C:\ProgramData\Anaconda3\python.exe C:/Users/rpi08/M/MT/MTP_AD/mainCodes/
allPre_FinalTest_CV/finalTest_Evaluation.py
C:\ProgramData\Anaconda3\lib\site-packages\requests__init__.py:91:
RequestsDependencyWarning: urllib3 (1.26.2) or chardet (3.0.4) doesn't match a
supported version!
  RequestsDependencyWarning)
Main Start running time: 210607_232134,******************************:

Name of corresponding python code file: finalTest_Evaluation

doScaleAfterSplit= True approach.

shiftNumber: 2, windowLength: 2
makeNoiseByJitter: False

Number of Rows Aucual Dataset After Cleaning step:
    Total: 14520
    Anomalies(positives): 89 (0.61% of total)

baseFileName of output Folders and Plots name: finalTest_Evaluation

Shape of Actual npTrain dataset: (14520, 60)
Shape of Actual npFinalTest dataset: (3630, 60)

Number of Actual npTrain labelled 0: 14431
Number of Actual npTrain labelled 1: 89

Number of Actual npFinalTest labelled 0: 3596
Number of Actual npFinalTest labelled 1: 34

Start running time : 210607_232134 ,------------------:

Shape of Actual yXtrainRolled After Rolling: (28856, 60)

Shape of Actual yXfinalTestShifted dataset: (3595, 60)
Shape of Actual yXfinalTestRolled After Rolling: (7188, 60)

Start Creating new folder finalTest run: 210607_232134

Start running time Data Augmentation: 210607_232134
,+++++++++++++++++++++++++++++++++++++++:

2021-06-07 23:21:34.887435: I tensorflow/core/platform/cpu_feature_guard.cc:
142] Your CPU supports instructions that this TensorFlow binary was not

compiled to use: AVX AVX2
2021-06-07 23:21:34.890034: I tensorflow/core/common_runtime/process_util.cc:
147] Creating new thread pool with default inter op setting: 2. Tune using
inter_op_parallelism_threads for best performance.

Hyperparameters of Data Augmentation model:
epochs: 1000, batch: 5, lr: 0.001, FitShuffle: True

Data Augmentation model.summary():

Model: "sequential"

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 236)	28084
dense_1 (Dense)	(None, 188)	44556
dense_2 (Dense)	(None, 153)	28917
dense_3 (Dense)	(None, 118)	18172

Total params: 119,729
Trainable params: 119,729

Non-trainable params: 0

None

Data Augmentation MSE Label 1==> mean: 0.000634, min: 0.00022, max: 0.001826

Data Augmentation MSE Label 1==> mean: 0.000422, min: 3.2e-05, max: 0.001573

Data Augmentation MSE Label 1==> mean: 0.000552, min: 8e-06, max: 0.003826

Data Augmentation MSE Label 1==> mean: 0.000875, min: 2e-06, max: 0.008459

Data Augmentation MSE Label 1==> mean: 0.001391, min: 0.0, max: 0.016087

Data Augmentation MSE Label 1==> mean: 0.001925, min: 0.0, max: 0.017263

Data Augmentation MSE Label 1==> mean: 0.002419, min: 0.0, max: 0.016966

Data Augmentation MSE Label 1==> mean: 0.003257, min: 0.0, max: 0.02692

Data Augmentation MSE Label 1==> mean: 0.003862, min: 0.0, max: 0.035516

Data Augmentation MSE Label 1==> mean: 0.003838, min: 0.0, max: 0.030996

Data Augmentation MSE Label 1==> mean: 0.003145, min: 0.0, max: 0.02691

Data Augmentation MSE Label 1==> mean: 0.003362, min: 0.0, max: 0.038015

Data Augmentation MSE Label 1==> mean: 0.003726, min: 0.0, max: 0.039637

Data Augmentation MSE Label 1==> mean: 0.003359, min: 0.0, max: 0.029118

MSE All generated Augmented data:
mean: 0.00234
min: 1.9e-05
max: 0.020937

End running time Data Augmentation: 210607_232209
,++++++++++++++++++++++++++++++++++.

Shape of data after Transform ToOneRow to give finalTest Model:

xtrain: (15646, 118), ytrain: (15646,)
xfinalTest: (3594, 118), yfinalTest: (3594,)

Number of final label 0 in yXtrain: 14341

Number of final label 1 in yXtrain_Before_AddingAugedData: 87
Number of final label 1 in yXtrain_After_AddingAugedData: 1305

Hyperparameters of finalTest Model:
epochs: 500, batch: 32, lr: 0.0001, flagSeed: True, FitShuffle: True

finalTest Model.summary():

Model: "sequential"

Layer (type)	Output Shape	Param #
lstm (LSTM)	(None, 236)	335120
dense (Dense)	(None, 188)	44556
dense_1 (Dense)	(None, 36)	6804
dense_2 (Dense)	(None, 1)	37

Total params: 386,517
Trainable params: 386,517
Non-trainable params: 0

None

finalTest Model config:

```
{'name': 'sequential', 'layers': [{'class_name': 'LSTM', 'config': {'name': '
lstm', 'trainable': True, 'batch_input_shape': (None, 1, 118), 'dtype': '
float32', 'return_sequences': False, 'return_state': False, 'go_backwards':
False, 'stateful': False, 'unroll': False, 'time_major': False, 'units': 236
, 'activation': 'tanh', 'recurrent_activation': 'sigmoid', 'use_bias': True,
'kernel_initializer': {'class_name': 'GlorotUniform', 'config': {'seed': None
}}, 'recurrent_initializer': {'class_name': 'Orthogonal', 'config': {'gain': 1
.0, 'seed': None}}, 'bias_initializer': {'class_name': 'Zeros', 'config
': {}}, 'unit_forget_bias': True, 'kernel_regularizer': None,
recurrent_regularizer': None, 'bias_regularizer': None, 'activity_regularizer
': None, 'kernel_constraint': None, 'recurrent_constraint': None, '
bias_constraint': None, 'dropout': 0.0, 'recurrent_dropout': 0.0,
implementation': 2}}, {'class_name': 'Dense', 'config': {'name': 'dense', '
trainable': True, 'dtype': 'float32', 'units': 188, 'activation': 'tanh', '
use_bias': True, 'kernel_initializer': {'class_name': 'GlorotUniform', 'config
': {'seed': None}}, 'bias_initializer': {'class_name': 'Zeros', 'config
': {}}, 'kernel_regularizer': {'class_name': 'L1L2', 'config': {'l1': 0.0, 'l2
': 0.014999999664723873}}, 'bias_regularizer': None, 'activity_regularizer':
None, 'kernel_constraint': None, 'bias_constraint': None}}, {'class_name': '
Dense', 'config': {'name': 'dense_1', 'trainable': True, 'dtype': 'float32',
units': 36, 'activation': 'tanh', 'use_bias': True, 'kernel_initializer': {'
class_name': 'GlorotUniform', 'config': {'seed': None}}, 'bias_initializer': {
': {'class_name': 'Zeros', 'config': {}}, 'kernel_regularizer': {'class_name
```

```
': 'L1L2', 'config': {'l1': 0.0, 'l2': 0.014999999664723873}},  '
bias_regularizer': None, 'activity_regularizer': None, 'kernel_constraint':
None, 'bias_constraint': None}}, {'class_name': 'Dense', 'config': {'name': '
dense_2', 'trainable': True, 'dtype': 'float32', 'units': 1, 'activation': '
sigmoid', 'use_bias': True, 'kernel_initializer': {'class_name': '
GlorotUniform', 'config': {'seed': None}}, 'bias_initializer': {'class_name
': 'Zeros', 'config': {}}, 'kernel_regularizer': None, 'bias_regularizer':
None, 'activity_regularizer': None, 'kernel_constraint': None, '
bias_constraint': None}}]}
```

```
Train on 15646 samples
Epoch 1/500
15646/15646 [==============================] - 5s 297us/sample - loss: 2.7770
 - accuracy: 0.9147
Epoch 2/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.9853
 - accuracy: 0.9418
Epoch 3/500
15646/15646 [==============================] - 3s 176us/sample - loss: 0.4030
 - accuracy: 0.9478
Epoch 4/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.2330
 - accuracy: 0.9522
Epoch 5/500
```

15646/15646 [==============================] - 3s 177us/sample - loss: 0.1853 - accuracy: 0.9558
Epoch 6/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.1701 - accuracy: 0.9574
Epoch 7/500
15646/15646 [==============================] - 3s 178us/sample - loss: 0.1638 - accuracy: 0.9587
Epoch 8/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.1589 - accuracy: 0.9592
Epoch 9/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.1552 - accuracy: 0.9599
Epoch 10/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.1530 - accuracy: 0.9607
Epoch 11/500
15646/15646 [==============================] - 3s 179us/sample - loss: 0.1500 - accuracy: 0.9611
Epoch 12/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.1475 - accuracy: 0.9618
Epoch 13/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.1450

```
- accuracy: 0.9615
Epoch 14/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.1430
- accuracy: 0.9622
Epoch 15/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.1408
- accuracy: 0.9625
Epoch 16/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.1386
- accuracy: 0.9632
Epoch 17/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.1362
- accuracy: 0.9640
Epoch 18/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.1347
- accuracy: 0.9641
Epoch 19/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.1333
- accuracy: 0.9648
Epoch 20/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.1310
- accuracy: 0.9653
Epoch 21/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.1293
- accuracy: 0.9664
```

```
Epoch 22/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.1268
    - accuracy: 0.9666
Epoch 23/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.1255
    - accuracy: 0.9667
Epoch 24/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.1234
    - accuracy: 0.9667
Epoch 25/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.1212
    - accuracy: 0.9690
Epoch 26/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.1194
    - accuracy: 0.9698
Epoch 27/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.1178
    - accuracy: 0.9702
Epoch 28/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.1159
    - accuracy: 0.9704
Epoch 29/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.1141
    - accuracy: 0.9713
Epoch 30/500
```

```
15646/15646 [==============================] - 3s 181us/sample - loss: 0.1130
 - accuracy: 0.9723
Epoch 31/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.1106
 - accuracy: 0.9736
Epoch 32/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.1087
 - accuracy: 0.9744
Epoch 33/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.1085
 - accuracy: 0.9742
Epoch 34/500
15646/15646 [==============================] - 3s 179us/sample - loss: 0.1059
 - accuracy: 0.9755
Epoch 35/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.1047
 - accuracy: 0.9760
Epoch 36/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.1038
 - accuracy: 0.9764
Epoch 37/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.1022
 - accuracy: 0.9767
Epoch 38/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.1008
```

- accuracy: 0.9771
Epoch 39/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0996
- accuracy: 0.9774
Epoch 40/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0983
- accuracy: 0.9781
Epoch 41/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0967
- accuracy: 0.9790
Epoch 42/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0961
- accuracy: 0.9791
Epoch 43/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0946
- accuracy: 0.9793
Epoch 44/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0944
- accuracy: 0.9792
Epoch 45/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0926
- accuracy: 0.9804
Epoch 46/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0914
- accuracy: 0.9808

```
Epoch 47/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0909
  - accuracy: 0.9808
Epoch 48/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0902
  - accuracy: 0.9804
Epoch 49/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0887
  - accuracy: 0.9818
Epoch 50/500
15646/15646 [==============================] - 3s 178us/sample - loss: 0.0880
  - accuracy: 0.9817
Epoch 51/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0870
  - accuracy: 0.9826
Epoch 52/500
15646/15646 [==============================] - 3s 179us/sample - loss: 0.0869
  - accuracy: 0.9818
Epoch 53/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0857
  - accuracy: 0.9820
Epoch 54/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0846
  - accuracy: 0.9834
Epoch 55/500
```

```
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0844
 - accuracy: 0.9829
Epoch 56/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0834
 - accuracy: 0.9836
Epoch 57/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0822
 - accuracy: 0.9836
Epoch 58/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0819
 - accuracy: 0.9840
Epoch 59/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0808
 - accuracy: 0.9842
Epoch 60/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0808
 - accuracy: 0.9841
Epoch 61/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0798
 - accuracy: 0.9845
Epoch 62/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0795
 - accuracy: 0.9840
Epoch 63/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0787
```

```
- accuracy: 0.9847
Epoch 64/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0782
- accuracy: 0.9849
Epoch 65/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0773
- accuracy: 0.9847
Epoch 66/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0767
- accuracy: 0.9854
Epoch 67/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0761
- accuracy: 0.9852
Epoch 68/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0755
- accuracy: 0.9859
Epoch 69/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0757
- accuracy: 0.9858
Epoch 70/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0743
- accuracy: 0.9860
Epoch 71/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0744
- accuracy: 0.9863
```

```
Epoch 72/500
15646/15646 [==============================] - 3s 204us/sample - loss: 0.0734
 - accuracy: 0.9863
Epoch 73/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0732
 - accuracy: 0.9861
Epoch 74/500
15646/15646 [==============================] - 3s 203us/sample - loss: 0.0727
 - accuracy: 0.9861
Epoch 75/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0727
 - accuracy: 0.9864
Epoch 76/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0716
 - accuracy: 0.9868
Epoch 77/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0717
 - accuracy: 0.9862
Epoch 78/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0715
 - accuracy: 0.9870
Epoch 79/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0702
 - accuracy: 0.9870
Epoch 80/500
```

```
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0696
 - accuracy: 0.9870
Epoch 81/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0693
 - accuracy: 0.9871
Epoch 82/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0683
 - accuracy: 0.9873
Epoch 83/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0683
 - accuracy: 0.9870
Epoch 84/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0681
 - accuracy: 0.9872
Epoch 85/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0675
 - accuracy: 0.9874
Epoch 86/500
15646/15646 [==============================] - 3s 205us/sample - loss: 0.0673
 - accuracy: 0.9877
Epoch 87/500
15646/15646 [==============================] - 3s 199us/sample - loss: 0.0672
 - accuracy: 0.9873
Epoch 88/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0671
```

```
                           - accuracy: 0.9879
Epoch 89/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0660
                           - accuracy: 0.9875
Epoch 90/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0657
                           - accuracy: 0.9877
Epoch 91/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0659
                           - accuracy: 0.9877
Epoch 92/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0647
                           - accuracy: 0.9879
Epoch 93/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0641
                           - accuracy: 0.9884
Epoch 94/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0639
                           - accuracy: 0.9885
Epoch 95/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0643
                           - accuracy: 0.9880
Epoch 96/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0635
                           - accuracy: 0.9882
```

```
Epoch 97/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0630
       - accuracy: 0.9882
Epoch 98/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0637
       - accuracy: 0.9884
Epoch 99/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0629
       - accuracy: 0.9882
Epoch 100/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0622
       - accuracy: 0.9889
Epoch 101/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0620
       - accuracy: 0.9894
Epoch 102/500
15646/15646 [==============================] - 3s 207us/sample - loss: 0.0614
       - accuracy: 0.9886
Epoch 103/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0616
       - accuracy: 0.9890
Epoch 104/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0606
       - accuracy: 0.9890
Epoch 105/500
```

15646/15646 [==============================] - 3s 181us/sample - loss: 0.0609 - accuracy: 0.9891
Epoch 106/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0610 - accuracy: 0.9884
Epoch 107/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0600 - accuracy: 0.9892
Epoch 108/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0603 - accuracy: 0.9886
Epoch 109/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0602 - accuracy: 0.9894
Epoch 110/500
15646/15646 [==============================] - 3s 205us/sample - loss: 0.0592 - accuracy: 0.9896
Epoch 111/500
15646/15646 [==============================] - 3s 203us/sample - loss: 0.0593 - accuracy: 0.9894
Epoch 112/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0589 - accuracy: 0.9889
Epoch 113/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0592

- accuracy: 0.9893
Epoch 114/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0583
- accuracy: 0.9891
Epoch 115/500
15646/15646 [==============================] - 3s 206us/sample - loss: 0.0583
- accuracy: 0.9891
Epoch 116/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0576
- accuracy: 0.9896
Epoch 117/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0576
- accuracy: 0.9895
Epoch 118/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0575
- accuracy: 0.9898
Epoch 119/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0567
- accuracy: 0.9900
Epoch 120/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0567
- accuracy: 0.9899
Epoch 121/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0570
- accuracy: 0.9899

Epoch 122/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0568
- accuracy: 0.9898
Epoch 123/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0556
- accuracy: 0.9899
Epoch 124/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0558
- accuracy: 0.9897
Epoch 125/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0563
- accuracy: 0.9897
Epoch 126/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0552
- accuracy: 0.9899
Epoch 127/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0553
- accuracy: 0.9901
Epoch 128/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0552
- accuracy: 0.9901
Epoch 129/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0548
- accuracy: 0.9900
Epoch 130/500

```
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0553
 - accuracy: 0.9902
Epoch 131/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0542
 - accuracy: 0.9902
Epoch 132/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0538
 - accuracy: 0.9906
Epoch 133/500
15646/15646 [==============================] - 3s 198us/sample - loss: 0.0538
 - accuracy: 0.9903
Epoch 134/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0536
 - accuracy: 0.9903
Epoch 135/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0535
 - accuracy: 0.9902
Epoch 136/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0528
 - accuracy: 0.9907
Epoch 137/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0537
 - accuracy: 0.9905
Epoch 138/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0528
```

- accuracy: 0.9905
Epoch 139/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0529
- accuracy: 0.9903
Epoch 140/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0522
- accuracy: 0.9902
Epoch 141/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0520
- accuracy: 0.9906
Epoch 142/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0523
- accuracy: 0.9905
Epoch 143/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0516
- accuracy: 0.9907
Epoch 144/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0519
- accuracy: 0.9905
Epoch 145/500
15646/15646 [==============================] - 3s 203us/sample - loss: 0.0519
- accuracy: 0.9908
Epoch 146/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0517
- accuracy: 0.9905

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Epoch 147/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0513
            - accuracy: 0.9906
Epoch 148/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0507
            - accuracy: 0.9909
Epoch 149/500
15646/15646 [==============================] - 3s 199us/sample - loss: 0.0507
            - accuracy: 0.9911
Epoch 150/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0506
            - accuracy: 0.9904
Epoch 151/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0506
            - accuracy: 0.9907
Epoch 152/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0502
            - accuracy: 0.9904
Epoch 153/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0502
            - accuracy: 0.9910
Epoch 154/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0498
            - accuracy: 0.9907
Epoch 155/500
```

15646/15646 [==============================] - 3s 198us/sample - loss: 0.0491 - accuracy: 0.9911
Epoch 156/500
15646/15646 [==============================] - 3s 213us/sample - loss: 0.0497 - accuracy: 0.9911
Epoch 157/500
15646/15646 [==============================] - 3s 198us/sample - loss: 0.0505 - accuracy: 0.9907
Epoch 158/500
15646/15646 [==============================] - 3s 216us/sample - loss: 0.0498 - accuracy: 0.9907
Epoch 159/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0487 - accuracy: 0.9912
Epoch 160/500
15646/15646 [==============================] - 3s 199us/sample - loss: 0.0495 - accuracy: 0.9910
Epoch 161/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0487 - accuracy: 0.9912
Epoch 162/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0489 - accuracy: 0.9915
Epoch 163/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0488

- accuracy: 0.9911
Epoch 164/500
15646/15646 [==============================] - 3s 199us/sample - loss: 0.0483
- accuracy: 0.9910
Epoch 165/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0477
- accuracy: 0.9914
Epoch 166/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0484
- accuracy: 0.9913
Epoch 167/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0481
- accuracy: 0.9912
Epoch 168/500
15646/15646 [==============================] - 3s 206us/sample - loss: 0.0483
- accuracy: 0.9913
Epoch 169/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0478
- accuracy: 0.9917
Epoch 170/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0477
- accuracy: 0.9912
Epoch 171/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0473
- accuracy: 0.9914

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Epoch 172/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0476
    - accuracy: 0.9916
Epoch 173/500
15646/15646 [==============================] - 3s 198us/sample - loss: 0.0474
    - accuracy: 0.9912
Epoch 174/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0475
    - accuracy: 0.9913
Epoch 175/500
15646/15646 [==============================] - 3s 208us/sample - loss: 0.0475
    - accuracy: 0.9916
Epoch 176/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0465
    - accuracy: 0.9915
Epoch 177/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0472
    - accuracy: 0.9914
Epoch 178/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0466
    - accuracy: 0.9917
Epoch 179/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0463
    - accuracy: 0.9918
Epoch 180/500
```

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15646/15646 [==============================] - 3s 183us/sample - loss: 0.0466
 - accuracy: 0.9914
Epoch 181/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0466
 - accuracy: 0.9919
Epoch 182/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0461
 - accuracy: 0.9914
Epoch 183/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0455
 - accuracy: 0.9916
Epoch 184/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0459
 - accuracy: 0.9919
Epoch 185/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0455
 - accuracy: 0.9917
Epoch 186/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0451
 - accuracy: 0.9919
Epoch 187/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0460
 - accuracy: 0.9918
Epoch 188/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0453
```

- accuracy: 0.9918
Epoch 189/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0449
- accuracy: 0.9918
Epoch 190/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0452
- accuracy: 0.9918
Epoch 191/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0447
- accuracy: 0.9919
Epoch 192/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0450
- accuracy: 0.9919
Epoch 193/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0451
- accuracy: 0.9919
Epoch 194/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0444
- accuracy: 0.9923
Epoch 195/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0445
- accuracy: 0.9919
Epoch 196/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0440
- accuracy: 0.9920

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Epoch 197/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0446
  - accuracy: 0.9920
Epoch 198/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0442
  - accuracy: 0.9919
Epoch 199/500
15646/15646 [==============================] - 3s 210us/sample - loss: 0.0444
  - accuracy: 0.9916
Epoch 200/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0435
  - accuracy: 0.9922
Epoch 201/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0441
  - accuracy: 0.9923
Epoch 202/500
15646/15646 [==============================] - 3s 203us/sample - loss: 0.0439
  - accuracy: 0.9923
Epoch 203/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0432
  - accuracy: 0.9918
Epoch 204/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0434
  - accuracy: 0.9921
Epoch 205/500
```

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15646/15646 [==============================] - 3s 200us/sample - loss: 0.0435
 - accuracy: 0.9924
Epoch 206/500
15646/15646 [==============================] - 3s 210us/sample - loss: 0.0429
 - accuracy: 0.9925
Epoch 207/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0429
 - accuracy: 0.9927
Epoch 208/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0427
 - accuracy: 0.9921
Epoch 209/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0428
 - accuracy: 0.9925
Epoch 210/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0429
 - accuracy: 0.9925
Epoch 211/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0432
 - accuracy: 0.9921
Epoch 212/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0429
 - accuracy: 0.9919
Epoch 213/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0426
```

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- accuracy: 0.9918
Epoch 214/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0426
- accuracy: 0.9923
Epoch 215/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0425
- accuracy: 0.9926
Epoch 216/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0419
- accuracy: 0.9926
Epoch 217/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0419
- accuracy: 0.9925
Epoch 218/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0422
- accuracy: 0.9922
Epoch 219/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0419
- accuracy: 0.9925
Epoch 220/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0419
- accuracy: 0.9926
Epoch 221/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0416
- accuracy: 0.9928
```

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Epoch 222/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0415
 - accuracy: 0.9924
Epoch 223/500
15646/15646 [==============================] - 3s 206us/sample - loss: 0.0417
 - accuracy: 0.9925
Epoch 224/500
15646/15646 [==============================] - 3s 199us/sample - loss: 0.0411
 - accuracy: 0.9925
Epoch 225/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0415
 - accuracy: 0.9926
Epoch 226/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0412
 - accuracy: 0.9927
Epoch 227/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0409
 - accuracy: 0.9928
Epoch 228/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0411
 - accuracy: 0.9930
Epoch 229/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0408
 - accuracy: 0.9926
Epoch 230/500
```

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15646/15646 [==============================] - 3s 185us/sample - loss: 0.0405
 - accuracy: 0.9926
Epoch 231/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0409
 - accuracy: 0.9926
Epoch 232/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0403
 - accuracy: 0.9927
Epoch 233/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0401
 - accuracy: 0.9928
Epoch 234/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0405
 - accuracy: 0.9930
Epoch 235/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0402
 - accuracy: 0.9930
Epoch 236/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0399
 - accuracy: 0.9928
Epoch 237/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0401
 - accuracy: 0.9930
Epoch 238/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0403
```

```
- accuracy: 0.9925
Epoch 239/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0406
- accuracy: 0.9923
Epoch 240/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0399
- accuracy: 0.9929
Epoch 241/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0399
- accuracy: 0.9927
Epoch 242/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0393
- accuracy: 0.9934
Epoch 243/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0398
- accuracy: 0.9928
Epoch 244/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0393
- accuracy: 0.9926
Epoch 245/500
15646/15646 [==============================] - 3s 209us/sample - loss: 0.0394
- accuracy: 0.9929
Epoch 246/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0393
- accuracy: 0.9930
```

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Epoch 247/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0395
    - accuracy: 0.9928
Epoch 248/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0395
    - accuracy: 0.9926
Epoch 249/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0397
    - accuracy: 0.9930
Epoch 250/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0389
    - accuracy: 0.9929
Epoch 251/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0396
    - accuracy: 0.9926
Epoch 252/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0388
    - accuracy: 0.9930
Epoch 253/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0388
    - accuracy: 0.9929
Epoch 254/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0392
    - accuracy: 0.9930
Epoch 255/500
```

```
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0389
- accuracy: 0.9929
Epoch 256/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0389
- accuracy: 0.9930
Epoch 257/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0381
- accuracy: 0.9927
Epoch 258/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0385
- accuracy: 0.9929
Epoch 259/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0381
- accuracy: 0.9930
Epoch 260/500
15646/15646 [==============================] - 3s 204us/sample - loss: 0.0380
- accuracy: 0.9929
Epoch 261/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0384
- accuracy: 0.9931
Epoch 262/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0378
- accuracy: 0.9932
Epoch 263/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0384
```

- accuracy: 0.9930
Epoch 264/500
15646/15646 [==============================] - 3s 199us/sample - loss: 0.0375
- accuracy: 0.9933
Epoch 265/500
15646/15646 [==============================] - 3s 207us/sample - loss: 0.0374
- accuracy: 0.9933
Epoch 266/500
15646/15646 [==============================] - 4s 224us/sample - loss: 0.0379
- accuracy: 0.9930
Epoch 267/500
15646/15646 [==============================] - 3s 211us/sample - loss: 0.0376
- accuracy: 0.9932
Epoch 268/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0375
- accuracy: 0.9933
Epoch 269/500
15646/15646 [==============================] - 3s 199us/sample - loss: 0.0373
- accuracy: 0.9935
Epoch 270/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0377
- accuracy: 0.9932
Epoch 271/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0369
- accuracy: 0.9934

Epoch 272/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0372
- accuracy: 0.9932
Epoch 273/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0372
- accuracy: 0.9935
Epoch 274/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0368
- accuracy: 0.9934
Epoch 275/500
15646/15646 [==============================] - 3s 215us/sample - loss: 0.0373
- accuracy: 0.9935
Epoch 276/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0369
- accuracy: 0.9932
Epoch 277/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0364
- accuracy: 0.9937
Epoch 278/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0375
- accuracy: 0.9933
Epoch 279/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0372
- accuracy: 0.9933
Epoch 280/500

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15646/15646 [==============================] - 3s 192us/sample - loss: 0.0371
 - accuracy: 0.9931
Epoch 281/500
15646/15646 [==============================] - 3s 178us/sample - loss: 0.0367
 - accuracy: 0.9930
Epoch 282/500
15646/15646 [==============================] - 3s 198us/sample - loss: 0.0369
 - accuracy: 0.9935
Epoch 283/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0366
 - accuracy: 0.9937
Epoch 284/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0362
 - accuracy: 0.9935
Epoch 285/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0364
 - accuracy: 0.9934
Epoch 286/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0363
 - accuracy: 0.9937
Epoch 287/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0363
 - accuracy: 0.9936
Epoch 288/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0364
```

- accuracy: 0.9934
Epoch 289/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0361
- accuracy: 0.9932
Epoch 290/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0359
- accuracy: 0.9935
Epoch 291/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0361
- accuracy: 0.9936
Epoch 292/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0367
- accuracy: 0.9935
Epoch 293/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0358
- accuracy: 0.9935
Epoch 294/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0356
- accuracy: 0.9937
Epoch 295/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0355
- accuracy: 0.9935
Epoch 296/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0359
- accuracy: 0.9939

Epoch 297/500
15646/15646 [==============================] - 3s 206us/sample - loss: 0.0357
        - accuracy: 0.9935
Epoch 298/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0350
        - accuracy: 0.9935
Epoch 299/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0357
        - accuracy: 0.9935
Epoch 300/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0351
        - accuracy: 0.9934
Epoch 301/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0352
        - accuracy: 0.9939
Epoch 302/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0351
        - accuracy: 0.9937
Epoch 303/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0348
        - accuracy: 0.9933
Epoch 304/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0352
        - accuracy: 0.9935
Epoch 305/500

15646/15646 [==============================] - 3s 195us/sample - loss: 0.0350
- accuracy: 0.9935
Epoch 306/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0345
- accuracy: 0.9939
Epoch 307/500
15646/15646 [==============================] - 3s 208us/sample - loss: 0.0352
- accuracy: 0.9940
Epoch 308/500
15646/15646 [==============================] - 4s 238us/sample - loss: 0.0348
- accuracy: 0.9936
Epoch 309/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0349
- accuracy: 0.9937
Epoch 310/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0350
- accuracy: 0.9934
Epoch 311/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0357
- accuracy: 0.9932
Epoch 312/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0343
- accuracy: 0.9937
Epoch 313/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0349

- accuracy: 0.9936
Epoch 314/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0345
- accuracy: 0.9939
Epoch 315/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0347
- accuracy: 0.9939
Epoch 316/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0346
- accuracy: 0.9937
Epoch 317/500
15646/15646 [==============================] - 3s 198us/sample - loss: 0.0345
- accuracy: 0.9939
Epoch 318/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0341
- accuracy: 0.9939
Epoch 319/500
15646/15646 [==============================] - 3s 203us/sample - loss: 0.0344
- accuracy: 0.9937
Epoch 320/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0340
- accuracy: 0.9939
Epoch 321/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0338
- accuracy: 0.9938

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Epoch 322/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0341
    - accuracy: 0.9941
Epoch 323/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0344
    - accuracy: 0.9941
Epoch 324/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0338
    - accuracy: 0.9939
Epoch 325/500
15646/15646 [==============================] - 3s 205us/sample - loss: 0.0339
    - accuracy: 0.9938
Epoch 326/500
15646/15646 [==============================] - 3s 198us/sample - loss: 0.0338
    - accuracy: 0.9942
Epoch 327/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0338
    - accuracy: 0.9938
Epoch 328/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0335
    - accuracy: 0.9941
Epoch 329/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0341
    - accuracy: 0.9941
Epoch 330/500
```

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15646/15646 [==============================] - 3s 197us/sample - loss: 0.0339
 - accuracy: 0.9941
Epoch 331/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0331
 - accuracy: 0.9943
Epoch 332/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0334
 - accuracy: 0.9940
Epoch 333/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0339
 - accuracy: 0.9942
Epoch 334/500
15646/15646 [==============================] - 4s 247us/sample - loss: 0.0331
 - accuracy: 0.9942
Epoch 335/500
15646/15646 [==============================] - 4s 226us/sample - loss: 0.0334
 - accuracy: 0.9937
Epoch 336/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0329
 - accuracy: 0.9942
Epoch 337/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0334
 - accuracy: 0.9941
Epoch 338/500
15646/15646 [==============================] - 4s 234us/sample - loss: 0.0335
```

- accuracy: 0.9943
Epoch 339/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0329
- accuracy: 0.9941
Epoch 340/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0326
- accuracy: 0.9939
Epoch 341/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0336
- accuracy: 0.9937
Epoch 342/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0329
- accuracy: 0.9941
Epoch 343/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0328
- accuracy: 0.9942
Epoch 344/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0328
- accuracy: 0.9939
Epoch 345/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0332
- accuracy: 0.9941
Epoch 346/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0321
- accuracy: 0.9943

```
Epoch 347/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0325
 - accuracy: 0.9942
Epoch 348/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0327
 - accuracy: 0.9942
Epoch 349/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0328
 - accuracy: 0.9942
Epoch 350/500
15646/15646 [==============================] - 3s 208us/sample - loss: 0.0319
 - accuracy: 0.9940
Epoch 351/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0326
 - accuracy: 0.9939
Epoch 352/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0319
 - accuracy: 0.9946
Epoch 353/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0326
 - accuracy: 0.9943
Epoch 354/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0323
 - accuracy: 0.9941
Epoch 355/500
```

15646/15646 [==============================] - 3s 183us/sample - loss: 0.0324 - accuracy: 0.9939
Epoch 356/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0322 - accuracy: 0.9942
Epoch 357/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0321 - accuracy: 0.9939
Epoch 358/500
15646/15646 [==============================] - 3s 210us/sample - loss: 0.0317 - accuracy: 0.9941
Epoch 359/500
15646/15646 [==============================] - 3s 207us/sample - loss: 0.0321 - accuracy: 0.9943
Epoch 360/500
15646/15646 [==============================] - 4s 236us/sample - loss: 0.0322 - accuracy: 0.9945
Epoch 361/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0316 - accuracy: 0.9943
Epoch 362/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0316 - accuracy: 0.9940
Epoch 363/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0320

```
            - accuracy: 0.9944
Epoch 364/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0318
            - accuracy: 0.9943
Epoch 365/500
15646/15646 [==============================] - 3s 207us/sample - loss: 0.0318
            - accuracy: 0.9942
Epoch 366/500
15646/15646 [==============================] - 3s 214us/sample - loss: 0.0320
            - accuracy: 0.9942
Epoch 367/500
15646/15646 [==============================] - 3s 205us/sample - loss: 0.0325
            - accuracy: 0.9940
Epoch 368/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0313
            - accuracy: 0.9944
Epoch 369/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0310
            - accuracy: 0.9945
Epoch 370/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0313
            - accuracy: 0.9943
Epoch 371/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0314
            - accuracy: 0.9946
```

```
Epoch 372/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0316
- accuracy: 0.9942
Epoch 373/500
15646/15646 [==============================] - 3s 193us/sample - loss: 0.0312
- accuracy: 0.9942
Epoch 374/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0317
- accuracy: 0.9942
Epoch 375/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0316
- accuracy: 0.9941
Epoch 376/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0313
- accuracy: 0.9944
Epoch 377/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0312
- accuracy: 0.9944
Epoch 378/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0316
- accuracy: 0.9939
Epoch 379/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0308
- accuracy: 0.9942
Epoch 380/500
```

15646/15646 [==============================] - 3s 201us/sample - loss: 0.0310
 - accuracy: 0.9946
Epoch 381/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0317
 - accuracy: 0.9943
Epoch 382/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0312
 - accuracy: 0.9942
Epoch 383/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0312
 - accuracy: 0.9944
Epoch 384/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0307
 - accuracy: 0.9942
Epoch 385/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0307
 - accuracy: 0.9944
Epoch 386/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0311
 - accuracy: 0.9943
Epoch 387/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0309
 - accuracy: 0.9944
Epoch 388/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0305

```
                    - accuracy: 0.9944
Epoch 389/500
15646/15646 [==============================] - 3s 179us/sample - loss: 0.0306
                    - accuracy: 0.9940
Epoch 390/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0304
                    - accuracy: 0.9944
Epoch 391/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0310
                    - accuracy: 0.9944
Epoch 392/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0308
                    - accuracy: 0.9941
Epoch 393/500
15646/15646 [==============================] - 3s 179us/sample - loss: 0.0305
                    - accuracy: 0.9942
Epoch 394/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0308
                    - accuracy: 0.9945
Epoch 395/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0299
                    - accuracy: 0.9945
Epoch 396/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0302
                    - accuracy: 0.9945
```

```
Epoch 397/500
15646/15646 [==============================] - 3s 179us/sample - loss: 0.0306
 - accuracy: 0.9943
Epoch 398/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0306
 - accuracy: 0.9943
Epoch 399/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0299
 - accuracy: 0.9944
Epoch 400/500
15646/15646 [==============================] - 3s 205us/sample - loss: 0.0301
 - accuracy: 0.9939
Epoch 401/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0301
 - accuracy: 0.9946
Epoch 402/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0305
 - accuracy: 0.9945
Epoch 403/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0304
 - accuracy: 0.9945
Epoch 404/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0300
 - accuracy: 0.9941
Epoch 405/500
```

15646/15646 [==============================] - 3s 185us/sample - loss: 0.0299
- accuracy: 0.9946
Epoch 406/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0301
- accuracy: 0.9944
Epoch 407/500
15646/15646 [==============================] - 3s 213us/sample - loss: 0.0300
- accuracy: 0.9947
Epoch 408/500
15646/15646 [==============================] - 3s 203us/sample - loss: 0.0299
- accuracy: 0.9947
Epoch 409/500
15646/15646 [==============================] - 3s 216us/sample - loss: 0.0298
- accuracy: 0.9946
Epoch 410/500
15646/15646 [==============================] - 3s 211us/sample - loss: 0.0298
- accuracy: 0.9944
Epoch 411/500
15646/15646 [==============================] - 3s 203us/sample - loss: 0.0293
- accuracy: 0.9944
Epoch 412/500
15646/15646 [==============================] - 3s 198us/sample - loss: 0.0299
- accuracy: 0.9948
Epoch 413/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0300

- accuracy: 0.9943
Epoch 414/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0294
- accuracy: 0.9944
Epoch 415/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0293
- accuracy: 0.9946
Epoch 416/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0285
- accuracy: 0.9947
Epoch 417/500
15646/15646 [==============================] - 3s 204us/sample - loss: 0.0301
- accuracy: 0.9943
Epoch 418/500
15646/15646 [==============================] - 3s 204us/sample - loss: 0.0293
- accuracy: 0.9946
Epoch 419/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0293
- accuracy: 0.9947
Epoch 420/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0297
- accuracy: 0.9945
Epoch 421/500
15646/15646 [==============================] - 3s 209us/sample - loss: 0.0298
- accuracy: 0.9946

Epoch 422/500
15646/15646 [==============================] - 3s 203us/sample - loss: 0.0288
 - accuracy: 0.9946
Epoch 423/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0287
 - accuracy: 0.9946
Epoch 424/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0283
 - accuracy: 0.9945
Epoch 425/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0294
 - accuracy: 0.9944
Epoch 426/500
15646/15646 [==============================] - 3s 202us/sample - loss: 0.0294
 - accuracy: 0.9947
Epoch 427/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0286
 - accuracy: 0.9945
Epoch 428/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0293
 - accuracy: 0.9946
Epoch 429/500
15646/15646 [==============================] - 3s 206us/sample - loss: 0.0289
 - accuracy: 0.9948
Epoch 430/500

15646/15646 [==============================] - 3s 194us/sample - loss: 0.0290
- accuracy: 0.9945
Epoch 431/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0289
- accuracy: 0.9944
Epoch 432/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0287
- accuracy: 0.9944
Epoch 433/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0285
- accuracy: 0.9946
Epoch 434/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0285
- accuracy: 0.9947
Epoch 435/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0287
- accuracy: 0.9946
Epoch 436/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0284
- accuracy: 0.9946
Epoch 437/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0287
- accuracy: 0.9947
Epoch 438/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0282

- accuracy: 0.9946
Epoch 439/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0284
- accuracy: 0.9946
Epoch 440/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0285
- accuracy: 0.9946
Epoch 441/500
15646/15646 [==============================] - 3s 208us/sample - loss: 0.0287
- accuracy: 0.9944
Epoch 442/500
15646/15646 [==============================] - 3s 217us/sample - loss: 0.0284
- accuracy: 0.9946
Epoch 443/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0286
- accuracy: 0.9949
Epoch 444/500
15646/15646 [==============================] - 3s 196us/sample - loss: 0.0280
- accuracy: 0.9945
Epoch 445/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0282
- accuracy: 0.9947
Epoch 446/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0282
- accuracy: 0.9944

```
Epoch 447/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0286
 - accuracy: 0.9947
Epoch 448/500
15646/15646 [==============================] - 3s 207us/sample - loss: 0.0279
 - accuracy: 0.9951
Epoch 449/500
15646/15646 [==============================] - 3s 197us/sample - loss: 0.0282
 - accuracy: 0.9946
Epoch 450/500
15646/15646 [==============================] - 3s 200us/sample - loss: 0.0283
 - accuracy: 0.9949
Epoch 451/500
15646/15646 [==============================] - 3s 178us/sample - loss: 0.0283
 - accuracy: 0.9947
Epoch 452/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0280
 - accuracy: 0.9948
Epoch 453/500
15646/15646 [==============================] - 3s 179us/sample - loss: 0.0282
 - accuracy: 0.9948
Epoch 454/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0279
 - accuracy: 0.9950
Epoch 455/500
```

15646/15646 [==============================] - 3s 180us/sample - loss: 0.0283
- accuracy: 0.9948
Epoch 456/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0285
- accuracy: 0.9948
Epoch 457/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0275
- accuracy: 0.9947
Epoch 458/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0277
- accuracy: 0.9948
Epoch 459/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0278
- accuracy: 0.9948
Epoch 460/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0281
- accuracy: 0.9950
Epoch 461/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0273
- accuracy: 0.9946
Epoch 462/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0278
- accuracy: 0.9948
Epoch 463/500
15646/15646 [==============================] - 3s 191us/sample - loss: 0.0277

- accuracy: 0.9944
Epoch 464/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0280
- accuracy: 0.9947
Epoch 465/500
15646/15646 [==============================] - 3s 189us/sample - loss: 0.0277
- accuracy: 0.9949
Epoch 466/500
15646/15646 [==============================] - 3s 181us/sample - loss: 0.0275
- accuracy: 0.9947
Epoch 467/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0270
- accuracy: 0.9951
Epoch 468/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0275
- accuracy: 0.9949
Epoch 469/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0282
- accuracy: 0.9948
Epoch 470/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0272
- accuracy: 0.9950
Epoch 471/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0281
- accuracy: 0.9946

```
Epoch 472/500
15646/15646 [==============================] - 3s 182us/sample - loss: 0.0274
 - accuracy: 0.9947
Epoch 473/500
15646/15646 [==============================] - 3s 188us/sample - loss: 0.0274
 - accuracy: 0.9948
Epoch 474/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0270
 - accuracy: 0.9949
Epoch 475/500
15646/15646 [==============================] - 3s 195us/sample - loss: 0.0270
 - accuracy: 0.9950
Epoch 476/500
15646/15646 [==============================] - 3s 207us/sample - loss: 0.0275
 - accuracy: 0.9947
Epoch 477/500
15646/15646 [==============================] - 3s 210us/sample - loss: 0.0274
 - accuracy: 0.9949
Epoch 478/500
15646/15646 [==============================] - 3s 213us/sample - loss: 0.0273
 - accuracy: 0.9948
Epoch 479/500
15646/15646 [==============================] - 3s 209us/sample - loss: 0.0268
 - accuracy: 0.9948
Epoch 480/500
```

15646/15646 [==============================] - 3s 198us/sample - loss: 0.0269
- accuracy: 0.9949
Epoch 481/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0273
- accuracy: 0.9946
Epoch 482/500
15646/15646 [==============================] - 3s 186us/sample - loss: 0.0269
- accuracy: 0.9950
Epoch 483/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0269
- accuracy: 0.9950
Epoch 484/500
15646/15646 [==============================] - 3s 185us/sample - loss: 0.0270
- accuracy: 0.9948
Epoch 485/500
15646/15646 [==============================] - 3s 180us/sample - loss: 0.0268
- accuracy: 0.9951
Epoch 486/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0264
- accuracy: 0.9951
Epoch 487/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0270
- accuracy: 0.9948
Epoch 488/500
15646/15646 [==============================] - 3s 187us/sample - loss: 0.0265

```
- accuracy: 0.9950
Epoch 489/500
15646/15646 [==============================] - 3s 183us/sample - loss: 0.0270
- accuracy: 0.9950
Epoch 490/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0267
- accuracy: 0.9950
Epoch 491/500
15646/15646 [==============================] - 3s 178us/sample - loss: 0.0268
- accuracy: 0.9948
Epoch 492/500
15646/15646 [==============================] - 3s 184us/sample - loss: 0.0264
- accuracy: 0.9951
Epoch 493/500
15646/15646 [==============================] - 3s 179us/sample - loss: 0.0265
- accuracy: 0.9948
Epoch 494/500
15646/15646 [==============================] - 3s 190us/sample - loss: 0.0272
- accuracy: 0.9946
Epoch 495/500
15646/15646 [==============================] - 3s 192us/sample - loss: 0.0263
- accuracy: 0.9950
Epoch 496/500
15646/15646 [==============================] - 3s 216us/sample - loss: 0.0265
- accuracy: 0.9950
```

```
Epoch 497/500
15646/15646 [==============================] - 3s 201us/sample - loss: 0.0267
 - accuracy: 0.9948
Epoch 498/500
15646/15646 [==============================] - 3s 210us/sample - loss: 0.0264
 - accuracy: 0.9949
Epoch 499/500
15646/15646 [==============================] - 4s 226us/sample - loss: 0.0270
 - accuracy: 0.9946
Epoch 500/500
15646/15646 [==============================] - 3s 194us/sample - loss: 0.0262
 - accuracy: 0.9950
3594/3594 [==============================] - 1s 160us/sample
```

$$
$$:

---*** Average's Results of Model FinalTest Evaluation is such as below:

Approach class_weight did not use

thresholdNum: 0.5

Average of train loss: 0.0575
Average of yPredProbability: 0.2715

classification_report FinalTest:

	precision	recall	f1-score	support
Normal 0	0.99	0.73	0.84	3562
Anomaly 1	0.02	0.50	0.03	32
accuracy			0.73	3594
macro avg	0.51	0.62	0.44	3594
weighted avg	0.99	0.73	0.84	3594

confusion_matrix FinalTest:
True Negatives: 2604
False Positives: 958
False Negatives: 16
True Positives: 16

Average threshold_rt Final Test: 0.45

Average precision_rt Final Test: 0.02
Average recall_rt   Final Test: 0.51

End running time FinalTest Evaluation: 210607_234710
, *****************************.

Process finished with exit code 0