Deep Learning Report 2

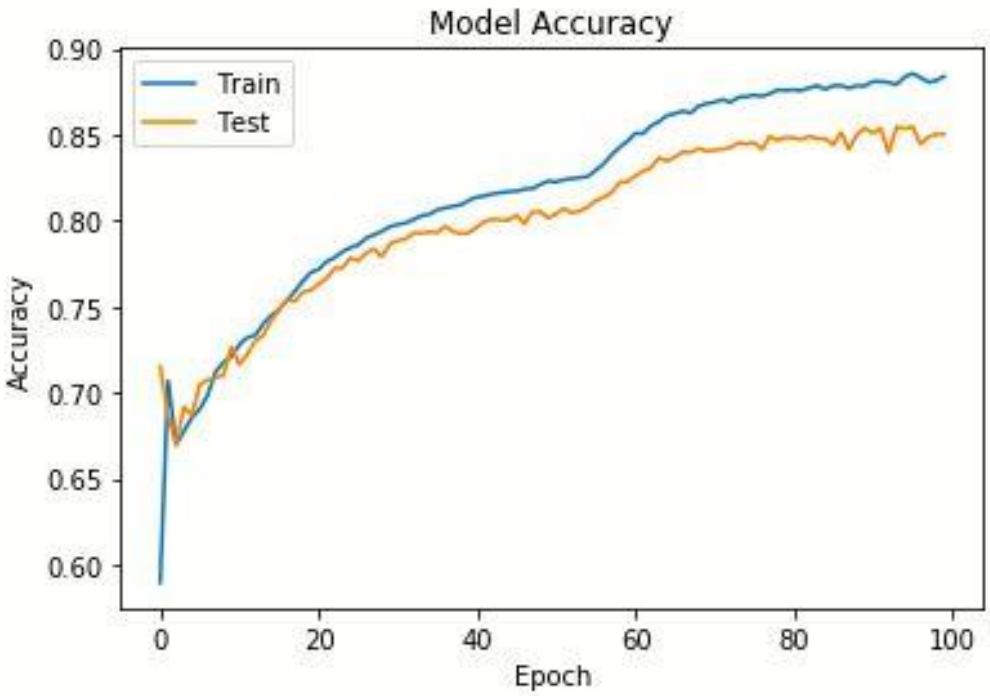
Dataset

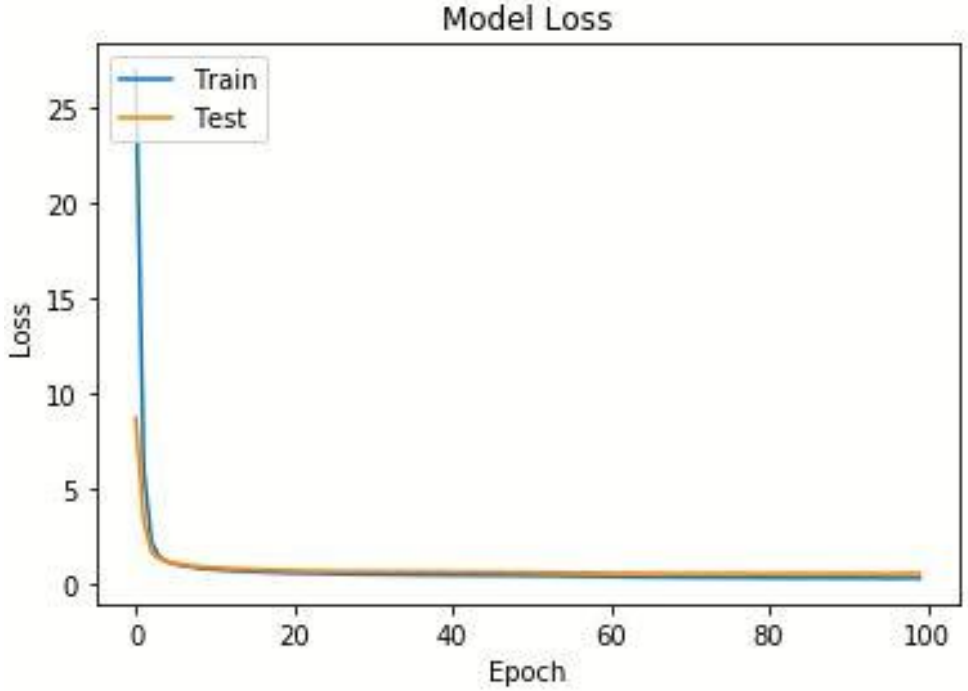
Fashion-MNIST is a dataset of Zalando's article images—consisting of a training set of 60,000 examples and a test set of 10,000 examples. Each example is a 28x28 grayscale image, associated with a label from 10 classes. Zalando intends Fashion-MNIST to serve as a direct drop-in replacement for the original MNIST dataset for benchmarking machine learning algorithms. It shares the same image size and structure of training and testing splits.

Multi-Layer Neural Network

- The 28x28 matrix was reshaped and flattened to a 784 array.
- A three-layer (one hidden layer) Deep Neural Net was used. Tried using 2 or more hidden layers were tried but did not give better results.
- The hidden layer was of 128 neurons with activation function ‘relu’. Different activations like ‘sigmoid’ were used but gave less accuracy.
- The final layer with 10 neurons with an activation function ‘softmax’. Since the number of catagories were 10.
- The loss function used was ‘catagorical-crossentropy’. This is the default function for multiclass classification and gave good enough results.
- Adam is the optimiser used since it is easier to handle and gave results of reasonable accuracy.

The evaluation accuracy was 88.64.

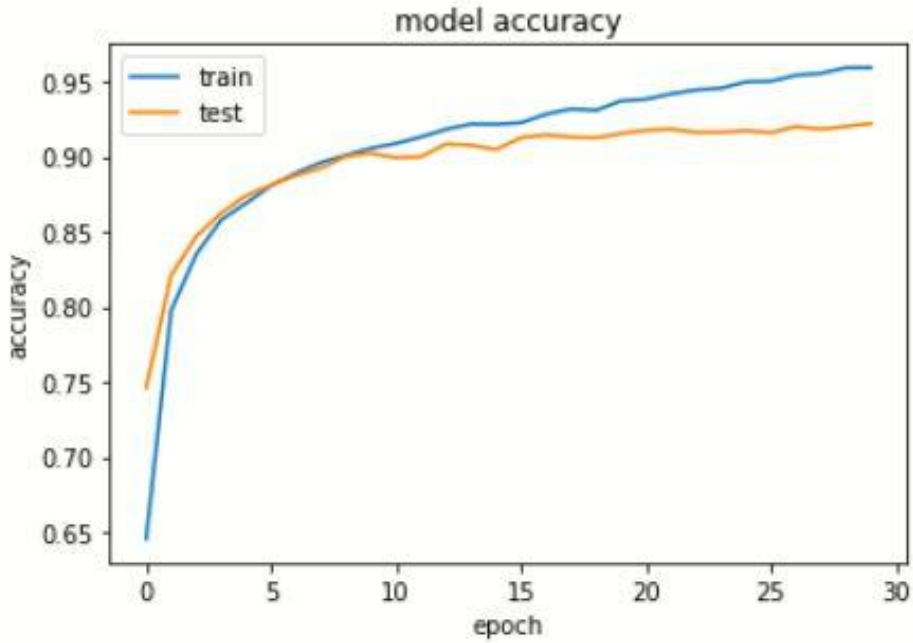

Model Accuracy
Train
Test
Accuracy
Epoch
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0
20
40
60
80
100

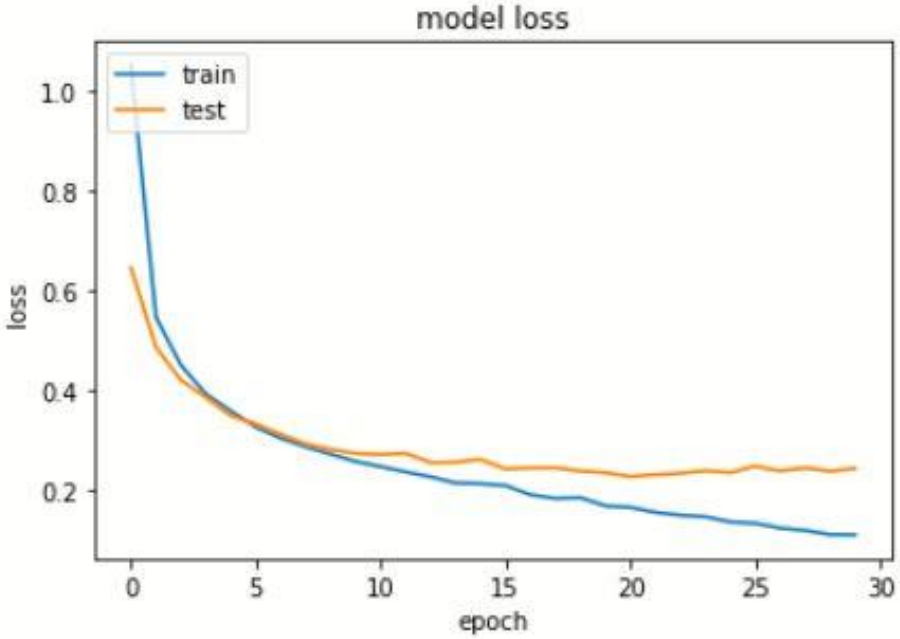

Model Loss
Train
Test
Loss
Epoch
25
20
15
10
5
0
0
20
40
60
80
100

Convolutional Neural Network

- Three convolutional layers are used in the architecture for optimal results.
- The first convolutional layer has 32 filters with activation function ‘relu’ and kernel size 3x3.
- The second layer is also convolutional layer, with 64 filters with the activation function and kernel size same as above. No padding is used in both layers.
- A Maxpool layer with pool size 2x2 is used for averaging.
- Another convolutional layer same as the second one followed by the same maxpool layer is built.
- The matrix is flattened to 128 neurons with activation function ‘relu’.
- The final layer with 10 neurons and activation function ‘softmax’.
- The loss function used is the ‘catagorical-crossentropy’ and optimiser is Adam.

The evaluation accuracy was 92 percent.


model accuracy
train
test
accuracy
epoch
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0
5
10
15
20
25
30


model loss
train
test
loss
epoch
1.0
0.8
0.6
0.4
0.2
0
5
10
15
20
25
30