AI Assignment – 2 Report

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OUTLINE:

We need to train a multilayer perceptron with one hidden layer. Number of neurons in hidden layer is varied from 5 to 8.There are two loss functions 'Sum of squared deviation' and 'Cross entropy loss function'.Sigmoid function is used as the activation function in both codes.
There are two stopping criterion-
1. Number of epochs = 100
2. $||\Delta W|| < \varepsilon = 0.01$
There are 16 attributes are given in the training set which are classified into 10 classes.

OBSERVATIONS:

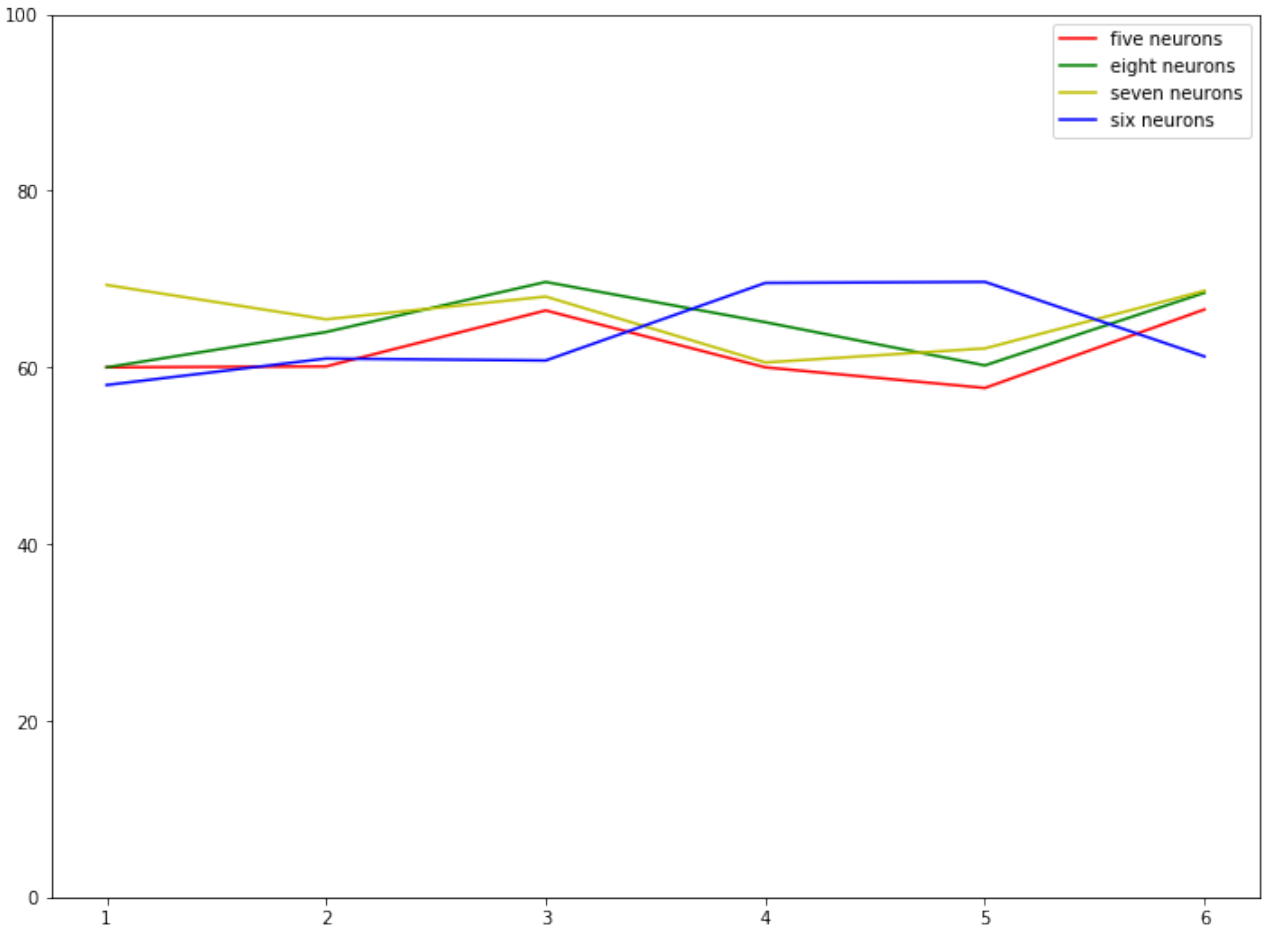
There are two codes.Both code initially have random generated weights b/w -1.0 to 1.0. The first one has loss function as 'Sum of squared deviation' and the stopping criterion is 100 epochs.
The second one has the loss function as 'Cross entropy loss function' and the stopping condition as '$||\Delta W|| < \varepsilon$'.

cross_en_epochs.c :

- Loss function = Cross entropy function
- Stopping Condition = 100 epochs
- Learning rate = 0.001

In code 1 the accuracy is very less relative to code 2, due to training is for very less epochs.
However the accuracy can be increased by reducing the value of epsilon and increasing the learning rate. The accuracy ranges from 9% to 25-30%, for the given conditions.

Graph b/w accuracy and number of neurons in hidden layer for code 1.

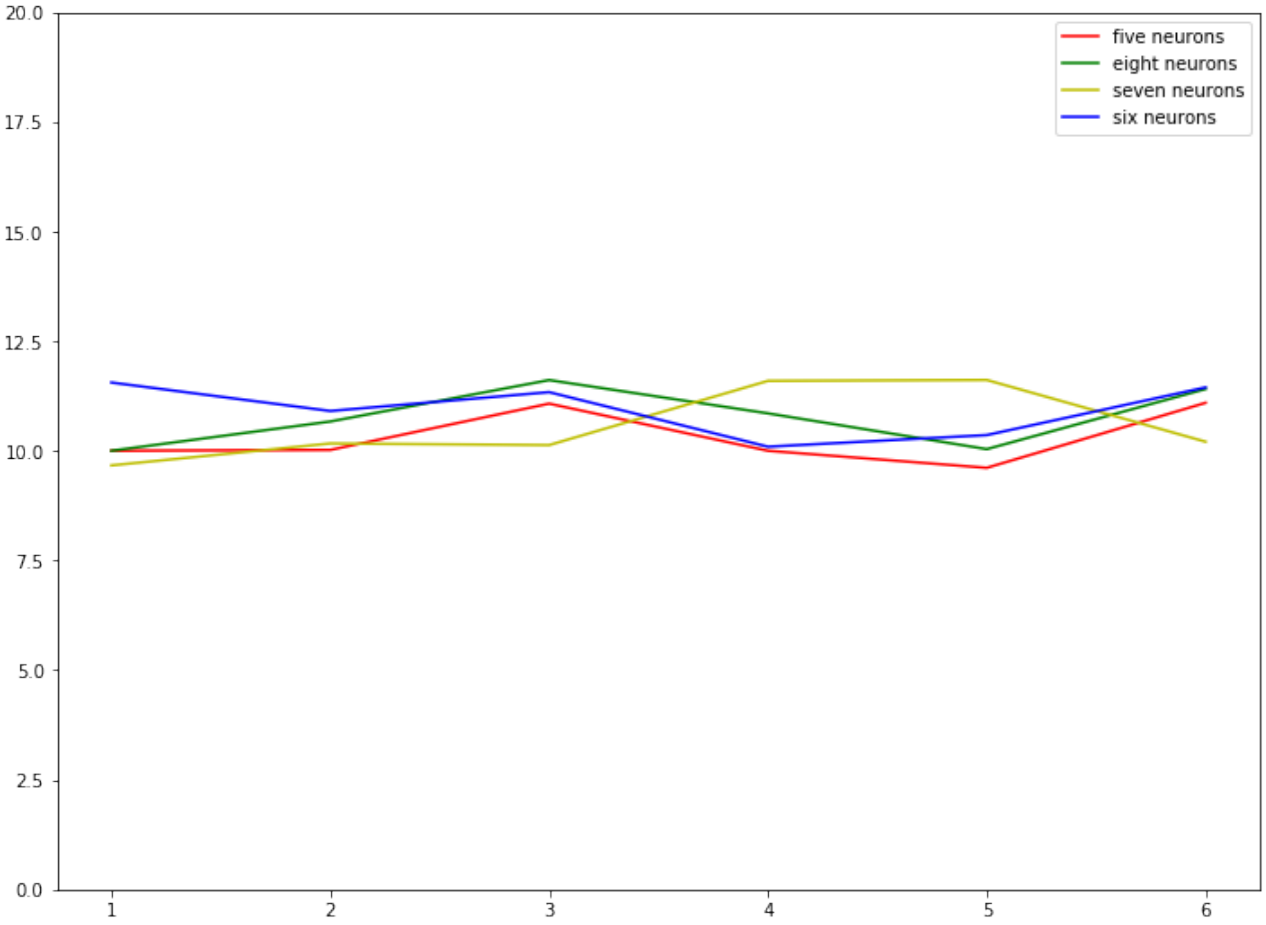


Graph b/w accuracy and number of neurons in hidden layer (learning rate = 0.01)

sq_weight.c :

- Loss function = Sum of squared deviation
- Stopping condition - $\| \Delta W \| < \varepsilon = 0.01$
- Learning rate = 0.001

At learning rate 0.001 and 100 epochs, we get a maximum accuracy of 40%-60%.A higher accuracy can be achieved by increasing the learning rate or number of epochs.
If we increasing learning rate by 10 times then the maximum accuracy obtained is 70% to 80%.
We get different results of accuracy from 20% to 80% as initial weights are randomly generated.
Neurons in hidden layer are also randomly chosen b/w 5 to 8.



Graph b/w accuracy and number of neurons in hidden layer for code 2.