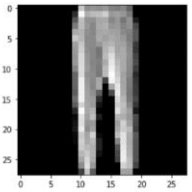
ANN vs CNN: “fashion-mnist” Dataset

Input

Fashion-MNIST is a dataset of Zalando's article images - consisting of a training set of 60,000 examples and a test set of 10,000 examples. Each example is a 28x28 grayscale image (taken from keras library).



Models

ANN:

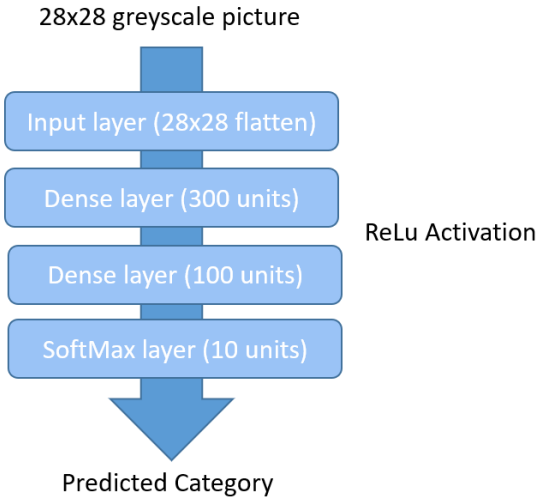
Loss function – Categorical Cross Entropy

Optimizer – Stochastic Gradient Descent

#Epoch – 200

Structure:

```
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
flatten_6 (Flatten)          (None, 784)               0
_________________________________________________________________
dense_18 (Dense)             (None, 300)               235500
_________________________________________________________________
dense_19 (Dense)             (None, 100)               30100
_________________________________________________________________
dense_20 (Dense)             (None, 10)                1010
=================================================================
Total params: 266,610
Trainable params: 266,610
Non-trainable params: 0
```



CNN:

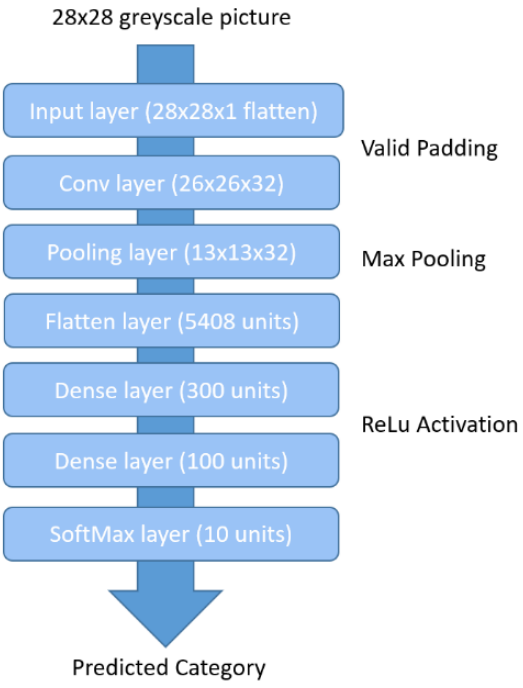
Loss function – Categorical Cross Entropy

Optimizer – Stochastic Gradient Descent

#Epoch – 70

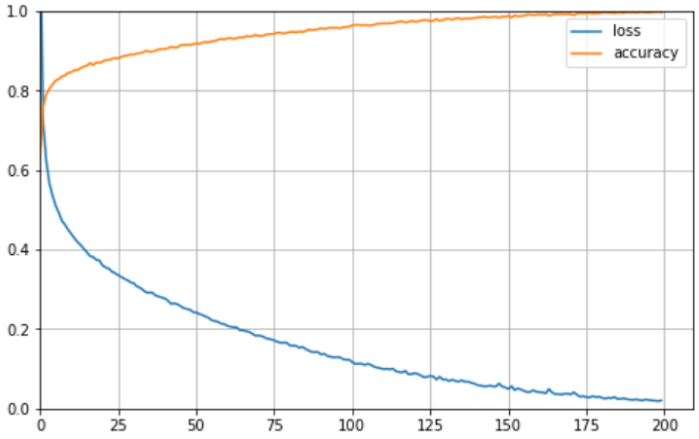
Structure:

```
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_1 (Conv2D)            (None, 26, 26, 32)        320
_________________________________________________________________
max_pooling2d_1 (MaxPooling2 (None, 13, 13, 32)        0
_________________________________________________________________
flatten_1 (Flatten)          (None, 5408)              0
_________________________________________________________________
dense_3 (Dense)              (None, 300)               1622700
_________________________________________________________________
dense_4 (Dense)              (None, 100)               30100
_________________________________________________________________
dense_5 (Dense)              (None, 10)                1010
=================================================================
Total params: 1,654,130
Trainable params: 1,654,130
Non-trainable params: 0
_________________________________________________________________
```

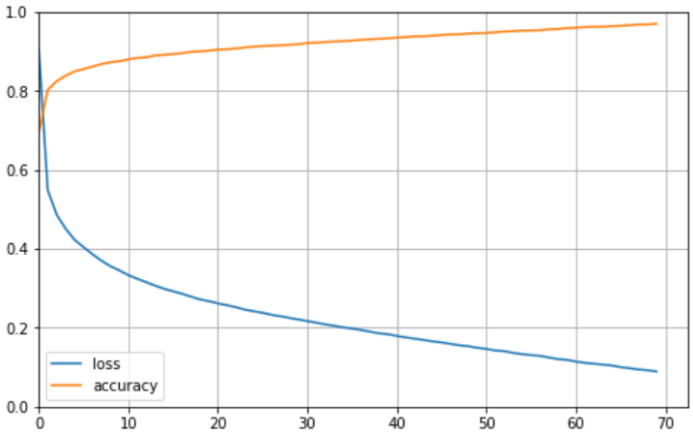


Training Phase Visualization:

ANN model



CNN model



Results

After ~30minutes of training (200 epochs for ANN model and 70 epochs for CNN model) and based on 10,000 testing dataset the results are:

ANN Model – 85.2% accuracy

CNN Model – 91.2% accuracy

Code

The implementation code is available in the Git repo (TensorFlow and NumPy are required).

Dor Edry, 2020