Deep Learning COL870 A1

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1   Residual Networks and Normalization schemes

1.1   Image Classification using ResNet

The fundamental idea behind a ResNet is to facilitate the network in learning the identity mapping which allows, the deeper layers to learn **atleast** what the shallow layers have learnt. Another perspective is that ResNets allow better propagation of gradients further back to the network since the gradient signal is received by weights of layer l and the weights of layer $l-2$.

Firstly, we create a ResNet with the architecture as mentioned in the assigment, and train it using SGD. We employ a weight decay of 10^{-4} and a momentum of 0.9 as mentioned by He et al. For training for 100 epochs, we get the following statistics(over 4 runs):

Train accuracy	Test accuracy
$92.58 \pm 0.58\%$	77.2 ± 0.64

In order to reduce the degree of over-fitting, we use the technique recommended in the paper. We use augmentation technique of padding 4 pixels on each side and then taking a random crop. The results obtained show that this highly reduces over-fitting, and gives higher test accuracy for a lower train accuracy.

	Train accuracy	Test accuracy
No augmentation	$92.58 \pm 0.58\%$	77.2 ± 0.64
Augmentation	$87.49 \pm 0.3\%$	$80.71 \pm 0.4\%$