

CNN exercises.

- Try editing the convolutions. Change the 32s to either 16 or 64. What impact will this have on accuracy and/or training time.
- Remove the final Convolution. What impact will this have on accuracy or training time?
- How about adding more Convolutions? What impact do you think this will have? Experiment with it.
- In the previous lesson you implemented a callback to check on the loss function and to cancel training once it hit a certain amount. See if you can implement that here!

Datasets: fashion_mnist

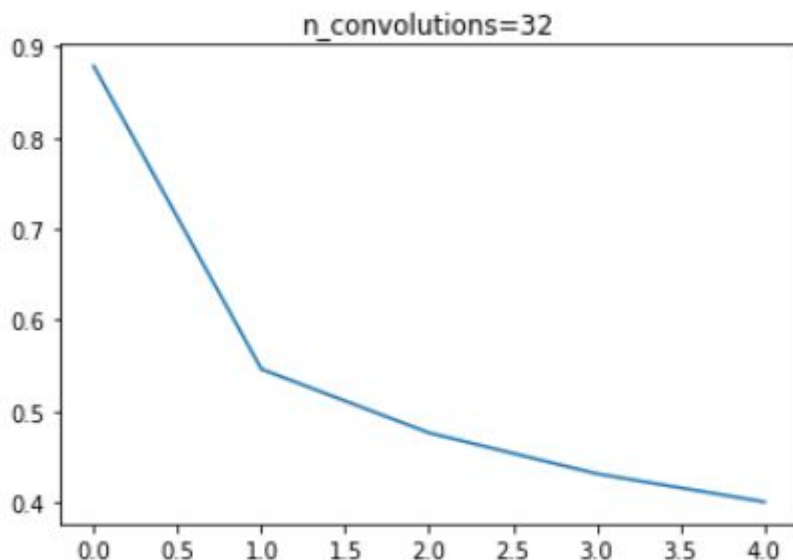
Normalization: division by 255

Base CNN model:

Conv(32, (3, 3), relu) - MaxPool(2, 2) - Conv(32, (3, 3), relu) - MaxPool(2, 2) - Flatten - Dense(128, relu) - Dense(10, softmax)

Loss validation = 0.4087, Accuracy validation = 0.8507, Total time execution 241 sec.

Loss by epochs:



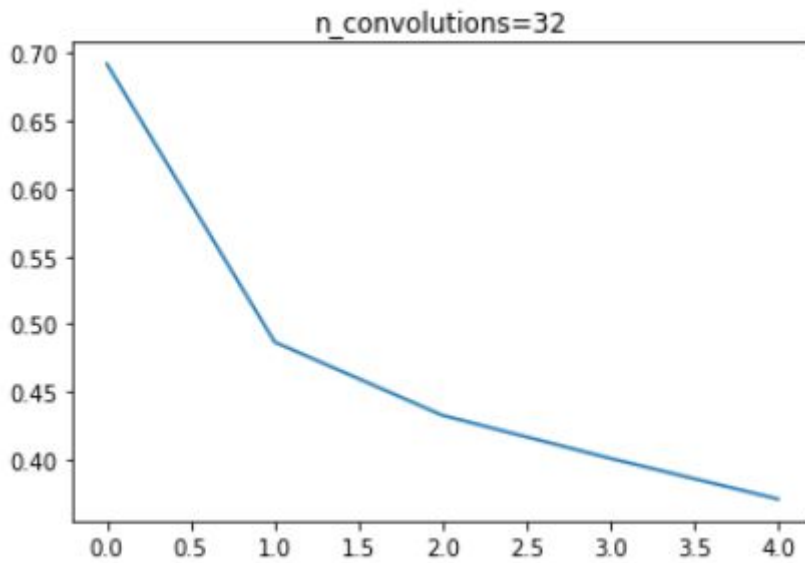
Changing number of convolution filters (16, 32 and 64) .

n_filters	Accuracy	Time (sec)
16	0.8499	142
32	0.8507	241
64	0.8566	528

Removing the final convolution layer (using only one conv layer)

Loss validation = 0.3824, Accuracy validation = 0.8622, Total time execution 212 sec.

Loss by epochs:



Outcome: If we use only one convolution layer accuracy increases and equals 0.8622 (time execution 212 sec)

Adding more Convolution layers

Table of accuracy for different number of conv layers (convolution filters = 32)

n_conv_layers	Accuracy	Time (sec)
1	0.8622	212
2	0.8507	241
3	0.8044	257

Callback realization

```
es=callbacks.EarlyStopping(monitor='val_loss',verbose=1, min_delta=0.01, mode='min')
```

Train on 60000 samples, validate on 10000 samples

Epoch 5/30

60000/60000 [=====] - 55s 919us/sample - loss: 0.3934 - acc: 0.8585 - val_loss: 0.4002 - val_acc: 0.8563

Epoch 6/30

60000/60000 [=====] - 54s 893us/sample - loss: 0.3726 - acc: 0.8637 - val_loss: 0.3825 - val_acc: 0.8615

Epoch 7/30

60000/60000 [=====] - 54s 904us/sample - loss: 0.3555 - acc: 0.8699 - val_loss: **0.3671** - val_acc: 0.8661

Epoch 8/30

60000/60000 [=====] - 52s 871us/sample - loss: 0.3408 - acc: 0.8769 - val_loss: **0.3624** - val_acc: 0.8700

Epoch 00008: early stopping