

MAIS 202 Assignment 4: MNIST CHALLENGE

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References:

- <https://www.kaggle.com/code/amithasanshuvo/fashion-mnist-classification-using-cnn-easy>
- <https://www.kaggle.com/code/bnhkid/tf-keras-conv-dense-solution>

Challenge:

To use AI models to classify images of fashion items (ex: boots, trousers, shirt) into their respective category. There are 10 categories/labels to work with : Tops, Trouser, Pullover, Dress, Coat, Sandal, Shirt, Sneaker, Bag, & Ankle Boot.

Dataset:

The dataset provided was based on the MNIST Fashion dataset and contained the following key files:

- Test_images.npy + Train_images.npy :
 - These files contain the images we need to work with. We use np.load() to interact with them.
 - I did not need to use train-test split because of this
- Train_labels.csv : contains the correct labels for each item of clothing

Model Used:

The model I used was a simple convolutional neural network (CNN) setup as follows:

- Activation Layer: RELU
- Kernel Initializer: he_normal
- The model was fit with
 - Epoch #: 20
 - Batch Size: 256
- For y_train and y_val we use to_categorical() method :
 - When training data uses classes as numbers we transform those numbers in proper vectors for using with models.
 - Outputs matrix of binary values

Model: "sequential"		
Layer (type)	Output Shape	Param #

conv2d (Conv2D)	(None, 26, 26, 32)	320

max_pooling2d (MaxPooling2D)	(None, 13, 13, 32)	0

dropout (Dropout)	(None, 13, 13, 32)	0

conv2d_1 (Conv2D)	(None, 11, 11, 64)	18496

max_pooling2d_1 (MaxPooling2D)	(None, 5, 5, 64)	0

dropout_1 (Dropout)	(None, 5, 5, 64)	0

conv2d_2 (Conv2D)	(None, 3, 3, 512)	295424

dropout_2 (Dropout)	(None, 3, 3, 512)	0

flatten (Flatten)	(None, 4608)	0

dense (Dense)	(None, 128)	589952

dropout_3 (Dropout)	(None, 128)	0

dense_1 (Dense)	(None, 10)	1290

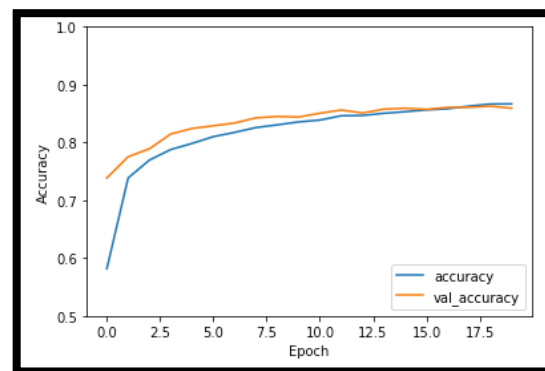
Total params: 905,482		
Trainable params: 905,482		
Non-trainable params: 0		

Results:

- KAGGLE SCORE (s): **0.868**

KarimJabbour_Asn4_FASHION_NeuralNetwork Ver 2 (version 2/2) 40 minutes ago by Karim Jabbour Notebook KarimJabbour_Asn4_FASHION_NeuralNetwork Version 2	0.86830
KarimJabbour_Asn4_FASHION_NeuralNetwork V1 (version 1/2) an hour ago by Karim Jabbour Notebook KarimJabbour_Asn4_FASHION_NeuralNetwork Version 1	0.86170

- Accuracy Plot:
 - Based on work from Reference#1
 - Accuracy increases to value 0.86 (limit) with each epoch



Challenges:

- Dataset preparation was a little tricky because I have never worked within Kaggle notebooks before and have never worked with the npy format. It was however not too complex to figure out once I looked at the sample code provided (Reference #2).
- I also faced some challenge in the fitting of the sequential model getting errors with my dataset shapes. The references I mention; however, helped a lot with that.

Conclusion:

In conclusion, this was not a particularly difficult assignment to be completely fair since a simple AI neural network could cut above the baseline. It was also simpler than usual because the dataset provided was simple to understand aside from the npy format which was novel to me.

It was interesting to achieve a high percentage of accuracy 86% using the CNN in classifying the images.

Contribution:

I am the only member ☺