MAIS 202 - PROJECT DELIVERABLE 2

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1. Problem statement:

The problem targeted in the project has been changed since iteration 1.

The project is now targeted to classify the english letters and therefore is an image classification problem. On top of that, the recognized english letter will be converted into english braille. Therefore, the overall goal of the project is to translate english letters into english braille.

2. Due to the change of the problem targeted for the project, the dataset has able been changed accordingly.

   Content of data:

   The dataset contains 26 folders (A-Z) containing handwritten images in size 28*28 pixels, each alphabet in the image is centre fitted to 20*20 pixel box.

   Each image is stored as Gray-level

   Labels are floats from 0.0-25.0 representing letters A-Z respectively.

   AZ Handwritten Alphabets in .csv format

3. Machine learning model:

   CNN is proposed to train the data.

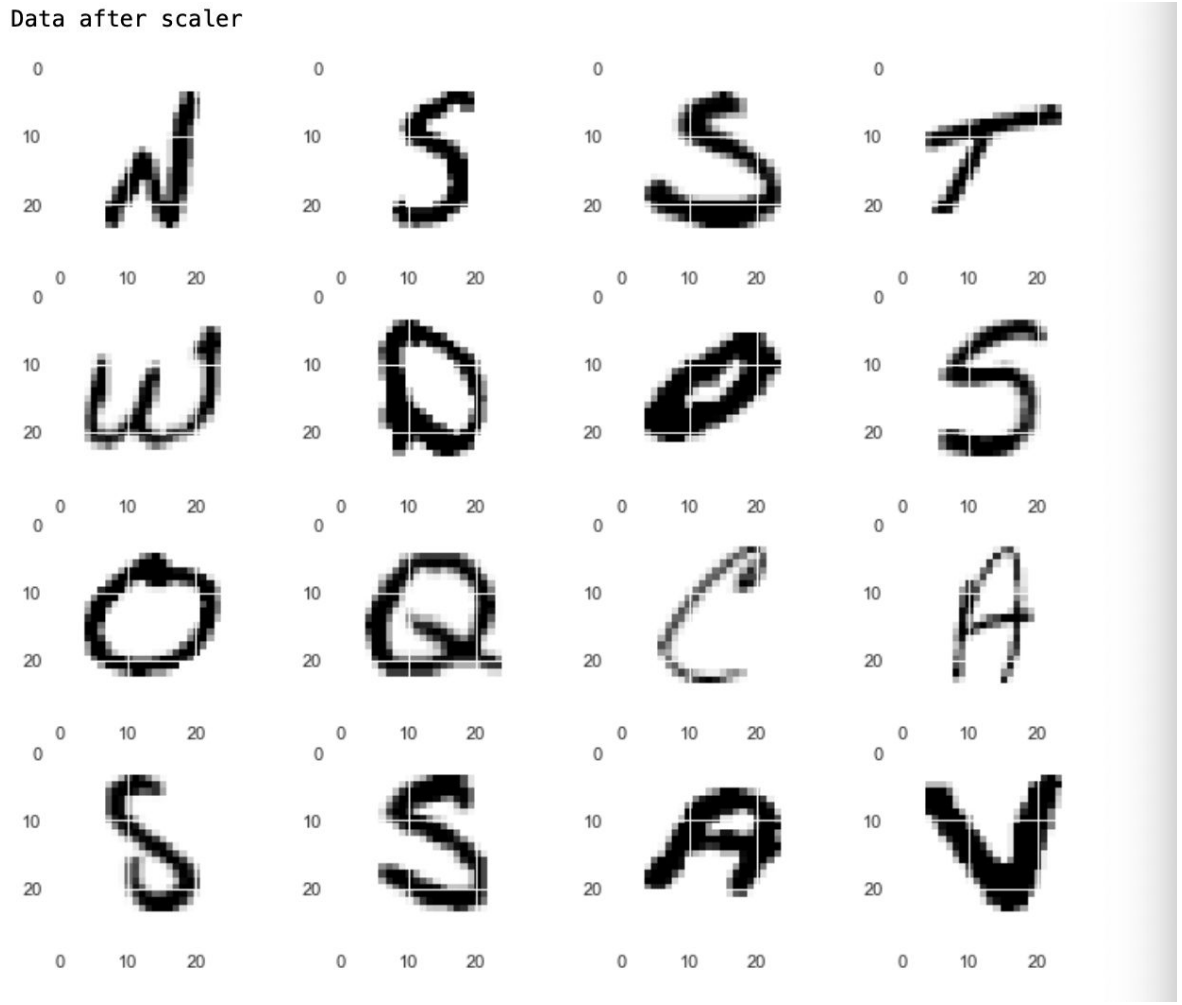
   Coremltools will be involved later in the project.

   First denoise the image using Greycodes and train the processed data.

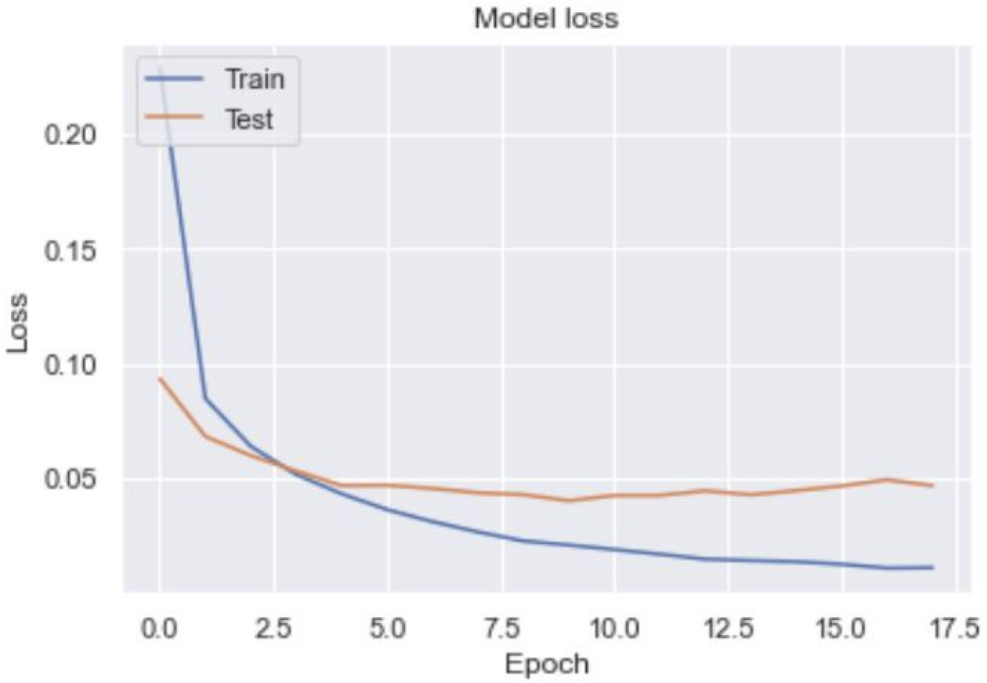
   The accuracy will be obtained by comparing the predicted label as output from the model with the actuarial label attached to it.

4. Preliminary results:

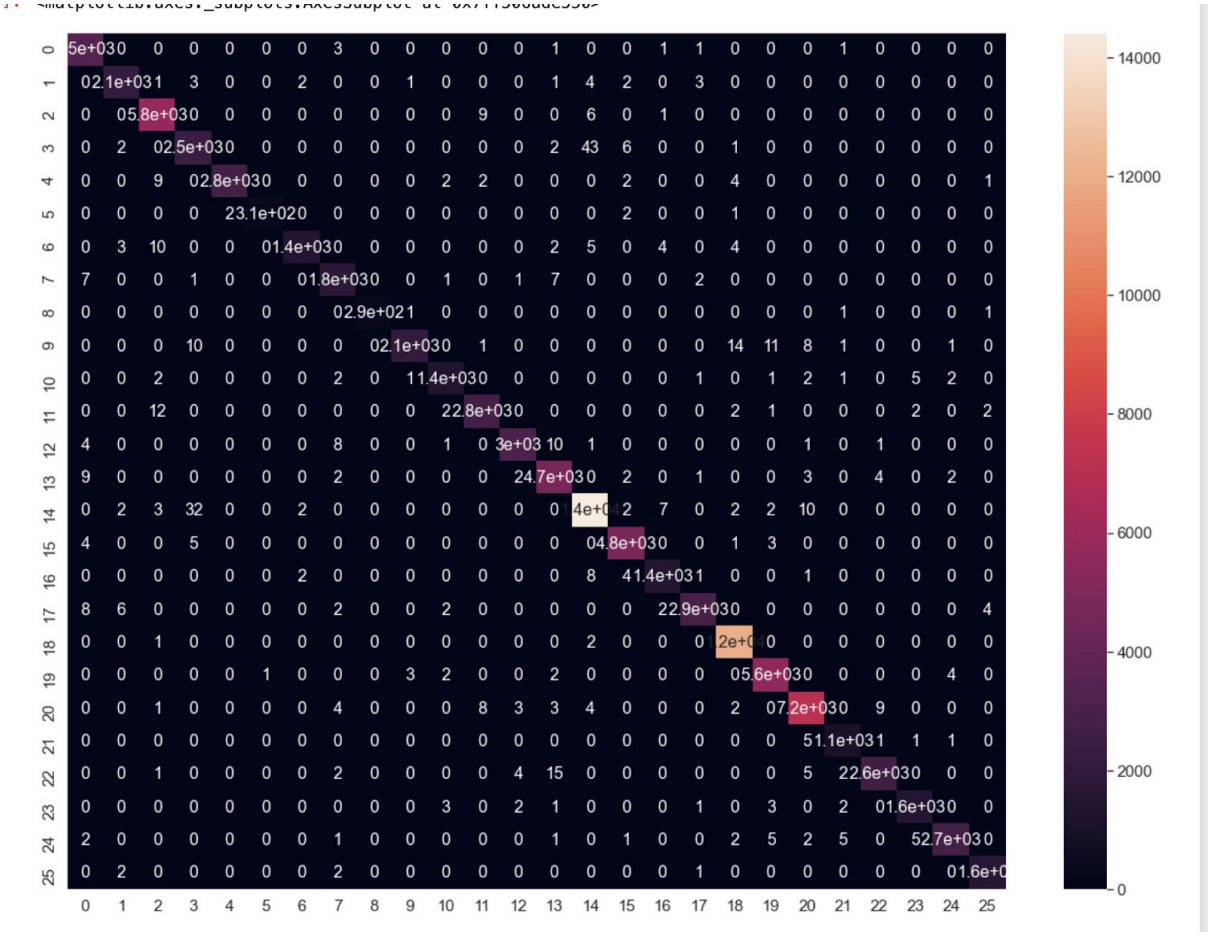
The input trained data after processed



The loss of the model with increasing Epoch: (the result in train data shows that the model is neither underfitting not overfitting)



The heat map for the confusion matrix:



From the overall result of the model, the final accuracy of the CNN model is 0.994.

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Epoch 1/18
1397/1397 - 62s - loss: 0.2289 - accuracy: 0.9369 - val_loss: 0.0935 - val_accuracy: 0.9738
Epoch 2/18
1397/1397 - 108s - loss: 0.0850 - accuracy: 0.9763 - val_loss: 0.0685 - val_accuracy: 0.9817
Epoch 3/18
1397/1397 - 67s - loss: 0.0641 - accuracy: 0.9817 - val_loss: 0.0601 - val_accuracy: 0.9836
Epoch 4/18
1397/1397 - 74s - loss: 0.0518 - accuracy: 0.9849 - val_loss: 0.0533 - val_accuracy: 0.9862
Epoch 5/18
1397/1397 - 81s - loss: 0.0435 - accuracy: 0.9873 - val_loss: 0.0470 - val_accuracy: 0.9883
Epoch 6/18
1397/1397 - 73s - loss: 0.0366 - accuracy: 0.9886 - val_loss: 0.0472 - val_accuracy: 0.9885
Epoch 7/18
1397/1397 - 80s - loss: 0.0313 - accuracy: 0.9903 - val_loss: 0.0457 - val_accuracy: 0.9888
Epoch 8/18
1397/1397 - 76s - loss: 0.0268 - accuracy: 0.9914 - val_loss: 0.0439 - val_accuracy: 0.9902
Epoch 9/18
1397/1397 - 82s - loss: 0.0229 - accuracy: 0.9923 - val_loss: 0.0431 - val_accuracy: 0.9910
Epoch 10/18
1397/1397 - 74s - loss: 0.0211 - accuracy: 0.9931 - val_loss: 0.0404 - val_accuracy: 0.9921
Epoch 11/18
1397/1397 - 84s - loss: 0.0192 - accuracy: 0.9934 - val_loss: 0.0427 - val_accuracy: 0.9921
Epoch 12/18
1397/1397 - 91s - loss: 0.0172 - accuracy: 0.9943 - val_loss: 0.0428 - val_accuracy: 0.9925
Epoch 13/18
1397/1397 - 109s - loss: 0.0150 - accuracy: 0.9948 - val_loss: 0.0448 - val_accuracy: 0.9924
Epoch 14/18
1397/1397 - 107s - loss: 0.0144 - accuracy: 0.9950 - val_loss: 0.0430 - val_accuracy: 0.9931
Epoch 15/18
1397/1397 - 86s - loss: 0.0139 - accuracy: 0.9953 - val_loss: 0.0449 - val_accuracy: 0.9933
Epoch 16/18
1397/1397 - 87s - loss: 0.0128 - accuracy: 0.9956 - val_loss: 0.0469 - val_accuracy: 0.9930
Epoch 17/18
1397/1397 - 94s - loss: 0.0111 - accuracy: 0.9963 - val_loss: 0.0496 - val_accuracy: 0.9926
Epoch 18/18
1397/1397 - 97s - loss: 0.0113 - accuracy: 0.9961 - val_loss: 0.0470 - val_accuracy: 0.9941
CNN Score: 0.9941361546516418
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