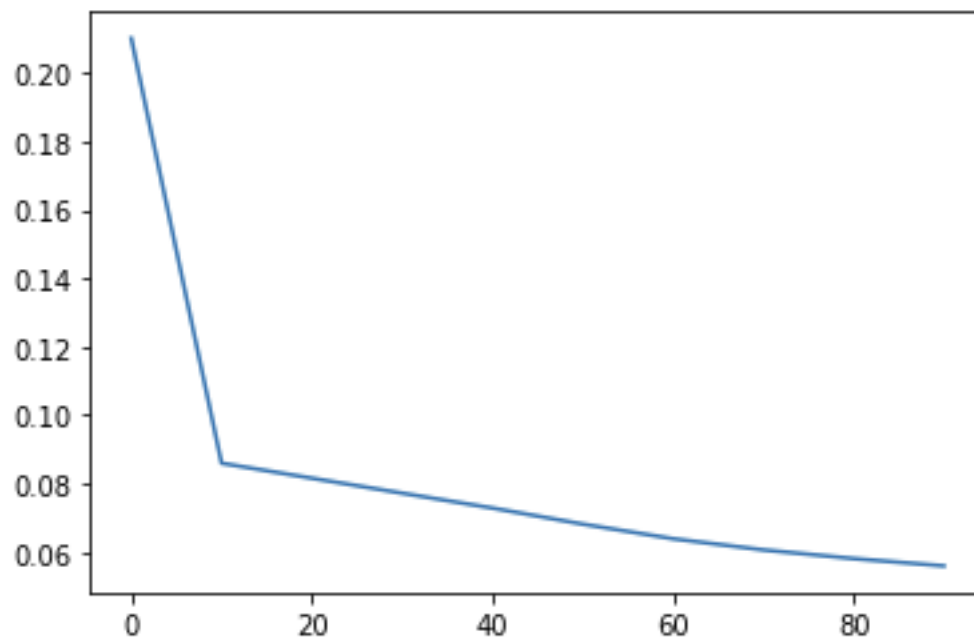
```
0.1078550904217328  
0.0628106617140903  
0.051898632931850756  
0.045950911164491785  
0.04291188409604102  
0.04104878027204864  
0.03977632161466216  
0.038803641792150866  
0.038014668059671075  
0.03735844604839605
```



```
0.6983333333333334
```

```
runsingle(trX,trainY,tX,testY,100,0.01)
```

```
0.21011728664868068  
0.08596888477178276  
0.08159328467592691  
0.07721806481234524  
0.07286970384030504  
0.06817861012384052  
0.06390465749373464  
0.0606450660059695  
0.058107149475393347  
0.05597459726925888
```



```
0.6383333333333333
```

Results:

With 1 hidden layer the best accuracy on test dataset was 71% with 0.05 LR and 100 epochs. With 2 hidden layers it was 75% ,so this shows that model became more precise after we increased layers.