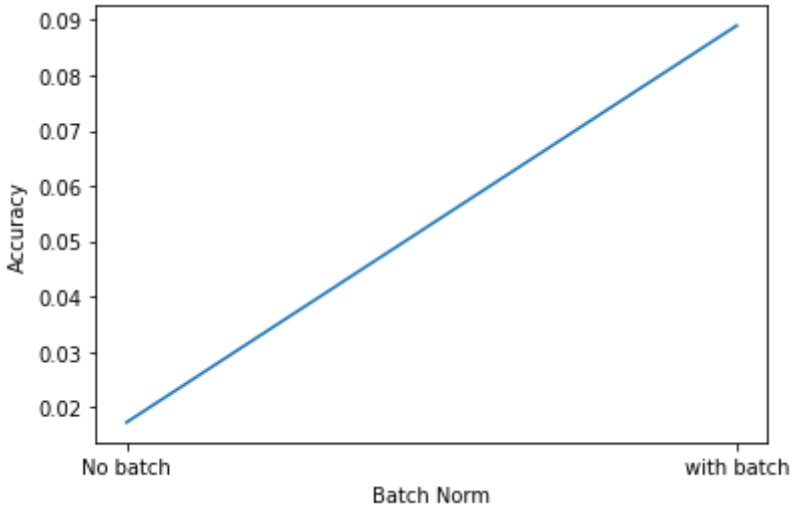
Report CV assgn5

Varying with Batch Norm

The accuracies I got

- With batch norm is 0.089
- Without batch norm is 0.0172

Batch normalization makes the input to each layer have zero mean and unit variance. Batch normalization regularizes the model. This regularization reduces overfitting which leads to better test performance through better generalization.

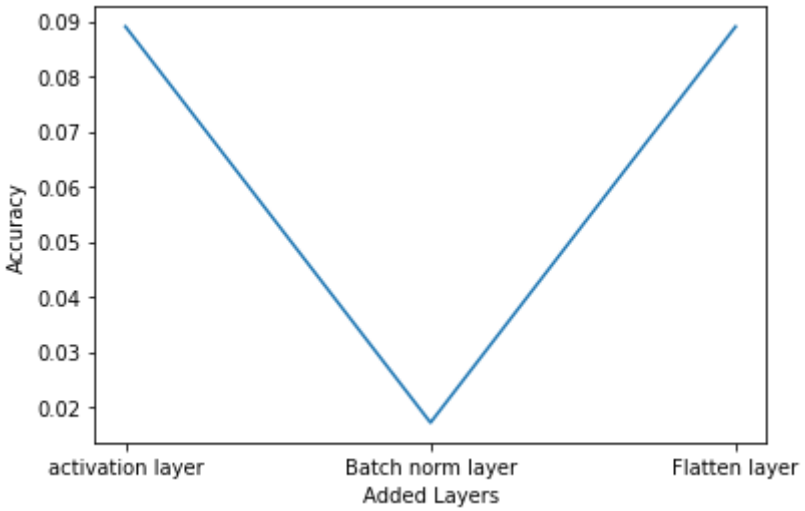


Adding New Layers

The accuracies I got

- Original model is 0.172
- Adding an extra activation function is 0.089
- Adding extra batch norm is 0.0192
- Adding extra flatten layer is 0.899

As we see all the layers have improved the accuracy compared to the original model.

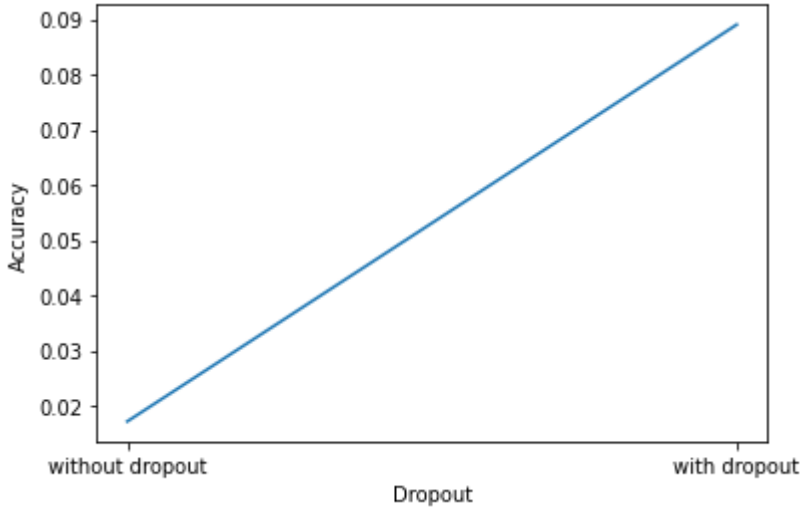


With Dropout

The accuracy obtained on using dropout is more than the accuracy obtained without using dropout. Dropout is a regularization technique. Regularization is used to prevent overfitting. Thus the accuracy is increased on using dropout. Similar to Batch norm.

The accuracies I got

- With out dropout is 0.891
- With dropout is 0.172

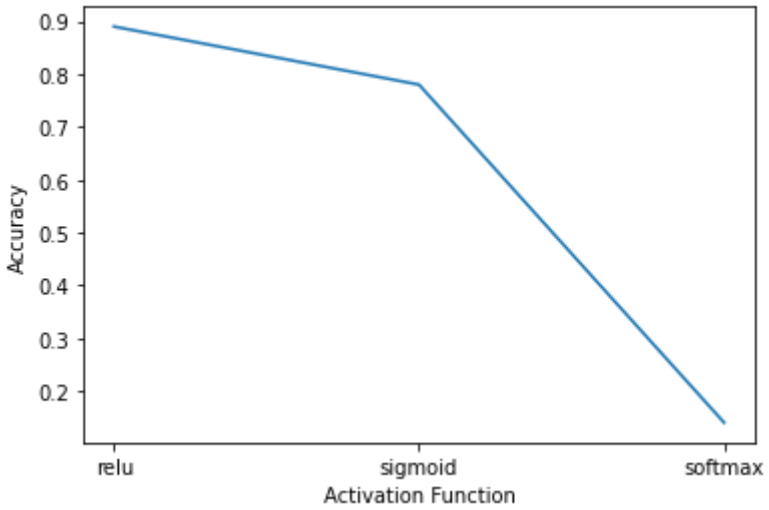


Different Activation Functions

The accuracies I got are 0.89, 0.71, 017 for relu, sigmoid, softmax. Relu performs the best compared to other two.

Relu has following pros
Pros:
1. Does not saturate (in +ve region)
2. Computationally, it is very efficient
3. Generally models with relu neurons converge much faster than neurons with other activation functions, as described here

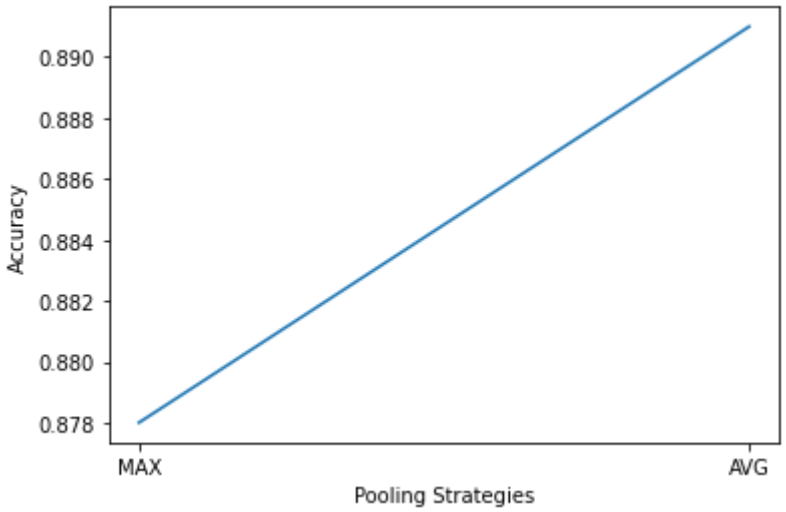
Both sigmoid/softmax are discouraged are more useful for recurrent networks, probabilistic models, and some autoencoders have additional requirements that rule out the use of piecewise linear activation functions



Different Pooling Strategies

Pooling is performed in neural networks to reduce variance and computation complexity.
Max pooling: The maximum pixel value of the batch is selected.
Average pooling: The average value of all the pixels in the batch is selected.The batch here means a group of pixels of size equal to the filter size which is decided based on the size of the image.

As average pooling takes all the pixels into account while computing,so it retains more information in comparison to max pooling.As more informations leads to better data,it leads to more accuracy.

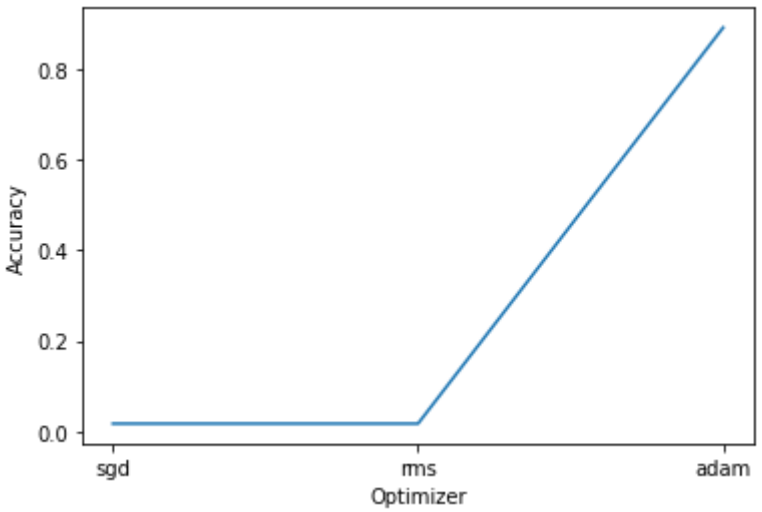


Different Optimizers

The accuracies I got

- Adam
- SGD
- RMS

Adam is the best among the adaptive optimizers in most of cases.
Good with sparse data: the adaptive learning rate is perfect for this type of datasets.



Basic Augmentation

I rotated the image by 90 and did the training. I got accuracy on the training data set as 0.20 and on validation data set as 0.1850

The accuracy increased as the dataset increased adding a little more robustness to the training set