SMAI ASSIGNMENT-2

V.Sai Harsha
201501157

1.1)Image is 1.png and outputs are present in pics folder which is submitted.
1.2)

Solutions:
1)k*3*w*h without bias as each value in matrix is a parameter.

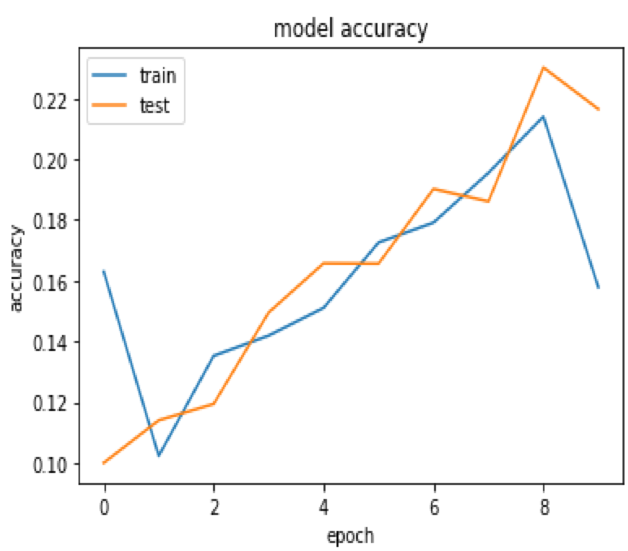
2)Parameters=0.HyperParameters=4 ((m,n),stride,slide)

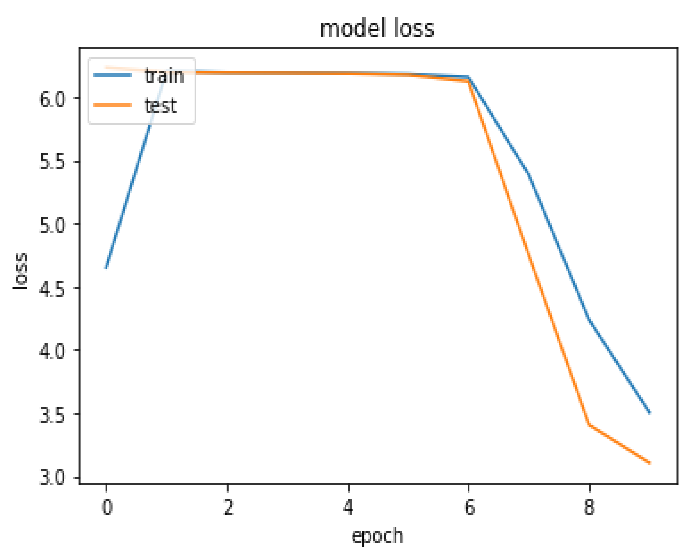
3)Fully connected.As FC needs more number of parameters,it is kept after conv,pooling,relu layers.

4)a)Convolutional layers initially

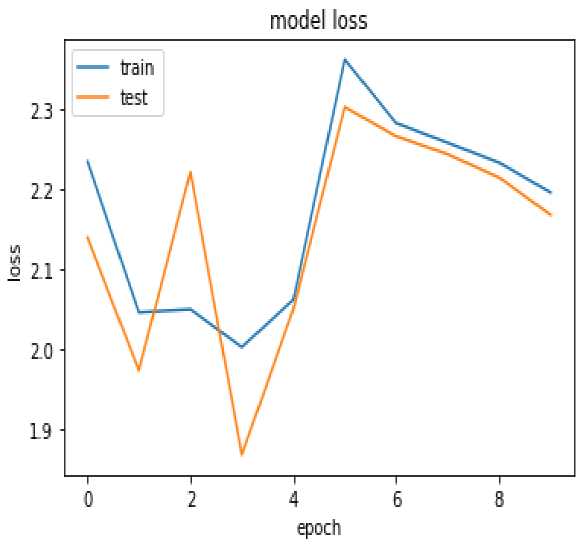
5)
<u>Varying Learning Rate:</u>
keeping num_classes = 10,num_epochs = 10,activation function=Relu,2 convolutional layer,batchSize = 50 as constant

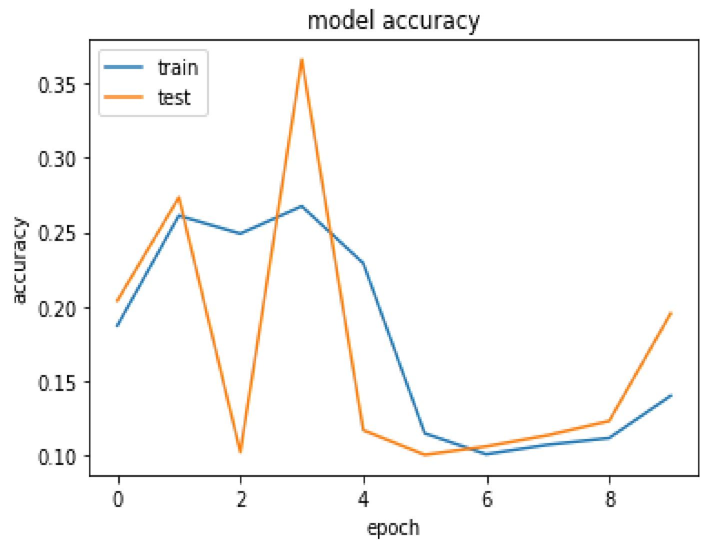
<u>if learning rate is 1:</u>



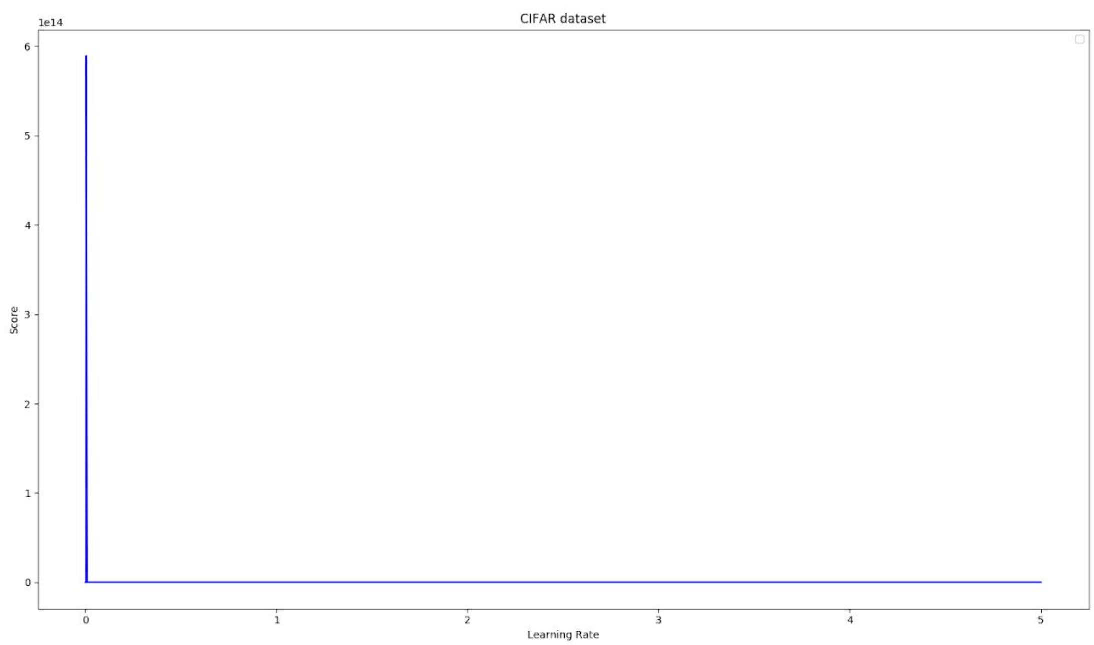


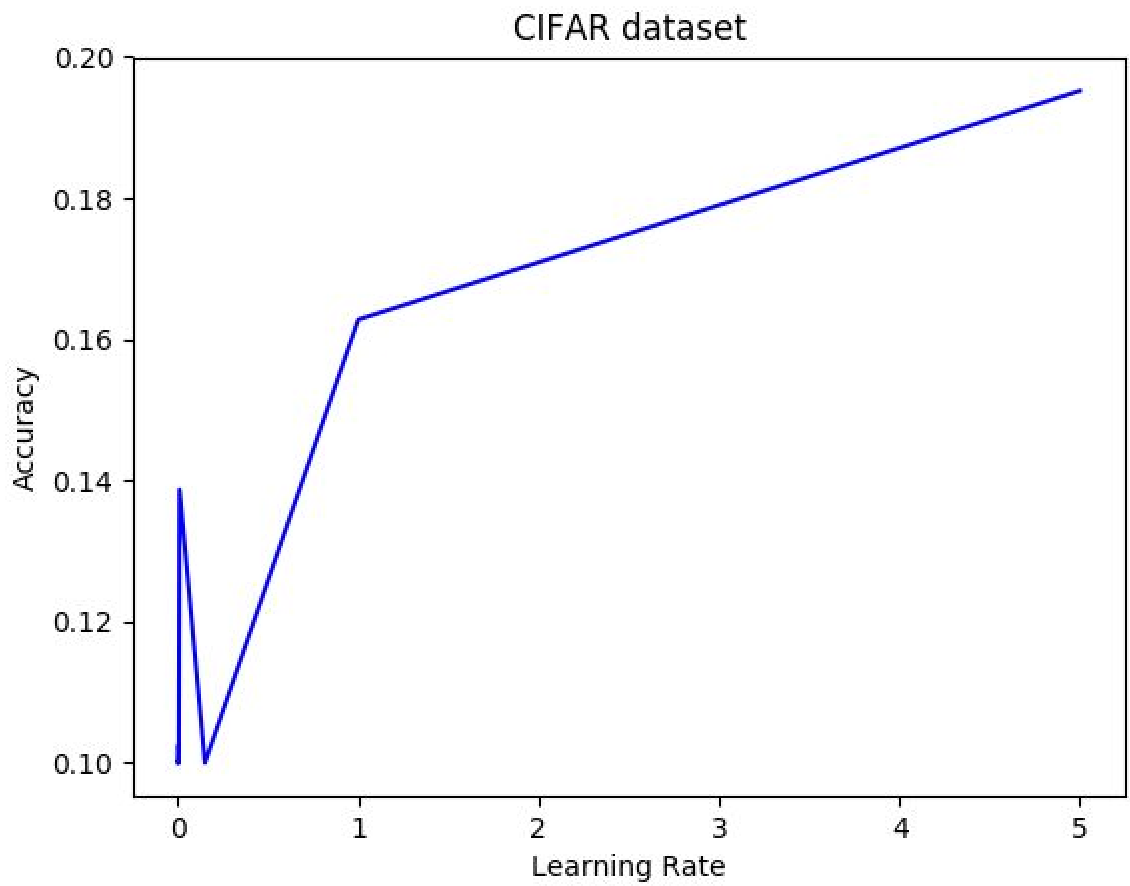
if learning rate is 5:





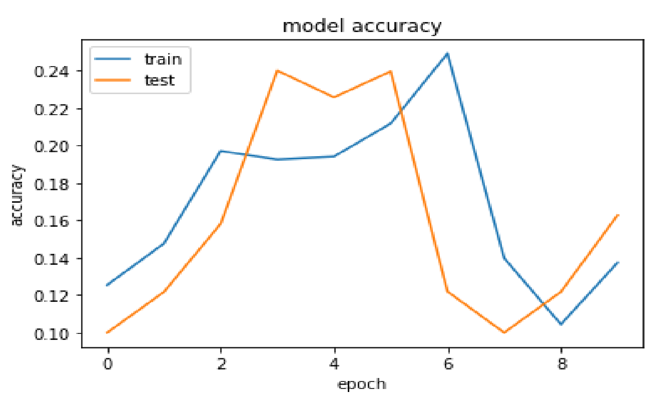
Generally

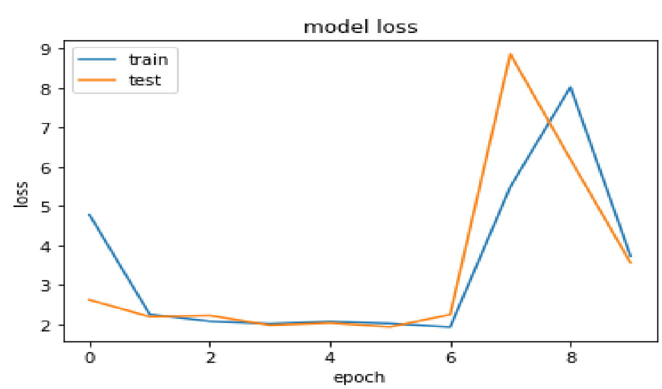




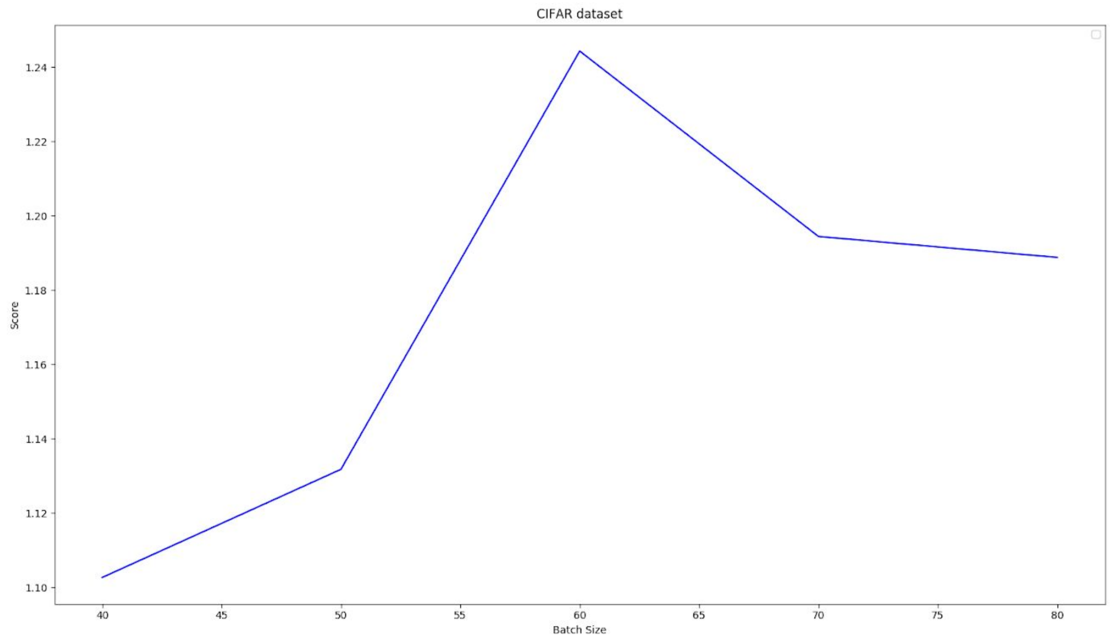
This is increasing as number of epochs are very low (10),but if you increase the number of epochs ,then accuracy decreases.If learning rate increases,accuracy increases fastly then it decreases.

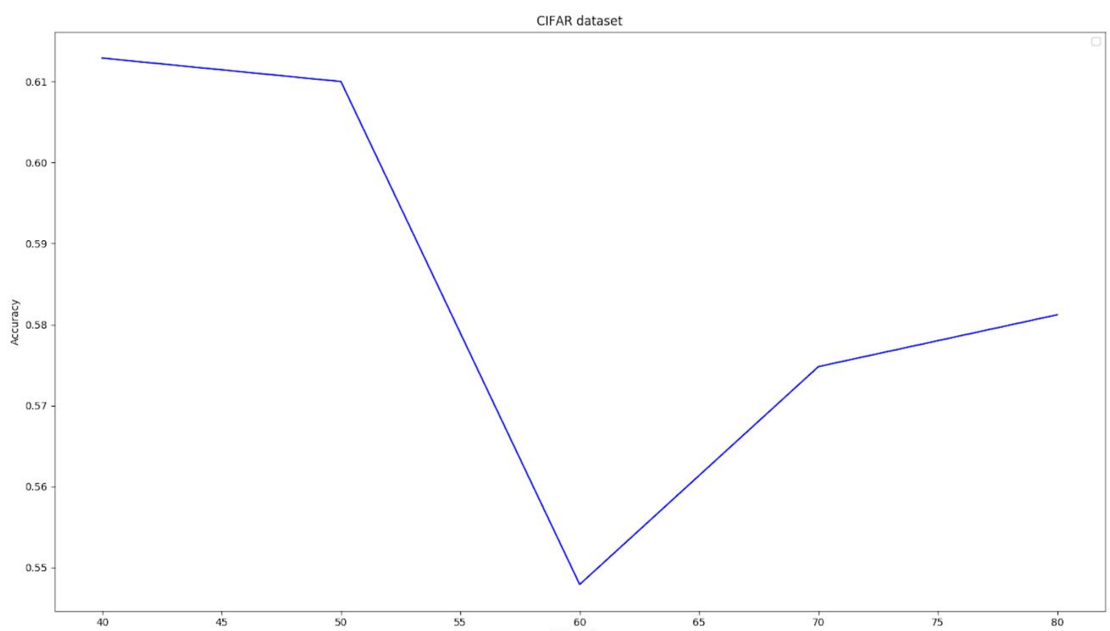
6) If batch size is made 1,accuracy and loss vary in fluctuating manner.Suppose if there are 10 points in a batch and last 9 of them don't vary the loss much but 1st one varies much,then if you consider batch size as 1,the loss fluctuates for that point initially then again it fluctuates but if you consider those 10 as a batch it doesn't fluctuate much as it considers average of all.





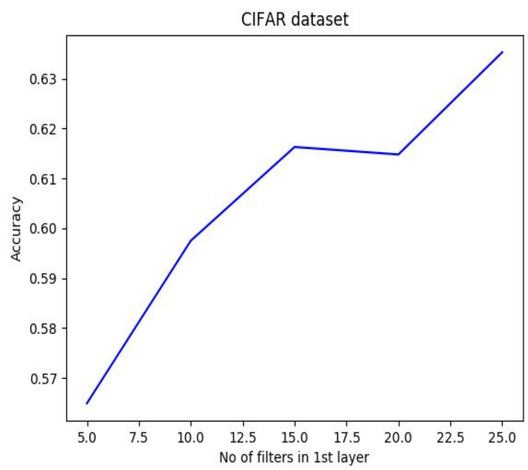
Varying Batch Size:keeping num_classes = 10,num_epochs = 10,learningRate= 0.001 ,activation function=Relu,2 convolutional layers as constant

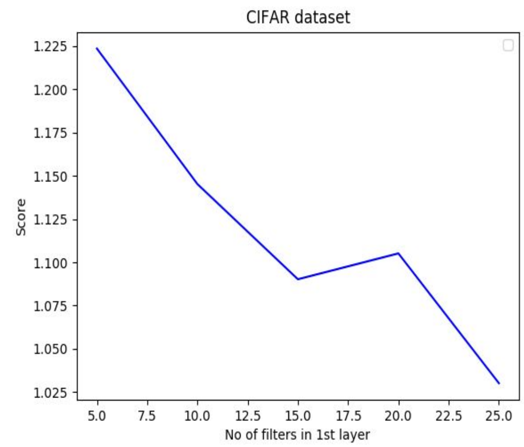




Generally accuracy decreases upon increasing the batch size.
7)
Keeping batchSize = 50 , num_epochs = 10 ,learningRate= 0.001,lr_weight_decay = 0.95,,Activation function=relu,2 convolution layers as constant

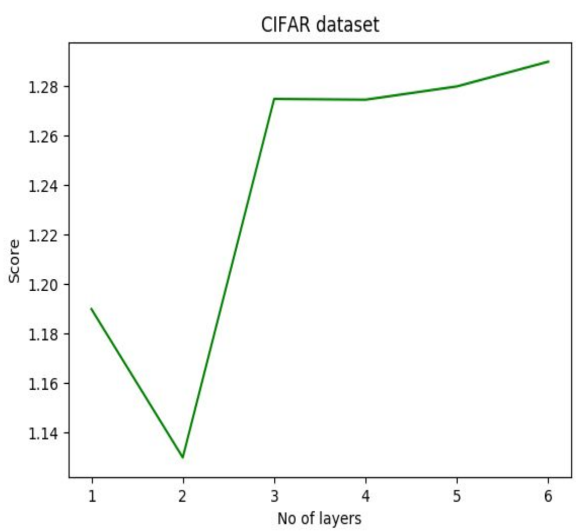
Varying no of filters in 1st convolution layer:
Increasing number of filters means storing more information so accuracy increases.But if we go on increasing no of filters,accuracy might decrease .

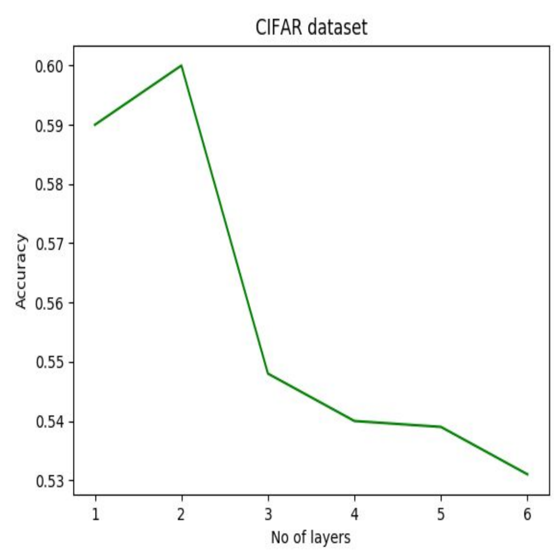




8)
Varying number of convolutional layers:

Increasing layers implies storing less information.So,accuracy decreases.

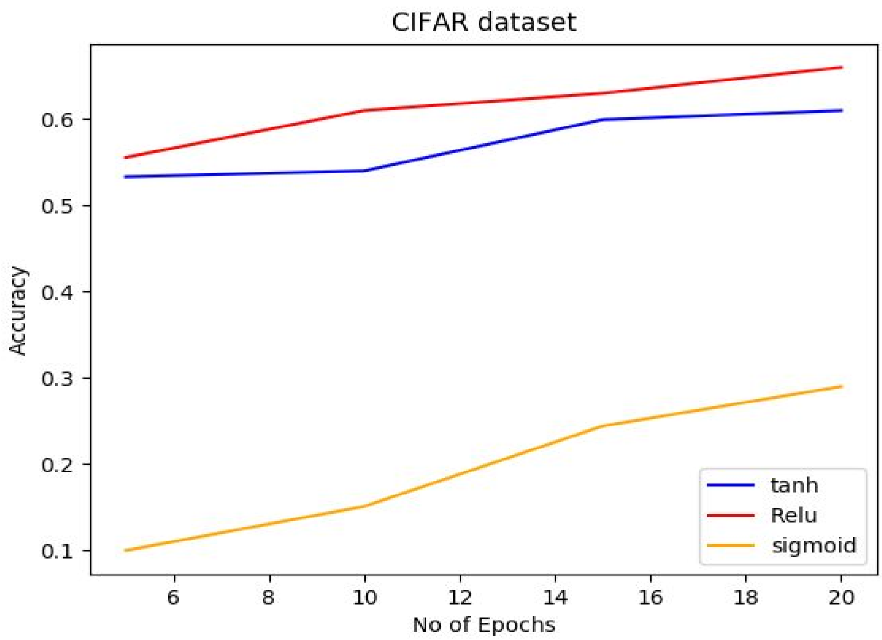




9)

Varying Activation functions:

Relu performs better as it doesnt squash the data much.Where as sigmoid squashes the data in the range 0 to 1 which implies more loss ,compared to tanh which squashes in range [-1,1] and Relu.So Relu and tanh gives better accuracy compared to sigmoid.



10)Other operations can be shifting, zooming in/out,rotated,distorted or shaded with a hue.We can also apply stylish transformation to image such as Cezanne, Enhance, Monet, Ukiyoe,Van Gogh and Winter.

Adding Salt and Pepper noise:

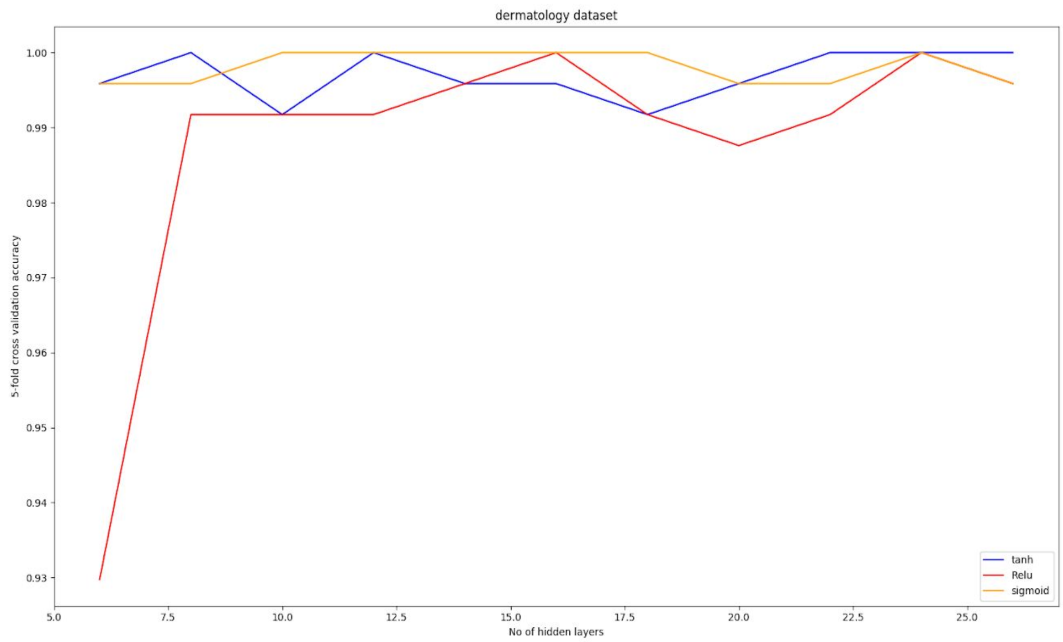
Adds white and black dots in the image. We can consider this because the person who took the photo might have taken it blurry and he may not be expert in taking photos.

Lighting condition:

This refers to changing amount of light in the image.This must also be taken into account as that image taken in any lightning condition must be valid.

2.2) Activation function in output layer is fixed as softmax.Activation functions in hidden layer are taken as Relu and Tanh because they perform better compared to sigmoid.Whereas sigmoid tries to bring every value in range 0 to 1 which means more squashing is done compared to other functions.Stopping condition used is derivative of error with respect to output w is less than theta.This is because it represents gradient of error.We can also use number of epochs as stopping condition.

For dataset1:theta=0.1,eta=0.1



For dataset2:theta=0.7,eta=0.1