Handwritten Digits Classification using Neural Networks

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In this project we have implemented Multilayer Neural network and evaluate it's performance on the MNIST dataset. We used the same network to also compare it's performance on CelebFaces Attribute Dataset to identify who all wore spectacles in the dataset.

Tuning Hyper parameters:

Following are the top hyper parameter combinations that are working the best for this dataset. The best hyper parameters can be achieved by **GridSearch** of different values of Lambda value and No. of neurons.

	Acc	Layer	Time	lambdaval
29	93.34	20	115.880328	10
30	93.33	20	116.140313	20
31	93.29	20	125.382484	30
28	93.24	20	129.878582	0
32	93.15	20	124.002306	40

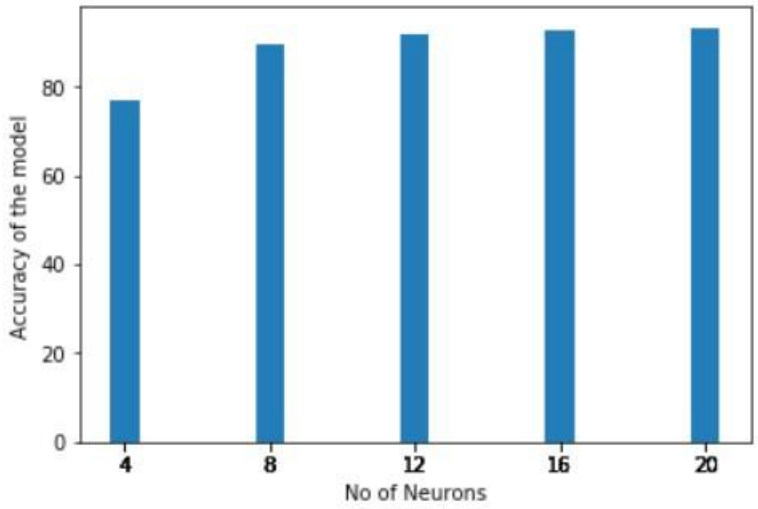
Tab – 1

Following combination gives the best accuracy on the test set :

No. of Neurons : 20
Lambda : 10

The above combination takes ~115 seconds to run and has an accuracy of 93.34%

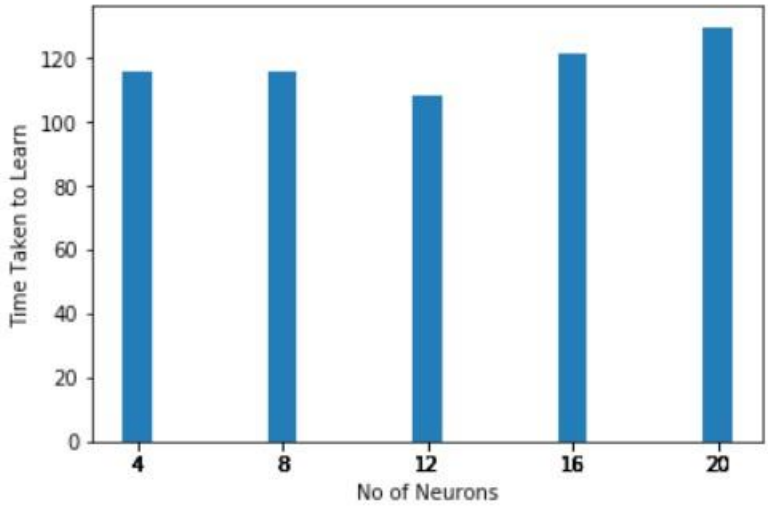
Comparison between no. of neurons and Test set accuracy:



Inference: As it is expected, with the increase in no of neurons in the hidden layer the accuracy of the model increases.

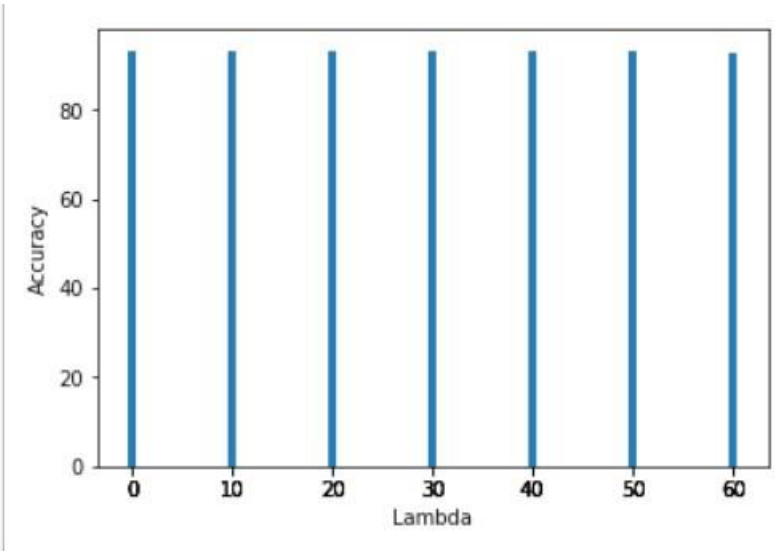
Thought the accuracy plateaus after 12 neurons, the general trend indicates that with the increase in no. of neurons, accuracy of the model increases.

Comparison between no. of neurons and Time Taken:



Inference: As it is expected, with the increase in no of neurons in the hidden layer the time taken for the model to run increases.

Comparison between Lambda and Accuracy:



Inference: Though it is not very clear which the best lambda is here, from the tab – 1 we can say that 10 gives best test accuracy.