Submission for Deep Learning Exercise 9

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1 Coding Tasks

1.1 [2] Describe what happens when you change the number of filters. Do more or fewer perform better?

Solution: The accuracy of the network on test images was raised to 38% from 33% after increasing the number of filters. The higher the number of filters, the higher the number of abstractions that the network is able to extract from image data.

1.2 [3] Describe what happens. What are benefits of using smaller filters?

Solution: There is no change happened in the accuracy. However, small kernel sizes are preferred because it reduces computational costs and weight sharing that ultimately leads to lesser weights for back-propagation.

1.3 [4] Insert batch normalization after the convolution in ConvNet3 and describe what happens. Is the network performing better? If so, why?

Solution: Yes it performed better as the accuracy increased from 38 % to 48 %. This is due to batch normalization which reduces the dependence of the network to the weight initialization, improves the gradient flow through the network and adds slight regularization into the network since empirical means and variances calculated using the samples from mini-batches.

1.4 [5] Transfer learning

Observations: The test accuracy of the first modified transfered model is 58% where we replaced the linear of resnet with a new layer for CIFAR dataset. In the second model where we freezed the layers excpept the fully connected layer which we replaced it to a new linear one, we got 37%. The reason for this is that the frozen layers are trained on Imagenet dataset not CIFAR10 one. In the third model, the accuarcy got a littel higher to 44% becuase we trained the conv2 layer in layer4 of the model. The model becomes more customized on the CIFAR10 dataset. In the last model the accuracy raised to 51% because we allowed the whole layers in layer4 of the model to be trained not frozen. So the model would be more customized on the target task.

1.5 [6] How is the ResNet model able to take images of variable sizes as inputs?

Answer:
num_ftrs = model_conv.fc.in_features
model_conv.fc = nn.Linear(num_ftrs, 2)

Refrences: https://pytorch.org/tutorials/beginner/transfer_learning_tutorial.htmlconvnet-as-fixed-feature-extractor