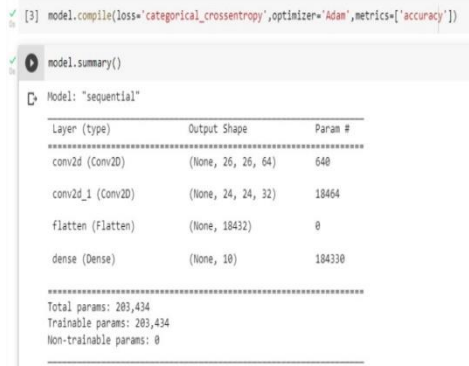
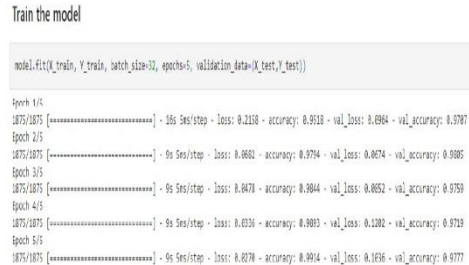


## Project Development Phase Model Performance Test

Date	10 November 2022
Team ID	PNT2022TMID38424
Project Name	Project - A Novel Method For Handwritten Digit Recognition System
Maximum Marks	10 Marks

### Model Performance Testing:

S.No	Parameter	Values	Screenshot
1.	Model Summary	Total params: <b>203,434</b> Trainable params: <b>203,434</b> Non-trainable params: <b>0</b>	 <pre>[3] model.compile(loss='categorical_crossentropy', optimizer='Adam', metrics=['accuracy']) [4] model.summary()  Model: "sequential" Layer (type)           Output Shape          Param # ----- conv2d (Conv2D)         (None, 26, 26, 64)    640 conv2d_1 (Conv2D)       (None, 24, 24, 32)    18464 flatten (Flatten)       (None, 18432)          0 dense (Dense)           (None, 10)            184330 ----- Total params: 203,434 Trainable params: 203,434 Non-trainable params: 0</pre>
2.	Accuracy	Training Accuracy – <b>0.9914</b>  Validation Accuracy – <b>0.9777</b>	 <pre>Train the model  model.fit(X_train, Y_train, batch_size=32, epochs=5, validation_data=(X_test, Y_test))  Epoch 1/5 1075/1075 [=====] - 6s 5ms/step - loss: 0.2110 - accuracy: 0.9310 - val_loss: 0.4964 - val_accuracy: 0.9787 Epoch 2/5 1075/1075 [=====] - 6s 5ms/step - loss: 0.0662 - accuracy: 0.9794 - val_loss: 0.4674 - val_accuracy: 0.9805 Epoch 3/5 1075/1075 [=====] - 6s 5ms/step - loss: 0.0470 - accuracy: 0.9844 - val_loss: 0.4652 - val_accuracy: 0.9759 Epoch 4/5 1075/1075 [=====] - 6s 5ms/step - loss: 0.0331 - accuracy: 0.9903 - val_loss: 0.4202 - val_accuracy: 0.9719 Epoch 5/5 1075/1075 [=====] - 6s 5ms/step - loss: 0.0278 - accuracy: 0.9914 - val_loss: 0.4636 - val_accuracy: 0.9777</pre>

# Model Summary

```
[3] model.compile(loss='categorical_crossentropy',optimizer='Adam',metrics=['accuracy'])
```

```
model.summary()
```

Model: "sequential"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 26, 26, 64)	640
conv2d_1 (Conv2D)	(None, 24, 24, 32)	18464
flatten (Flatten)	(None, 18432)	0
dense (Dense)	(None, 10)	184330
Total params: 203,434		
Trainable params: 203,434		
Non-trainable params: 0		

## Accuracy

### Train the model

```
model.fit(X_train, Y_train, batch_size=32, epochs=5, validation_data=(X_test,Y_test))
```

```
Epoch 1/5
1875/1875 [=====] - 16s 5ms/step - loss: 0.2158 - accuracy: 0.9518 - val_loss: 0.0964 - val_accuracy: 0.9707
Epoch 2/5
1875/1875 [=====] - 9s 5ms/step - loss: 0.0682 - accuracy: 0.9794 - val_loss: 0.0674 - val_accuracy: 0.9805
Epoch 3/5
1875/1875 [=====] - 9s 5ms/step - loss: 0.0478 - accuracy: 0.9844 - val_loss: 0.0852 - val_accuracy: 0.9759
Epoch 4/5
1875/1875 [=====] - 9s 5ms/step - loss: 0.0336 - accuracy: 0.9893 - val_loss: 0.1202 - val_accuracy: 0.9719
Epoch 5/5
1875/1875 [=====] - 9s 5ms/step - loss: 0.0270 - accuracy: 0.9914 - val_loss: 0.1036 - val_accuracy: 0.9777
```