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Git Link:

List of resources: Towardsdatascience, stackoverflow, matplotlib and tensorflow wikis for doubts

Completed:

* Standard ANN
* MNIST digit accuracy > 99%
* MNIST fashion accuracy > 92%
* Cifar 10 accuracy > 70%
* Cifar 100 coarse accuracy > 60%
* Cifar 100 fine accuracy > 50%
* Plots for accuracy and data pre-processing
* Added cmd-line arguments for running program

Questions:

A CNN in this situation is superior as it’s method of learning features progressively through filters and pooling allows it to understand the parts of the data better and predict better than ANNs, which only parse through data like this as a tensor of numbers with no consideration of a common structure between similar samples.

Pooling reduces the dimensionality of the data and keeps the important information (if said information is represented by bigger umbers in the tensor). This reduces the load on the network of working on a large multidimensional input and instead progressively work on a smaller one.

Cifar dataset is a 32x32 RGB image which means an extra third dimension for the images to process, whereas an MNIST dataset has 28x28 greyscale images. Processing the data is computationally easier.

I increase the accuracy of my CNN by adding multiple conv-pooling sections (64,64 with a 3x3 kernel size to a 128,128 set with a 3x3 kernel size) with increasing number of filters plus batch normalization. This lets my network progressively learn finer and finer features. I also add a large double layer of 512 dense neurons after flattening the final convoluted tensor which I scale down to the output layer. For the loss and optimization, cat. cross entropy is viable for most scenarios and adam is a good all-rounder. The epoch size is set according to if data augmentation is done or not.

Accuracy Graphs for ANN and CNN:

Chart, bar chart

Description automatically generated

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Description automatically generated

CMD-Line outputs are in the files starting with accuracy\_log, labelled for each dataset and network.