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Robotics and Computer Vision

Kdq2

10/23/17

Homework 4 – Deep Learning

From my understanding of deep learning, a key aspect that we discussed was Convolution Neural Nets (CNN) a type of multi-layered network that processes features from our input images into something understandable by humans. Lower levels of CNNs can include filtering for edge or spot detection, as we process higher up the network edges can become boxes or circles. Until finally among the output levels our CNN can make out discernible features from our input image.

In the program we are running we start off by importing our data from the MNIST dataset, and load it into testing and training sets with images and labels. The shape command lets us know that we have 60k training images and 10k test images that are 28 by 28 pixels each. Following that we import models and layers from keras to use in our network, in ours we use a sequential model and two layers. With our network built we compile it while declaring our loss function and optimizer. For our data to be compatible with the network we must reshape it and normalize it which is why the reshape and atype function is used, furthermore, after using atype we divide by 255 to ensure our pixels don't overflow. To_categorical is used to change our input data from integers to binary and also to ensure we can class our inputs. After that we use network.fit to fit our model based on our training data, and we finally test it on our test data to ensure we have a good model. Our model had an accuracy of: 98.09%

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kq@kq: ~/Documents/Robotics-and-Computer-Vision/Homework/Hw4
kq@kq: ~/Documents/Robotics-and-Comp... x kq@kq: ~
44288/60000 [=====>.....] - ETA: 1s - loss: 0.0358 - acc: 0.9
44928/60000 [=====>.....] - ETA: 1s - loss: 0.0357 - acc: 0.9
45568/60000 [=====>.....] - ETA: 1s - loss: 0.0358 - acc: 0.9
46208/60000 [=====>.....] - ETA: 1s - loss: 0.0362 - acc: 0.9
46848/60000 [=====>.....] - ETA: 1s - loss: 0.0366 - acc: 0.9
47488/60000 [=====>.....] - ETA: 1s - loss: 0.0366 - acc: 0.9
48128/60000 [=====>.....] - ETA: 1s - loss: 0.0369 - acc: 0.9
48768/60000 [=====>.....] - ETA: 1s - loss: 0.0372 - acc: 0.9
49408/60000 [=====>.....] - ETA: 0s - loss: 0.0373 - acc: 0.9
50048/60000 [=====>.....] - ETA: 0s - loss: 0.0373 - acc: 0.9
50688/60000 [=====>.....] - ETA: 0s - loss: 0.0374 - acc: 0.9
51200/60000 [=====>.....] - ETA: 0s - loss: 0.0375 - acc: 0.9
51840/60000 [=====>.....] - ETA: 0s - loss: 0.0377 - acc: 0.9
52480/60000 [=====>.....] - ETA: 0s - loss: 0.0376 - acc: 0.9
53120/60000 [=====>.....] - ETA: 0s - loss: 0.0376 - acc: 0.9
53760/60000 [=====>.....] - ETA: 0s - loss: 0.0375 - acc: 0.9
54400/60000 [=====>.....] - ETA: 0s - loss: 0.0375 - acc: 0.9
55040/60000 [=====>.....] - ETA: 0s - loss: 0.0376 - acc: 0.9
55680/60000 [=====>.....] - ETA: 0s - loss: 0.0377 - acc: 0.9
56192/60000 [=====>.....] - ETA: 0s - loss: 0.0377 - acc: 0.9
56832/60000 [=====>.....] - ETA: 0s - loss: 0.0376 - acc: 0.9
57472/60000 [=====>.....] - ETA: 0s - loss: 0.0375 - acc: 0.9
58112/60000 [=====>.....] - ETA: 0s - loss: 0.0376 - acc: 0.9
58752/60000 [=====>.....] - ETA: 0s - loss: 0.0376 - acc: 0.9
59392/60000 [=====>.....] - ETA: 0s - loss: 0.0374 - acc: 0.9
50000/60000 [=====>.....] - 5s - loss: 0.0374 - acc: 0.9889

9664/10000 [=====>...] - ETA: 0s

('test_acc:', 0.9808999999999999)
kq@kq: ~/Documents/Robotics-and-Computer-Vision/Homework/Hw4$
```