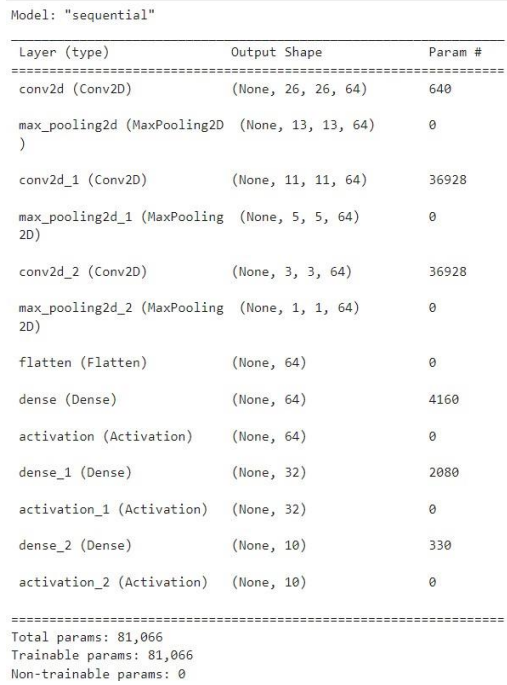



## Project Development Phase Model Performance Test

Date	10 November 2022
Team ID	PNT2022TMID07699
Project Name	Project – A novel method for handwritten digit recognition system.
Maximum Marks	10 Marks

### Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Values	Screenshot
1.	Metrics	<b>Regression Model:</b> model summary	 <pre> Model: "sequential" ----- Layer (type)                 Output Shape              Param # ----- conv2d (Conv2D)              (None, 26, 26, 64)        640 max_pooling2d (MaxPooling2D) (None, 13, 13, 64)         0 conv2d_1 (Conv2D)            (None, 11, 11, 64)        36928 max_pooling2d_1 (MaxPooling2D) (None, 5, 5, 64)          0 conv2d_2 (Conv2D)            (None, 3, 3, 64)          36928 max_pooling2d_2 (MaxPooling2D) (None, 1, 1, 64)          0 flatten (Flatten)            (None, 64)                 0 dense (Dense)                 (None, 64)                 4160 activation (Activation)       (None, 64)                 0 dense_1 (Dense)               (None, 32)                 2080 activation_1 (Activation)     (None, 32)                 0 dense_2 (Dense)               (None, 10)                 330 activation_2 (Activation)     (None, 10)                 0 ----- Total params: 81,066 Trainable params: 81,066 Non-trainable params: 0 </pre>

2.	Accuracy	Accuracy of 99.21% is achieved.	<div>Epoch 1/10</div> <div>1125/1125 [=====] - 43s 37ms/step - loss: 0.3674 - accuracy: 0.8839 - val_loss: 0.1889 - val_accuracy: 0.9452</div> <div>Epoch 2/10</div> <div>1125/1125 [=====] - 44s 39ms/step - loss: 0.1151 - accuracy: 0.9643 - val_loss: 0.1069 - val_accuracy: 0.9679</div> <div>Epoch 3/10</div> <div>1125/1125 [=====] - 42s 38ms/step - loss: 0.0821 - accuracy: 0.9745 - val_loss: 0.0724 - val_accuracy: 0.9774</div> <div>Epoch 4/10</div> <div>1125/1125 [=====] - 43s 38ms/step - loss: 0.0639 - accuracy: 0.9803 - val_loss: 0.0748 - val_accuracy: 0.9774</div> <div>Epoch 5/10</div> <div>1125/1125 [=====] - 43s 38ms/step - loss: 0.0512 - accuracy: 0.9839 - val_loss: 0.0748 - val_accuracy: 0.9762</div> <div>Epoch 6/10</div> <div>1125/1125 [=====] - 46s 41ms/step - loss: 0.0431 - accuracy: 0.9860 - val_loss: 0.0760 - val_accuracy: 0.9782</div> <div>Epoch 7/10</div> <div>1125/1125 [=====] - 60s 53ms/step - loss: 0.0347 - accuracy: 0.9884 - val_loss: 0.0810 - val_accuracy: 0.9786</div> <div>Epoch 8/10</div> <div>1125/1125 [=====] - 64s 57ms/step - loss: 0.0282 - accuracy: 0.9909 - val_loss: 0.0697 - val_accuracy: 0.9809</div> <div>Epoch 9/10</div> <div>1125/1125 [=====] - 52s 46ms/step - loss: 0.0243 - accuracy: 0.9919 - val_loss: 0.0730 - val_accuracy: 0.9797</div> <div>Epoch 10/10</div> <div>1125/1125 [=====] - 42s 37ms/step - loss: 0.0229 - accuracy: 0.9921 - val_loss: 0.0620 - val_accuracy: 0.9837</div> <div>Out[26]:</div>
3.	Tune the model	Dataset is tested and digits are recognized.	<div>In [101... img = Image.open(streaming_body_1).convert("L") img = img.resize( (28,28) )</div> <div>In [102... img</div> <div>Out[102... </div> <div>In [103... im2arr = np.array(img) im2arr = im2arr.reshape(1, 28, 28, 1)</div> <div>In [104... pred = model.predict(im2arr) print(pred)  [[0. 0. 0. 0. 0. 0. 0. 1. 0.]]</div> <div>In [105... print(np.argmax(pred, axis=1))  [8]</div> <div>In [ ]:</div>