C:\ProgramData\Anaconda3\python.exe C:/Users/rpi08/M/MT/MTP_AD/mainCodes/
allPre_FinalTest_CV/finalTest_CV.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: 210504_220859,*******************************:

Name of corresponding python code file: finalTest_CV

doScaleAfterSplit= True approach.

shiftNumber: 2, windowLength: 2
makeNoiseByJitter: False

Number of Rows Aucual yXRolled_SelFeat_Transformed :
  Total: 14520
  Anomalies(positives): 89 (0.61% of total)

baseFileName of output Folders and Plots name: finalTest_CV

Shape of Actual npTrain dataset: (14520, 60)
Number of Actual npTrain labelled 0: 14431
Number of Actual npTrain labelled 1: 89

Start running time Fold_1: 210504_220901 ,----------------:

Shape of Actual yXtrainRolled After Rolling Fold_1: (23108, 60)

Shape of Actual yXvalidShifted dataset: (2873, 60)
Shape of Actual yXvalidRolled After Rolling Fold_1: (5744, 60)
Start running time Data Augmentation_Fold_1: 210504_220901
,++++++++++++++++++++++++++++++++++++:

2021-05-04 22:09:01.755981: I tensorflow/core/platform/cpu_feature_guard.cc:
142] Your CPU supports instructions that this TensorFlow binary was not
compiled to use: AVX AVX2
2021-05-04 22:09:01.759217: 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: 0.000631, min: 0.00025, max: 0.001717

Data Augmentation MSE Label 1==> mean: 0.000409, min: 2.9e-05, max: 0.001701

Data Augmentation MSE Label 1==> mean: 0.000047, min: 7e-06, max: 0.002781

Data Augmentation MSE Label 1==> mean: 0.000604, min: 2e-06, max: 0.004269

Data Augmentation MSE Label 1==> mean: 0.0000794, min: 1e-06, max: 0.0076

Data Augmentation MSE Label 1==> mean: 0.000983, min: 0.0, max: 0.011277

Data Augmentation MSE Label 1==> mean: 0.001006, min: 0.0, max: 0.006221

Data Augmentation MSE Label 1==> mean: 0.001097, min: 0.0, max: 0.009118

Data Augmentation MSE Label 1==> mean: 0.001119, min: 0.0, max: 0.006659

Data Augmentation MSE Label 1==> mean: 0.001131, min: 0.0, max: 0.003842

Data Augmentation MSE Label 1==> mean: 0.001159, min: 0.0, max: 0.004191

Data Augmentation MSE Label 1==> mean: 0.001153, min: 0.0, max: 0.006128

Data Augmentation MSE Label 1==> mean: 0.001182, min: 0.0, max: 0.007949

Data Augmentation MSE Label 1==> mean: 0.001252, min: 0.0, max: 0.007109

MSE All genereated Augmented data Fold_1:

mean: 0.000928
min: 2.1e-05
max: 0.005754

End running time Data Augmentation_Fold_1: 210504_220953
,++++++++++++++++++++++++++++++++++.

 Shape of data after Transform ToOneRow to give Cross Validation Model in fold_1:

 xtrain: (12380, 118), ytrain: (12380,)
 xvalid: (2872, 118), yvalid: (2872,)

Number of final label 0 in yXtrain_Fold_1: 11495

Number of final label 1 in yXtrain_Before_AddingAugedData_Fold_1: 59
Number of final label 1 in yXtrain_After_AddingAugedData_Fold_1: 885

Hyperparameters of Cross Validation Model:
epochs: 500, batch: 32, lr: 0.0001, numberOfSplits:5, flagSeed: True,
train_val_split_Shuffle: False, FitShuffle: True

Start Creating new folder for each run: 210504_220953

Cross Validation Model.summary():

Model: "sequential"

Layer (type)	Output Shape	Param #
dense (Dense)	(None, 236)	28084
dense_1 (Dense)	(None, 188)	44556
dense_2 (Dense)	(None, 36)	6804
dense_3 (Dense)	(None, 1)	37

Total params: 79,481
Trainable params: 79,481
Non-trainable params: 0

None

Cross Validation Model config:
{'name': 'sequential', 'layers': [{'class_name': 'Dense', 'config': {'name

': 'dense', 'trainable': True, 'batch_input_shape': (None, 118), 'dtype': 'float32', 'units': 236, 'activation': 'tanh', '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}}, {'class_name': 'Dense', 'config': {'name': 'dense_1', '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_2', '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_3', '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 12380 samples
Epoch 1/500
12380/12380 [==============================] - 3s 252us/sample - loss: 3.1778
 - accuracy: 0.9284
Epoch 2/500
12380/12380 [==============================] - 1s 117us/sample - loss: 1.5594
 - accuracy: 0.9366
Epoch 3/500
12380/12380 [==============================] - 2s 124us/sample - loss: 0.7802
 - accuracy: 0.9494
Epoch 4/500
12380/12380 [==============================] - 1s 113us/sample - loss: 0.4289
 - accuracy: 0.9530
Epoch 5/500
12380/12380 [==============================] - 1s 112us/sample - loss: 0.2750
 - accuracy: 0.9572
Epoch 6/500
12380/12380 [==============================] - 1s 112us/sample - loss: 0.2077
 - accuracy: 0.9587
Epoch 7/500
12380/12380 [==============================] - 1s 119us/sample - loss: 0.1776
 - accuracy: 0.9613
Epoch 8/500
```

```
12380/12380 [==============================] - 1s 118us/sample - loss: 0.1624
       - accuracy: 0.9627
Epoch 9/500
12380/12380 [==============================] - 1s 107us/sample - loss: 0.1542
       - accuracy: 0.9635
Epoch 10/500
12380/12380 [==============================] - 1s 113us/sample - loss: 0.1479
       - accuracy: 0.9647
Epoch 11/500
12380/12380 [==============================] - 1s 116us/sample - loss: 0.1433
       - accuracy: 0.9662
Epoch 12/500
12380/12380 [==============================] - 1s 115us/sample - loss: 0.1406
       - accuracy: 0.9658
Epoch 13/500
12380/12380 [==============================] - 2s 123us/sample - loss: 0.1375
       - accuracy: 0.9667
Epoch 14/500
12380/12380 [==============================] - 2s 125us/sample - loss: 0.1344
       - accuracy: 0.9685
Epoch 15/500
12380/12380 [==============================] - 1s 120us/sample - loss: 0.1318
       - accuracy: 0.9687
Epoch 16/500
12380/12380 [==============================] - 1s 113us/sample - loss: 0.1291
```

```
                                                            - accuracy: 0.9687
Epoch 17/500
12380/12380 [==============================] - 1s 106us/sample - loss: 0.1279
                                                            - accuracy: 0.9700
Epoch 18/500
12380/12380 [==============================] - 2s 123us/sample - loss: 0.1255
                                                            - accuracy: 0.9698
Epoch 19/500
12380/12380 [==============================] - 2s 127us/sample - loss: 0.1228
                                                            - accuracy: 0.9707
Epoch 20/500
12380/12380 [==============================] - 1s 111us/sample - loss: 0.1219
                                                            - accuracy: 0.9710
Epoch 21/500
12380/12380 [==============================] - 1s 108us/sample - loss: 0.1193
                                                            - accuracy: 0.9723
Epoch 22/500
12380/12380 [==============================] - 1s 113us/sample - loss: 0.1184
                                                            - accuracy: 0.9725
Epoch 23/500
12380/12380 [==============================] - 1s 116us/sample - loss: 0.1165
                                                            - accuracy: 0.9729
Epoch 24/500
12380/12380 [==============================] - 1s 113us/sample - loss: 0.1153
                                                            - accuracy: 0.9731
```

Epoch 25/500
12380/12380 [==============================] - 1s 110us/sample - loss: 0.1136 - accuracy: 0.9737
Epoch 26/500
12380/12380 [==============================] - 2s 129us/sample - loss: 0.1124 - accuracy: 0.9739
Epoch 27/500
12380/12380 [==============================] - 2s 126us/sample - loss: 0.1105 - accuracy: 0.9743
Epoch 28/500
12380/12380 [==============================] - 1s 121us/sample - loss: 0.1092 - accuracy: 0.9746
Epoch 29/500
12380/12380 [==============================] - 1s 109us/sample - loss: 0.1081 - accuracy: 0.9751
Epoch 30/500
12380/12380 [==============================] - 2s 124us/sample - loss: 0.1064 - accuracy: 0.9750
Epoch 31/500
12380/12380 [==============================] - 1s 116us/sample - loss: 0.1063 - accuracy: 0.9749
Epoch 32/500
12380/12380 [==============================] - 1s 114us/sample - loss: 0.1049 - accuracy: 0.9760
Epoch 33/500

```
12380/12380 [==============================] - 1s 112us/sample - loss: 0.1033
 - accuracy: 0.9758
Epoch 34/500
12380/12380 [==============================] - 1s 118us/sample - loss: 0.1027
 - accuracy: 0.9758
Epoch 35/500
12380/12380 [==============================] - 1s 120us/sample - loss: 0.1010
 - accuracy: 0.9775
Epoch 36/500
12380/12380 [==============================] - 1s 115us/sample - loss: 0.1000
 - accuracy: 0.9767
Epoch 37/500
12380/12380 [==============================] - 1s 118us/sample - loss: 0.0993
 - accuracy: 0.9771
Epoch 38/500
12380/12380 [==============================] - 1s 121us/sample - loss: 0.0979
 - accuracy: 0.9776
Epoch 39/500
12380/12380 [==============================] - 2s 180us/sample - loss: 0.0978
 - accuracy: 0.9779
Epoch 40/500
12380/12380 [==============================] - 1s 111us/sample - loss: 0.0970
 - accuracy: 0.9784
Epoch 41/500
12380/12380 [==============================] - 1s 119us/sample - loss: 0.0957
```

```
- accuracy: 0.9785
Epoch 42/500
12380/12380 [==============================] - 2s 123us/sample - loss: 0.0946
 - accuracy: 0.9785
Epoch 43/500
12380/12380 [==============================] - 1s 120us/sample - loss: 0.0927
 - accuracy: 0.9784
Epoch 44/500
12380/12380 [==============================] - 1s 117us/sample - loss: 0.0931
 - accuracy: 0.9790
Epoch 45/500
12380/12380 [==============================] - 2s 129us/sample - loss: 0.0918
 - accuracy: 0.9794
Epoch 46/500
12380/12380 [==============================] - 1s 119us/sample - loss: 0.0916
 - accuracy: 0.9798
Epoch 47/500
12380/12380 [==============================] - 1s 118us/sample - loss: 0.0905
 - accuracy: 0.9805
Epoch 48/500
12380/12380 [==============================] - 2s 122us/sample - loss: 0.0900
 - accuracy: 0.9806
Epoch 49/500
12380/12380 [==============================] - 1s 121us/sample - loss: 0.0891
 - accuracy: 0.9802
```

```
Epoch 50/500
12380/12380 [==============================] - 1s 117us/sample - loss: 0.0883
        - accuracy: 0.9799
Epoch 51/500
12380/12380 [==============================] - 1s 105us/sample - loss: 0.0868
        - accuracy: 0.9803
Epoch 52/500
12380/12380 [==============================] - 1s 108us/sample - loss: 0.0869
        - accuracy: 0.9805
Epoch 53/500
12380/12380 [==============================] - 2s 129us/sample - loss: 0.0862
        - accuracy: 0.9814
Epoch 54/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0847
        - accuracy: 0.9824
Epoch 55/500
12380/12380 [==============================] - 1s 116us/sample - loss: 0.0846
        - accuracy: 0.9813
Epoch 56/500
12380/12380 [==============================] - 2s 135us/sample - loss: 0.0837
        - accuracy: 0.9819
Epoch 57/500
12380/12380 [==============================] - 2s 126us/sample - loss: 0.0842
        - accuracy: 0.9821
Epoch 58/500
```

```
12380/12380 [==============================] - 1s 113us/sample - loss: 0.0826
- accuracy: 0.9819
Epoch 59/500
12380/12380 [==============================] - 1s 108us/sample - loss: 0.0819
- accuracy: 0.9820
Epoch 60/500
12380/12380 [==============================] - 2s 125us/sample - loss: 0.0821
- accuracy: 0.9828
Epoch 61/500
12380/12380 [==============================] - 2s 124us/sample - loss: 0.0816
- accuracy: 0.9831
Epoch 62/500
12380/12380 [==============================] - 1s 116us/sample - loss: 0.0809
- accuracy: 0.9829
Epoch 63/500
12380/12380 [==============================] - 1s 114us/sample - loss: 0.0797
- accuracy: 0.9828
Epoch 64/500
12380/12380 [==============================] - 2s 124us/sample - loss: 0.0796
- accuracy: 0.9830
Epoch 65/500
12380/12380 [==============================] - 1s 119us/sample - loss: 0.0791
- accuracy: 0.9829
Epoch 66/500
12380/12380 [==============================] - 1s 109us/sample - loss: 0.0784
```

- accuracy: 0.9838
Epoch 67/500
12380/12380 [==============================] - 2s 124us/sample - loss: 0.0779
- accuracy: 0.9837
Epoch 68/500
12380/12380 [==============================] - 2s 127us/sample - loss: 0.0771
- accuracy: 0.9836
Epoch 69/500
12380/12380 [==============================] - 2s 134us/sample - loss: 0.0767
- accuracy: 0.9835
Epoch 70/500
12380/12380 [==============================] - 1s 114us/sample - loss: 0.0759
- accuracy: 0.9842
Epoch 71/500
12380/12380 [==============================] - 1s 118us/sample - loss: 0.0762
- accuracy: 0.9837
Epoch 72/500
12380/12380 [==============================] - 1s 117us/sample - loss: 0.0749
- accuracy: 0.9851
Epoch 73/500
12380/12380 [==============================] - 1s 121us/sample - loss: 0.0746
- accuracy: 0.9847
Epoch 74/500
12380/12380 [==============================] - 1s 117us/sample - loss: 0.0750
- accuracy: 0.9841

Epoch 75/500
12380/12380 [==============================] - 2s 123us/sample - loss: 0.0737
    - accuracy: 0.9847
Epoch 76/500
12380/12380 [==============================] - 2s 122us/sample - loss: 0.0741
    - accuracy: 0.9844
Epoch 77/500
12380/12380 [==============================] - 2s 125us/sample - loss: 0.0733
    - accuracy: 0.9850
Epoch 78/500
12380/12380 [==============================] - 2s 129us/sample - loss: 0.0729
    - accuracy: 0.9854
Epoch 79/500
12380/12380 [==============================] - 2s 138us/sample - loss: 0.0725
    - accuracy: 0.9850
Epoch 80/500
12380/12380 [==============================] - 2s 135us/sample - loss: 0.0725
    - accuracy: 0.9845
Epoch 81/500
12380/12380 [==============================] - 2s 128us/sample - loss: 0.0715
    - accuracy: 0.9847
Epoch 82/500
12380/12380 [==============================] - 2s 138us/sample - loss: 0.0712
    - accuracy: 0.9851
Epoch 83/500

```
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0710
- accuracy: 0.9852
Epoch 84/500
12380/12380 [==============================] - 2s 133us/sample - loss: 0.0706
- accuracy: 0.9852
Epoch 85/500
12380/12380 [==============================] - 2s 135us/sample - loss: 0.0695
- accuracy: 0.9855
Epoch 86/500
12380/12380 [==============================] - 2s 136us/sample - loss: 0.0701
- accuracy: 0.9852
Epoch 87/500
12380/12380 [==============================] - 2s 138us/sample - loss: 0.0692
- accuracy: 0.9857
Epoch 88/500
12380/12380 [==============================] - 2s 132us/sample - loss: 0.0685
- accuracy: 0.9857
Epoch 89/500
12380/12380 [==============================] - 2s 145us/sample - loss: 0.0684
- accuracy: 0.9870
Epoch 90/500
12380/12380 [==============================] - 2s 137us/sample - loss: 0.0690
- accuracy: 0.9851
Epoch 91/500
12380/12380 [==============================] - 2s 129us/sample - loss: 0.0680
```

```
- accuracy: 0.9860
Epoch 92/500
12380/12380 [==============================] - 2s 134us/sample - loss: 0.0677
- accuracy: 0.9859
Epoch 93/500
12380/12380 [==============================] - 2s 137us/sample - loss: 0.0676
- accuracy: 0.9858
Epoch 94/500
12380/12380 [==============================] - 2s 133us/sample - loss: 0.0673
- accuracy: 0.9855
Epoch 95/500
12380/12380 [==============================] - 2s 130us/sample - loss: 0.0672
- accuracy: 0.9863
Epoch 96/500
12380/12380 [==============================] - 2s 143us/sample - loss: 0.0664
- accuracy: 0.9865
Epoch 97/500
12380/12380 [==============================] - 2s 135us/sample - loss: 0.0660
- accuracy: 0.9868
Epoch 98/500
12380/12380 [==============================] - 2s 132us/sample - loss: 0.0671
- accuracy: 0.9863
Epoch 99/500
12380/12380 [==============================] - 2s 136us/sample - loss: 0.0659
- accuracy: 0.9861
```

```
Epoch 100/500
12380/12380 [==============================] - 2s 142us/sample - loss: 0.0649
- accuracy: 0.9867
Epoch 101/500
12380/12380 [==============================] - 2s 129us/sample - loss: 0.0657
- accuracy: 0.9864
Epoch 102/500
12380/12380 [==============================] - 2s 131us/sample - loss: 0.0643
- accuracy: 0.9872
Epoch 103/500
12380/12380 [==============================] - 2s 140us/sample - loss: 0.0650
- accuracy: 0.9872
Epoch 104/500
12380/12380 [==============================] - 2s 136us/sample - loss: 0.0648
- accuracy: 0.9870
Epoch 105/500
12380/12380 [==============================] - 2s 129us/sample - loss: 0.0638
- accuracy: 0.9875
Epoch 106/500
12380/12380 [==============================] - 2s 139us/sample - loss: 0.0638
- accuracy: 0.9868
Epoch 107/500
12380/12380 [==============================] - 2s 137us/sample - loss: 0.0635
- accuracy: 0.9868
Epoch 108/500
```

```
12380/12380 [==============================] - 2s 131us/sample - loss: 0.0637
 - accuracy: 0.9876
Epoch 109/500
12380/12380 [==============================] - 2s 139us/sample - loss: 0.0631
 - accuracy: 0.9876
Epoch 110/500
12380/12380 [==============================] - 2s 142us/sample - loss: 0.0633
 - accuracy: 0.9875
Epoch 111/500
12380/12380 [==============================] - 2s 135us/sample - loss: 0.0622
 - accuracy: 0.9872
Epoch 112/500
12380/12380 [==============================] - 2s 133us/sample - loss: 0.0626
 - accuracy: 0.9868
Epoch 113/500
12380/12380 [==============================] - 2s 141us/sample - loss: 0.0616
 - accuracy: 0.9878
Epoch 114/500
12380/12380 [==============================] - 2s 140us/sample - loss: 0.0610
 - accuracy: 0.9880
Epoch 115/500
12380/12380 [==============================] - 2s 131us/sample - loss: 0.0613
 - accuracy: 0.9879
Epoch 116/500
12380/12380 [==============================] - 2s 147us/sample - loss: 0.0611
```

```
 - accuracy: 0.9879
Epoch 117/500
12380/12380 [==============================] - 2s 141us/sample - loss: 0.0608
 - accuracy: 0.9878
Epoch 118/500
12380/12380 [==============================] - 2s 123us/sample - loss: 0.0609
 - accuracy: 0.9880
Epoch 119/500
12380/12380 [==============================] - 1s 111us/sample - loss: 0.0601
 - accuracy: 0.9881
Epoch 120/500
12380/12380 [==============================] - 1s 114us/sample - loss: 0.0597
 - accuracy: 0.9877
Epoch 121/500
12380/12380 [==============================] - 1s 118us/sample - loss: 0.0599
 - accuracy: 0.9879
Epoch 122/500
12380/12380 [==============================] - 1s 121us/sample - loss: 0.0596
 - accuracy: 0.9878
Epoch 123/500
12380/12380 [==============================] - 2s 142us/sample - loss: 0.0591
 - accuracy: 0.9886
Epoch 124/500
12380/12380 [==============================] - 2s 147us/sample - loss: 0.0593
 - accuracy: 0.9879
```

Epoch 125/500
12380/12380 [==============================] - 2s 142us/sample - loss: 0.0585
 - accuracy: 0.9890
Epoch 126/500
12380/12380 [==============================] - 2s 139us/sample - loss: 0.0586
 - accuracy: 0.9887
Epoch 127/500
12380/12380 [==============================] - 2s 147us/sample - loss: 0.0581
 - accuracy: 0.9889
Epoch 128/500
12380/12380 [==============================] - 2s 140us/sample - loss: 0.0578
 - accuracy: 0.9882
Epoch 129/500
12380/12380 [==============================] - 2s 136us/sample - loss: 0.0581
 - accuracy: 0.9884
Epoch 130/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0571
 - accuracy: 0.9889
Epoch 131/500
12380/12380 [==============================] - 2s 142us/sample - loss: 0.0582
 - accuracy: 0.9881
Epoch 132/500
12380/12380 [==============================] - 2s 135us/sample - loss: 0.0586
 - accuracy: 0.9885
Epoch 133/500

```
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0568
  - accuracy: 0.9889
Epoch 134/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0564
  - accuracy: 0.9880
Epoch 135/500
12380/12380 [==============================] - 2s 140us/sample - loss: 0.0563
  - accuracy: 0.9893
Epoch 136/500
12380/12380 [==============================] - 2s 143us/sample - loss: 0.0572
  - accuracy: 0.9891
Epoch 137/500
12380/12380 [==============================] - 2s 145us/sample - loss: 0.0567
  - accuracy: 0.9890
Epoch 138/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0567
  - accuracy: 0.9886
Epoch 139/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0556
  - accuracy: 0.9892
Epoch 140/500
12380/12380 [==============================] - 2s 145us/sample - loss: 0.0567
  - accuracy: 0.9886
Epoch 141/500
12380/12380 [==============================] - 2s 141us/sample - loss: 0.0555
```

```
- accuracy: 0.9891
Epoch 142/500
12380/12380 [==============================] - 2s 140us/sample - loss: 0.0553
- accuracy: 0.9893
Epoch 143/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0553
- accuracy: 0.9891
Epoch 144/500
12380/12380 [==============================] - 2s 146us/sample - loss: 0.0549
- accuracy: 0.9897
Epoch 145/500
12380/12380 [==============================] - 2s 141us/sample - loss: 0.0550
- accuracy: 0.9893
Epoch 146/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0546
- accuracy: 0.9893
Epoch 147/500
12380/12380 [==============================] - 2s 146us/sample - loss: 0.0544
- accuracy: 0.9892
Epoch 148/500
12380/12380 [==============================] - 2s 142us/sample - loss: 0.0544
- accuracy: 0.9890
Epoch 149/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0543
- accuracy: 0.9889
```

Epoch 150/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0537
 - accuracy: 0.9892
Epoch 151/500
12380/12380 [==============================] - 2s 141us/sample - loss: 0.0543
 - accuracy: 0.9898
Epoch 152/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0541
 - accuracy: 0.9894
Epoch 153/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0535
 - accuracy: 0.9897
Epoch 154/500
12380/12380 [==============================] - 2s 143us/sample - loss: 0.0525
 - accuracy: 0.9908
Epoch 155/500
12380/12380 [==============================] - 2s 139us/sample - loss: 0.0533
 - accuracy: 0.9895
Epoch 156/500
12380/12380 [==============================] - 2s 146us/sample - loss: 0.0530
 - accuracy: 0.9894
Epoch 157/500
12380/12380 [==============================] - 2s 146us/sample - loss: 0.0531
 - accuracy: 0.9901
Epoch 158/500

```
12380/12380 [==============================] - 2s 138us/sample - loss: 0.0531
    - accuracy: 0.9901
Epoch 159/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0527
    - accuracy: 0.9897
Epoch 160/500
12380/12380 [==============================] - 2s 145us/sample - loss: 0.0519
    - accuracy: 0.9903
Epoch 161/500
12380/12380 [==============================] - 2s 141us/sample - loss: 0.0523
    - accuracy: 0.9894
Epoch 162/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0522
    - accuracy: 0.9900
Epoch 163/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0519
    - accuracy: 0.9901
Epoch 164/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0521
    - accuracy: 0.9901
Epoch 165/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0514
    - accuracy: 0.9904
Epoch 166/500
12380/12380 [==============================] - 2s 171us/sample - loss: 0.0511
```

```
- accuracy: 0.9902
Epoch 167/500
12380/12380 [==============================] - 2s 169us/sample - loss: 0.0511
- accuracy: 0.9905
Epoch 168/500
12380/12380 [==============================] - 3s 218us/sample - loss: 0.0512
- accuracy: 0.9905
Epoch 169/500
12380/12380 [==============================] - 2s 167us/sample - loss: 0.0510
- accuracy: 0.9901
Epoch 170/500
12380/12380 [==============================] - 2s 177us/sample - loss: 0.0503
- accuracy: 0.9905
Epoch 171/500
12380/12380 [==============================] - 2s 166us/sample - loss: 0.0502
- accuracy: 0.9910
Epoch 172/500
12380/12380 [==============================] - 2s 177us/sample - loss: 0.0508
- accuracy: 0.9903
Epoch 173/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0500
- accuracy: 0.9905
Epoch 174/500
12380/12380 [==============================] - 2s 137us/sample - loss: 0.0509
- accuracy: 0.9903
```

Epoch 175/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0495
  - accuracy: 0.9905
Epoch 176/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0496
  - accuracy: 0.9905
Epoch 177/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0499
  - accuracy: 0.9908
Epoch 178/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0497
  - accuracy: 0.9905
Epoch 179/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0496
  - accuracy: 0.9907
Epoch 180/500
12380/12380 [==============================] - 2s 174us/sample - loss: 0.0494
  - accuracy: 0.9910
Epoch 181/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0492
  - accuracy: 0.9908
Epoch 182/500
12380/12380 [==============================] - 2s 170us/sample - loss: 0.0495
  - accuracy: 0.9901
Epoch 183/500

```
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0486
- accuracy: 0.9912
Epoch 184/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0489
- accuracy: 0.9908
Epoch 185/500
12380/12380 [==============================] - 2s 170us/sample - loss: 0.0488
- accuracy: 0.9912
Epoch 186/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0479
- accuracy: 0.9905
Epoch 187/500
12380/12380 [==============================] - 2s 131us/sample - loss: 0.0491
- accuracy: 0.9911
Epoch 188/500
12380/12380 [==============================] - 2s 140us/sample - loss: 0.0485
- accuracy: 0.9907
Epoch 189/500
12380/12380 [==============================] - 2s 159us/sample - loss: 0.0477
- accuracy: 0.9909
Epoch 190/500
12380/12380 [==============================] - 2s 174us/sample - loss: 0.0481
- accuracy: 0.9913
Epoch 191/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0485
```

```
                    - accuracy: 0.9911
Epoch 192/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0479
                    - accuracy: 0.9913
Epoch 193/500
12380/12380 [==============================] - 2s 146us/sample - loss: 0.0477
                    - accuracy: 0.9906
Epoch 194/500
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0478
                    - accuracy: 0.9915
Epoch 195/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0473
                    - accuracy: 0.9914
Epoch 196/500
12380/12380 [==============================] - 2s 147us/sample - loss: 0.0475
                    - accuracy: 0.9911
Epoch 197/500
12380/12380 [==============================] - 2s 160us/sample - loss: 0.0476
                    - accuracy: 0.9911
Epoch 198/500
12380/12380 [==============================] - 2s 172us/sample - loss: 0.0474
                    - accuracy: 0.9915
Epoch 199/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0470
                    - accuracy: 0.9912
```

Epoch 200/500
12380/12380 [==============================] - 2s 167us/sample - loss: 0.0467 - accuracy: 0.9917
Epoch 201/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0465 - accuracy: 0.9910
Epoch 202/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0467 - accuracy: 0.9912
Epoch 203/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0464 - accuracy: 0.9918
Epoch 204/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0467 - accuracy: 0.9915
Epoch 205/500
12380/12380 [==============================] - 2s 176us/sample - loss: 0.0461 - accuracy: 0.9914
Epoch 206/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0462 - accuracy: 0.9917
Epoch 207/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0454 - accuracy: 0.9913
Epoch 208/500

```
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0456
 - accuracy: 0.9917
Epoch 209/500
12380/12380 [==============================] - 2s 168us/sample - loss: 0.0456
 - accuracy: 0.9914
Epoch 210/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0458
 - accuracy: 0.9915
Epoch 211/500
12380/12380 [==============================] - 2s 160us/sample - loss: 0.0457
 - accuracy: 0.9918
Epoch 212/500
12380/12380 [==============================] - 2s 146us/sample - loss: 0.0458
 - accuracy: 0.9909
Epoch 213/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0445
 - accuracy: 0.9915
Epoch 214/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0446
 - accuracy: 0.9917
Epoch 215/500
12380/12380 [==============================] - 2s 164us/sample - loss: 0.0448
 - accuracy: 0.9918
Epoch 216/500
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0447
```

```
    - accuracy: 0.9917
Epoch 217/500
12380/12380 [==============================] - 2s 174us/sample - loss: 0.0453
    - accuracy: 0.9913
Epoch 218/500
12380/12380 [==============================] - 2s 147us/sample - loss: 0.0448
    - accuracy: 0.9919
Epoch 219/500
12380/12380 [==============================] - 2s 172us/sample - loss: 0.0442
    - accuracy: 0.9919
Epoch 220/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0441
    - accuracy: 0.9914
Epoch 221/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0448
    - accuracy: 0.9919
Epoch 222/500
12380/12380 [==============================] - 2s 163us/sample - loss: 0.0444
    - accuracy: 0.9919
Epoch 223/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0442
    - accuracy: 0.9915
Epoch 224/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0445
    - accuracy: 0.9915
```

```
Epoch 225/500
12380/12380 [==============================] - 2s 174us/sample - loss: 0.0439
 - accuracy: 0.9916
Epoch 226/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0438
 - accuracy: 0.9914
Epoch 227/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0438
 - accuracy: 0.9918
Epoch 228/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0437
 - accuracy: 0.9922
Epoch 229/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0431
 - accuracy: 0.9916
Epoch 230/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0432
 - accuracy: 0.9916
Epoch 231/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0434
 - accuracy: 0.9917
Epoch 232/500
12380/12380 [==============================] - 2s 168us/sample - loss: 0.0429
 - accuracy: 0.9920
Epoch 233/500
```

```
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0432
 - accuracy: 0.9919
Epoch 234/500
12380/12380 [==============================] - 2s 175us/sample - loss: 0.0428
 - accuracy: 0.9920
Epoch 235/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0426
 - accuracy: 0.9923
Epoch 236/500
12380/12380 [==============================] - 2s 167us/sample - loss: 0.0429
 - accuracy: 0.9922
Epoch 237/500
12380/12380 [==============================] - 2s 163us/sample - loss: 0.0424
 - accuracy: 0.9924
Epoch 238/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0427
 - accuracy: 0.9918
Epoch 239/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0427
 - accuracy: 0.9922
Epoch 240/500
12380/12380 [==============================] - 2s 137us/sample - loss: 0.0424
 - accuracy: 0.9924
Epoch 241/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0422
```

- accuracy: 0.9921
Epoch 242/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0430
- accuracy: 0.9920
Epoch 243/500
12380/12380 [==============================] - 2s 147us/sample - loss: 0.0419
- accuracy: 0.9926
Epoch 244/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0423
- accuracy: 0.9928
Epoch 245/500
12380/12380 [==============================] - 2s 198us/sample - loss: 0.0420
- accuracy: 0.9921
Epoch 246/500
12380/12380 [==============================] - 2s 135us/sample - loss: 0.0413
- accuracy: 0.9925
Epoch 247/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0415
- accuracy: 0.9923
Epoch 248/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0418
- accuracy: 0.9920
Epoch 249/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0413
- accuracy: 0.9924

Epoch 250/500
12380/12380 [==============================] - 2s 147us/sample - loss: 0.0416
        - accuracy: 0.9926
Epoch 251/500
12380/12380 [==============================] - 2s 167us/sample - loss: 0.0414
        - accuracy: 0.9928
Epoch 252/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0415
        - accuracy: 0.9926
Epoch 253/500
12380/12380 [==============================] - 2s 166us/sample - loss: 0.0413
        - accuracy: 0.9925
Epoch 254/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0408
        - accuracy: 0.9926
Epoch 255/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0411
        - accuracy: 0.9930
Epoch 256/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0407
        - accuracy: 0.9926
Epoch 257/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0411
        - accuracy: 0.9929
Epoch 258/500

```
12380/12380 [==============================] - 2s 142us/sample - loss: 0.0402
      - accuracy: 0.9922
Epoch 259/500
12380/12380 [==============================] - 2s 169us/sample - loss: 0.0401
      - accuracy: 0.9923
Epoch 260/500
12380/12380 [==============================] - 2s 163us/sample - loss: 0.0406
      - accuracy: 0.9924
Epoch 261/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0404
      - accuracy: 0.9926
Epoch 262/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0399
      - accuracy: 0.9925
Epoch 263/500
12380/12380 [==============================] - 2s 190us/sample - loss: 0.0402
      - accuracy: 0.9923
Epoch 264/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0402
      - accuracy: 0.9923
Epoch 265/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0398
      - accuracy: 0.9924
Epoch 266/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0402
```

```
- accuracy: 0.9924
Epoch 267/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0400
- accuracy: 0.9927
Epoch 268/500
12380/12380 [==============================] - 2s 174us/sample - loss: 0.0396
- accuracy: 0.9926
Epoch 269/500
12380/12380 [==============================] - 2s 159us/sample - loss: 0.0399
- accuracy: 0.9928
Epoch 270/500
12380/12380 [==============================] - 2s 169us/sample - loss: 0.0399
- accuracy: 0.9926
Epoch 271/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0401
- accuracy: 0.9931
Epoch 272/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0396
- accuracy: 0.9925
Epoch 273/500
12380/12380 [==============================] - 2s 166us/sample - loss: 0.0393
- accuracy: 0.9932
Epoch 274/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0383
- accuracy: 0.9926
```

Epoch 275/500
12380/12380 [==============================] - 2s 164us/sample - loss: 0.0390
 - accuracy: 0.9930
Epoch 276/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0389
 - accuracy: 0.9926
Epoch 277/500
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0386
 - accuracy: 0.9929
Epoch 278/500
12380/12380 [==============================] - 2s 174us/sample - loss: 0.0386
 - accuracy: 0.9930
Epoch 279/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0385
 - accuracy: 0.9928
Epoch 280/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0384
 - accuracy: 0.9928
Epoch 281/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0389
 - accuracy: 0.9932
Epoch 282/500
12380/12380 [==============================] - 2s 189us/sample - loss: 0.0388
 - accuracy: 0.9930
Epoch 283/500

```
12380/12380 [==============================] - 2s 160us/sample - loss: 0.0385
 - accuracy: 0.9930
Epoch 284/500
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0381
 - accuracy: 0.9931
Epoch 285/500
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0387
 - accuracy: 0.9926
Epoch 286/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0380
 - accuracy: 0.9929
Epoch 287/500
12380/12380 [==============================] - 2s 163us/sample - loss: 0.0383
 - accuracy: 0.9931
Epoch 288/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0380
 - accuracy: 0.9934
Epoch 289/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0378
 - accuracy: 0.9931
Epoch 290/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0371
 - accuracy: 0.9936
Epoch 291/500
12380/12380 [==============================] - 2s 167us/sample - loss: 0.0377
```

```
- accuracy: 0.9933
Epoch 292/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0377
- accuracy: 0.9931
Epoch 293/500
12380/12380 [==============================] - 3s 221us/sample - loss: 0.0382
- accuracy: 0.9926
Epoch 294/500
12380/12380 [==============================] - 2s 168us/sample - loss: 0.0376
- accuracy: 0.9933
Epoch 295/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0374
- accuracy: 0.9931
Epoch 296/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0376
- accuracy: 0.9931
Epoch 297/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0371
- accuracy: 0.9933
Epoch 298/500
12380/12380 [==============================] - 2s 144us/sample - loss: 0.0372
- accuracy: 0.9930
Epoch 299/500
12380/12380 [==============================] - 2s 179us/sample - loss: 0.0369
- accuracy: 0.9931
```

Epoch 300/500
12380/12380 [==============================] - 2s 169us/sample - loss: 0.0368
- accuracy: 0.9935
Epoch 301/500
12380/12380 [==============================] - 2s 145us/sample - loss: 0.0372
- accuracy: 0.9931
Epoch 302/500
12380/12380 [==============================] - 2s 174us/sample - loss: 0.0370
- accuracy: 0.9933
Epoch 303/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0368
- accuracy: 0.9934
Epoch 304/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0367
- accuracy: 0.9931
Epoch 305/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0367
- accuracy: 0.9936
Epoch 306/500
12380/12380 [==============================] - 2s 140us/sample - loss: 0.0364
- accuracy: 0.9934
Epoch 307/500
12380/12380 [==============================] - 2s 171us/sample - loss: 0.0365
- accuracy: 0.9935
Epoch 308/500

```
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0363
- accuracy: 0.9931
Epoch 309/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0365
- accuracy: 0.9935
Epoch 310/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0361
- accuracy: 0.9932
Epoch 311/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0368
- accuracy: 0.9932
Epoch 312/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0363
- accuracy: 0.9937
Epoch 313/500
12380/12380 [==============================] - 2s 168us/sample - loss: 0.0359
- accuracy: 0.9934
Epoch 314/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0359
- accuracy: 0.9935
Epoch 315/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0360
- accuracy: 0.9936
Epoch 316/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0358
```

```
- accuracy: 0.9935
Epoch 317/500
12380/12380 [==============================] - 2s 164us/sample - loss: 0.0354
- accuracy: 0.9932
Epoch 318/500
12380/12380 [==============================] - 2s 149us/sample - loss: 0.0356
- accuracy: 0.9935
Epoch 319/500
12380/12380 [==============================] - 2s 163us/sample - loss: 0.0359
- accuracy: 0.9937
Epoch 320/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0356
- accuracy: 0.9938
Epoch 321/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0354
- accuracy: 0.9941
Epoch 322/500
12380/12380 [==============================] - 2s 166us/sample - loss: 0.0354
- accuracy: 0.9937
Epoch 323/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0352
- accuracy: 0.9932
Epoch 324/500
12380/12380 [==============================] - 2s 149us/sample - loss: 0.0356
- accuracy: 0.9937
```

Epoch 325/500
12380/12380 [==============================] - 2s 149us/sample - loss: 0.0358
- accuracy: 0.9929
Epoch 326/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0351
- accuracy: 0.9939
Epoch 327/500
12380/12380 [==============================] - 2s 168us/sample - loss: 0.0353
- accuracy: 0.9935
Epoch 328/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0354
- accuracy: 0.9936
Epoch 329/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0350
- accuracy: 0.9939
Epoch 330/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0348
- accuracy: 0.9932
Epoch 331/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0344
- accuracy: 0.9942
Epoch 332/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0351
- accuracy: 0.9935
Epoch 333/500

```
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0350
- accuracy: 0.9935
Epoch 334/500
12380/12380 [==============================] - 2s 170us/sample - loss: 0.0347
- accuracy: 0.9940
Epoch 335/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0347
- accuracy: 0.9936
Epoch 336/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0352
- accuracy: 0.9935
Epoch 337/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0342
- accuracy: 0.9937
Epoch 338/500
12380/12380 [==============================] - 2s 149us/sample - loss: 0.0342
- accuracy: 0.9941
Epoch 339/500
12380/12380 [==============================] - 2s 171us/sample - loss: 0.0340
- accuracy: 0.9939
Epoch 340/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0336
- accuracy: 0.9937
Epoch 341/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0344
```

```
        - accuracy: 0.9938
Epoch 342/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0350
        - accuracy: 0.9939
Epoch 343/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0339
        - accuracy: 0.9937
Epoch 344/500
12380/12380 [==============================] - 2s 141us/sample - loss: 0.0338
        - accuracy: 0.9940
Epoch 345/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0338
        - accuracy: 0.9938
Epoch 346/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0336
        - accuracy: 0.9939
Epoch 347/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0336
        - accuracy: 0.9941
Epoch 348/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0337
        - accuracy: 0.9939
Epoch 349/500
12380/12380 [==============================] - 2s 170us/sample - loss: 0.0342
        - accuracy: 0.9939
```

Epoch 350/500

12380/12380 [==============================] - 2s 157us/sample - loss: 0.0331 - accuracy: 0.9940

Epoch 351/500

12380/12380 [==============================] - 2s 181us/sample - loss: 0.0331 - accuracy: 0.9939

Epoch 352/500

12380/12380 [==============================] - 2s 145us/sample - loss: 0.0336 - accuracy: 0.9941

Epoch 353/500

12380/12380 [==============================] - 2s 150us/sample - loss: 0.0340 - accuracy: 0.9939

Epoch 354/500

12380/12380 [==============================] - 2s 198us/sample - loss: 0.0330 - accuracy: 0.9938

Epoch 355/500

12380/12380 [==============================] - 2s 149us/sample - loss: 0.0335 - accuracy: 0.9938

Epoch 356/500

12380/12380 [==============================] - 2s 168us/sample - loss: 0.0336 - accuracy: 0.9942

Epoch 357/500

12380/12380 [==============================] - 2s 163us/sample - loss: 0.0332 - accuracy: 0.9945

Epoch 358/500

```
12380/12380 [==============================] - 2s 171us/sample - loss: 0.0334
 - accuracy: 0.9942
Epoch 359/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0330
 - accuracy: 0.9941
Epoch 360/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0330
 - accuracy: 0.9945
Epoch 361/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0327
 - accuracy: 0.9940
Epoch 362/500
12380/12380 [==============================] - 2s 159us/sample - loss: 0.0330
 - accuracy: 0.9944
Epoch 363/500
12380/12380 [==============================] - 2s 170us/sample - loss: 0.0329
 - accuracy: 0.9943
Epoch 364/500
12380/12380 [==============================] - 2s 130us/sample - loss: 0.0327
 - accuracy: 0.9939
Epoch 365/500
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0325
 - accuracy: 0.9940
Epoch 366/500
12380/12380 [==============================] - 2s 163us/sample - loss: 0.0320
```

```
    - accuracy: 0.9947
Epoch 367/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0328
    - accuracy: 0.9943
Epoch 368/500
12380/12380 [==============================] - 2s 178us/sample - loss: 0.0320
    - accuracy: 0.9946
Epoch 369/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0330
    - accuracy: 0.9939
Epoch 370/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0324
    - accuracy: 0.9943
Epoch 371/500
12380/12380 [==============================] - 2s 176us/sample - loss: 0.0324
    - accuracy: 0.9939
Epoch 372/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0325
    - accuracy: 0.9946
Epoch 373/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0317
    - accuracy: 0.9944
Epoch 374/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0320
    - accuracy: 0.9943
```

```
Epoch 375/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0324
- accuracy: 0.9944
Epoch 376/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0319
- accuracy: 0.9941
Epoch 377/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0324
- accuracy: 0.9942
Epoch 378/500
12380/12380 [==============================] - 2s 172us/sample - loss: 0.0323
- accuracy: 0.9941
Epoch 379/500
12380/12380 [==============================] - 2s 167us/sample - loss: 0.0319
- accuracy: 0.9943
Epoch 380/500
12380/12380 [==============================] - 2s 170us/sample - loss: 0.0325
- accuracy: 0.9943
Epoch 381/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0319
- accuracy: 0.9946
Epoch 382/500
12380/12380 [==============================] - 2s 187us/sample - loss: 0.0317
- accuracy: 0.9949
Epoch 383/500
```

```
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0313
 - accuracy: 0.9943
Epoch 384/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0320
 - accuracy: 0.9947
Epoch 385/500
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0314
 - accuracy: 0.9943
Epoch 386/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0314
 - accuracy: 0.9945
Epoch 387/500
12380/12380 [==============================] - 2s 173us/sample - loss: 0.0318
 - accuracy: 0.9947
Epoch 388/500
12380/12380 [==============================] - 2s 164us/sample - loss: 0.0317
 - accuracy: 0.9947
Epoch 389/500
12380/12380 [==============================] - 2s 147us/sample - loss: 0.0313
 - accuracy: 0.9946
Epoch 390/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0310
 - accuracy: 0.9943
Epoch 391/500
12380/12380 [==============================] - 2s 163us/sample - loss: 0.0310
```

```
                - accuracy: 0.9947
Epoch 392/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0313
                - accuracy: 0.9944
Epoch 393/500
12380/12380 [==============================] - 2s 181us/sample - loss: 0.0314
                - accuracy: 0.9941
Epoch 394/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0308
                - accuracy: 0.9947
Epoch 395/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0306
                - accuracy: 0.9947
Epoch 396/500
12380/12380 [==============================] - 2s 164us/sample - loss: 0.0306
                - accuracy: 0.9946
Epoch 397/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0310
                - accuracy: 0.9945
Epoch 398/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0308
                - accuracy: 0.9942
Epoch 399/500
12380/12380 [==============================] - 2s 159us/sample - loss: 0.0311
                - accuracy: 0.9947
```

```
Epoch 400/500
12380/12380 [==============================] - 2s 159us/sample - loss: 0.0310
    - accuracy: 0.9947
Epoch 401/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0305
    - accuracy: 0.9948
Epoch 402/500
12380/12380 [==============================] - 2s 182us/sample - loss: 0.0305
    - accuracy: 0.9947
Epoch 403/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0307
    - accuracy: 0.9946
Epoch 404/500
12380/12380 [==============================] - 2s 184us/sample - loss: 0.0311
    - accuracy: 0.9947
Epoch 405/500
12380/12380 [==============================] - 2s 135us/sample - loss: 0.0305
    - accuracy: 0.9948
Epoch 406/500
12380/12380 [==============================] - 2s 145us/sample - loss: 0.0305
    - accuracy: 0.9945
Epoch 407/500
12380/12380 [==============================] - 2s 160us/sample - loss: 0.0299
    - accuracy: 0.9950
Epoch 408/500
```

```
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0302
 - accuracy: 0.9946
Epoch 409/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0306
 - accuracy: 0.9945
Epoch 410/500
12380/12380 [==============================] - 2s 171us/sample - loss: 0.0302
 - accuracy: 0.9949
Epoch 411/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0303
 - accuracy: 0.9952
Epoch 412/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0301
 - accuracy: 0.9950
Epoch 413/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0308
 - accuracy: 0.9943
Epoch 414/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0301
 - accuracy: 0.9947
Epoch 415/500
12380/12380 [==============================] - 2s 149us/sample - loss: 0.0298
 - accuracy: 0.9941
Epoch 416/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0296
```

```
                          - accuracy: 0.9947
Epoch 417/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0298
                          - accuracy: 0.9952
Epoch 418/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0292
                          - accuracy: 0.9948
Epoch 419/500
12380/12380 [==============================] - 2s 182us/sample - loss: 0.0306
                          - accuracy: 0.9948
Epoch 420/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0296
                          - accuracy: 0.9948
Epoch 421/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0290
                          - accuracy: 0.9948
Epoch 422/500
12380/12380 [==============================] - 2s 175us/sample - loss: 0.0311
                          - accuracy: 0.9949
Epoch 423/500
12380/12380 [==============================] - 2s 142us/sample - loss: 0.0295
                          - accuracy: 0.9947
Epoch 424/500
12380/12380 [==============================] - 2s 175us/sample - loss: 0.0292
                          - accuracy: 0.9949
```

```
Epoch 425/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0291
 - accuracy: 0.9945
Epoch 426/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0297
 - accuracy: 0.9951
Epoch 427/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0293
 - accuracy: 0.9948
Epoch 428/500
12380/12380 [==============================] - 2s 164us/sample - loss: 0.0294
 - accuracy: 0.9949
Epoch 429/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0286
 - accuracy: 0.9952
Epoch 430/500
12380/12380 [==============================] - 2s 171us/sample - loss: 0.0293
 - accuracy: 0.9947
Epoch 431/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0290
 - accuracy: 0.9954
Epoch 432/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0294
 - accuracy: 0.9951
Epoch 433/500
```

```
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0291
    - accuracy: 0.9949
Epoch 434/500
12380/12380 [==============================] - 2s 153us/sample - loss: 0.0292
    - accuracy: 0.9947
Epoch 435/500
12380/12380 [==============================] - 2s 164us/sample - loss: 0.0292
    - accuracy: 0.9948
Epoch 436/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0290
    - accuracy: 0.9944
Epoch 437/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0296
    - accuracy: 0.9948
Epoch 438/500
12380/12380 [==============================] - 2s 145us/sample - loss: 0.0287
    - accuracy: 0.9950
Epoch 439/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0285
    - accuracy: 0.9950
Epoch 440/500
12380/12380 [==============================] - 2s 161us/sample - loss: 0.0289
    - accuracy: 0.9947
Epoch 441/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0289
```

```
                 - accuracy: 0.9949
Epoch 442/500
12380/12380 [==============================] - 2s 175us/sample - loss: 0.0288
                 - accuracy: 0.9952
Epoch 443/500
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0295
                 - accuracy: 0.9952
Epoch 444/500
12380/12380 [==============================] - 2s 166us/sample - loss: 0.0295
                 - accuracy: 0.9950
Epoch 445/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0282
                 - accuracy: 0.9947
Epoch 446/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0283
                 - accuracy: 0.9951
Epoch 447/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0279
                 - accuracy: 0.9952
Epoch 448/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0280
                 - accuracy: 0.9945
Epoch 449/500
12380/12380 [==============================] - 2s 159us/sample - loss: 0.0288
                 - accuracy: 0.9951
```

Epoch 450/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0288 - accuracy: 0.9949
Epoch 451/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0273 - accuracy: 0.9953
Epoch 452/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0282 - accuracy: 0.9948
Epoch 453/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0287 - accuracy: 0.9952
Epoch 454/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0284 - accuracy: 0.9951
Epoch 455/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0283 - accuracy: 0.9952
Epoch 456/500
12380/12380 [==============================] - 2s 168us/sample - loss: 0.0282 - accuracy: 0.9953
Epoch 457/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0281 - accuracy: 0.9949
Epoch 458/500

```
12380/12380 [==============================] - 2s 167us/sample - loss: 0.0285
 - accuracy: 0.9952
Epoch 459/500
12380/12380 [==============================] - 2s 143us/sample - loss: 0.0281
 - accuracy: 0.9952
Epoch 460/500
12380/12380 [==============================] - 2s 154us/sample - loss: 0.0277
 - accuracy: 0.9950
Epoch 461/500
12380/12380 [==============================] - 2s 170us/sample - loss: 0.0278
 - accuracy: 0.9951
Epoch 462/500
12380/12380 [==============================] - 2s 159us/sample - loss: 0.0280
 - accuracy: 0.9949
Epoch 463/500
12380/12380 [==============================] - 2s 160us/sample - loss: 0.0273
 - accuracy: 0.9948
Epoch 464/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0276
 - accuracy: 0.9954
Epoch 465/500
12380/12380 [==============================] - 2s 175us/sample - loss: 0.0276
 - accuracy: 0.9951
Epoch 466/500
12380/12380 [==============================] - 2s 150us/sample - loss: 0.0288
```

```
                                - accuracy: 0.9951
Epoch 467/500
12380/12380 [==============================] - 2s 174us/sample - loss: 0.0274
                                - accuracy: 0.9950
Epoch 468/500
12380/12380 [==============================] - 2s 159us/sample - loss: 0.0275
                                - accuracy: 0.9951
Epoch 469/500
12380/12380 [==============================] - 2s 151us/sample - loss: 0.0270
                                - accuracy: 0.9953
Epoch 470/500
12380/12380 [==============================] - 2s 172us/sample - loss: 0.0272
                                - accuracy: 0.9949
Epoch 471/500
12380/12380 [==============================] - 2s 160us/sample - loss: 0.0275
                                - accuracy: 0.9952
Epoch 472/500
12380/12380 [==============================] - 2s 167us/sample - loss: 0.0273
                                - accuracy: 0.9951
Epoch 473/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0275
                                - accuracy: 0.9952
Epoch 474/500
12380/12380 [==============================] - 2s 164us/sample - loss: 0.0274
                                - accuracy: 0.9952
```

Epoch 475/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0269
 - accuracy: 0.9952
Epoch 476/500
12380/12380 [==============================] - 2s 167us/sample - loss: 0.0269
 - accuracy: 0.9953
Epoch 477/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0271
 - accuracy: 0.9954
Epoch 478/500
12380/12380 [==============================] - 2s 168us/sample - loss: 0.0271
 - accuracy: 0.9949
Epoch 479/500
12380/12380 [==============================] - 2s 141us/sample - loss: 0.0267
 - accuracy: 0.9955
Epoch 480/500
12380/12380 [==============================] - 2s 165us/sample - loss: 0.0270
 - accuracy: 0.9949
Epoch 481/500
12380/12380 [==============================] - 2s 147us/sample - loss: 0.0262
 - accuracy: 0.9954
Epoch 482/500
12380/12380 [==============================] - 2s 168us/sample - loss: 0.0263
 - accuracy: 0.9955
Epoch 483/500

```
12380/12380 [==============================] - 2s 148us/sample - loss: 0.0267
- accuracy: 0.9952
Epoch 484/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0272
- accuracy: 0.9954
Epoch 485/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0278
- accuracy: 0.9951
Epoch 486/500
12380/12380 [==============================] - 2s 156us/sample - loss: 0.0267
- accuracy: 0.9949
Epoch 487/500
12380/12380 [==============================] - 2s 149us/sample - loss: 0.0262
- accuracy: 0.9954
Epoch 488/500
12380/12380 [==============================] - 2s 162us/sample - loss: 0.0269
- accuracy: 0.9955
Epoch 489/500
12380/12380 [==============================] - 2s 159us/sample - loss: 0.0262
- accuracy: 0.9954
Epoch 490/500
12380/12380 [==============================] - 2s 157us/sample - loss: 0.0265
- accuracy: 0.9952
Epoch 491/500
12380/12380 [==============================] - 2s 163us/sample - loss: 0.0263
```

- accuracy: 0.9952
Epoch 492/500
12380/12380 [==============================] - 2s 152us/sample - loss: 0.0264
- accuracy: 0.9952
Epoch 493/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0260
- accuracy: 0.9952
Epoch 494/500
12380/12380 [==============================] - 2s 169us/sample - loss: 0.0263
- accuracy: 0.9952
Epoch 495/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0265
- accuracy: 0.9949
Epoch 496/500
12380/12380 [==============================] - 2s 173us/sample - loss: 0.0265
- accuracy: 0.9951
Epoch 497/500
12380/12380 [==============================] - 2s 155us/sample - loss: 0.0266
- accuracy: 0.9951
Epoch 498/500
12380/12380 [==============================] - 2s 171us/sample - loss: 0.0264
- accuracy: 0.9956
Epoch 499/500
12380/12380 [==============================] - 2s 158us/sample - loss: 0.0262
- accuracy: 0.9951

```
Epoch 500/500
12380/12380 [==============================] - 2s 169us/sample - loss: 0.0259
 - accuracy: 0.9952
2872/2872 [==============================] - 0s 89us/sample

class_weight_Fold_1: {0: 0.10769899956502825, 1: 12.58983050847457575}

pos_weight: 0.9
thresholdNum: 0.5


Average of train loss Fold_1: 0.062
Average of yPredProbability Fold_1: 0.4084

classification_report_Fold_1:
              precision    recall  f1-score   support

    Normal 0       0.99      0.59      0.74      2845
   Anomaly 1       0.01      0.26      0.01        27

    accuracy                           0.59      2872
   macro avg       0.50      0.43      0.38      2872
weighted avg       0.98      0.59      0.73      2872
```

```
confusion_matrix_Fold_1:
True Negatives:  1685
False Positives:  1160
False Negatives:  20
True Positives:  7

End running time Fold_1: 210504_222528  ,-----------------------.

Start running time Fold_2: 210504_222528  ,------------------------:

  Shape of Actual yXtrainRolled After Rolling Fold_2: (23070, 60)

  Shape of Actual yXvalidShifted dataset: (2892, 60)
  Shape of Actual yXvalidRolled After Rolling Fold_2: (5782, 60)
Start running time Data Augmentation_Fold_2: 210504_222528
 ,+++++++++++++++++++++++++++++++++:

Data Augmentation MSE Label 1==> mean: 0.0006, min: 0.000166, max: 0.001393

Data Augmentation MSE Label 1==> mean: 0.000326, min: 4.3e-05, max: 0.001125
```

Data Augmentation MSE Label 1==> mean: 0.000329, min: 8e-06, max: 0.001276

Data Augmentation MSE Label 1==> mean: 0.000407, min: 2e-06, max: 0.00216

Data Augmentation MSE Label 1==> mean: 0.000559, min: 0.0, max: 0.004198

Data Augmentation MSE Label 1==> mean: 0.000751, min: 0.0, max: 0.005602

Data Augmentation MSE Label 1==> mean: 0.000926, min: 0.0, max: 0.007199

Data Augmentation MSE Label 1==> mean: 0.00117, min: 0.0, max: 0.011053

Data Augmentation MSE Label 1==> mean: 0.001636, min: 0.0, max: 0.015223

Data Augmentation MSE Label 1==> mean: 0.002228, min: 0.0, max: 0.018773

Data Augmentation MSE Label 1==> mean: 0.002444, min: 0.0, max: 0.014983

Data Augmentation MSE Label 1==> mean: 0.002784, min: 0.0, max: 0.025891

Data Augmentation MSE Label 1==> mean: 0.002606, min: 0.0, max: 0.018531

Data Augmentation MSE Label 1==> mean: 0.002261, min: 0.0, max: 0.011732

MSE All genereted Augmented data Fold_2:

mean: 0.001359
min: 1.6e-05
max: 0.009938

End running time Data Augmentation_Fold_2: 210504_222625
,+++++++++++++++++++++++++++++++.

   Shape of data after Transform ToOneRow to give Cross Validation Model in
fold_2:

   xtrain: (12599, 118), ytrain: (12599,)
   xvalid: (2891, 118), yvalid: (2891,)

Number of final label 0 in yXtrain_Fold_2: 11459

Number of final label 1 in yXtrain_Before_AddingAugedData_Fold_2: 76
Number of final label 1 in yXtrain_After_AddingAugedData_Fold_2: 1140

Train on 12599 samples
Epoch 1/500
12599/12599 [==============================] - 3s 248us/sample - loss: 3.2809
- accuracy: 0.9144
Epoch 2/500
12599/12599 [==============================] - 2s 149us/sample - loss: 1.7122

```
                    - accuracy: 0.9312
Epoch 3/500
12599/12599 [==============================] - 2s 168us/sample - loss: 0.9167
                    - accuracy: 0.9398
Epoch 4/500
12599/12599 [==============================] - 2s 151us/sample - loss: 0.5333
                    - accuracy: 0.9444
Epoch 5/500
12599/12599 [==============================] - 2s 172us/sample - loss: 0.3514
                    - accuracy: 0.9483
Epoch 6/500
12599/12599 [==============================] - 2s 158us/sample - loss: 0.2645
                    - accuracy: 0.9485
Epoch 7/500
12599/12599 [==============================] - 2s 159us/sample - loss: 0.2223
                    - accuracy: 0.9507
Epoch 8/500
12599/12599 [==============================] - 2s 150us/sample - loss: 0.2006
                    - accuracy: 0.9522
Epoch 9/500
12599/12599 [==============================] - 2s 157us/sample - loss: 0.1888
                    - accuracy: 0.9533
Epoch 10/500
12599/12599 [==============================] - 2s 158us/sample - loss: 0.1813
                    - accuracy: 0.9539
```

Epoch 11/500
12599/12599 [==============================] - 2s 161us/sample - loss: 0.1770
 - accuracy: 0.9554
Epoch 12/500
12599/12599 [==============================] - 2s 163us/sample - loss: 0.1733
 - accuracy: 0.9559
Epoch 13/500
12599/12599 [==============================] - 2s 171us/sample - loss: 0.1692
 - accuracy: 0.9579
Epoch 14/500
12599/12599 [==============================] - 2s 171us/sample - loss: 0.1669
 - accuracy: 0.9582
Epoch 15/500
12599/12599 [==============================] - 2s 150us/sample - loss: 0.1642
 - accuracy: 0.9585
Epoch 16/500
12599/12599 [==============================] - 2s 169us/sample - loss: 0.1620
 - accuracy: 0.9597
Epoch 17/500
12599/12599 [==============================] - 2s 157us/sample - loss: 0.1605
 - accuracy: 0.9602
Epoch 18/500
12599/12599 [==============================] - 2s 166us/sample - loss: 0.1584
 - accuracy: 0.9607
Epoch 19/500

12599/12599 [==============================] - 2s 160us/sample - loss: 0.1571
- accuracy: 0.9608
Epoch 20/500
12599/12599 [==============================] - 2s 166us/sample - loss: 0.1544
- accuracy: 0.9614
Epoch 21/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.1528
- accuracy: 0.9626
Epoch 22/500
12599/12599 [==============================] - 2s 169us/sample - loss: 0.1518
- accuracy: 0.9619
Epoch 23/500
12599/12599 [==============================] - 2s 151us/sample - loss: 0.1493
- accuracy: 0.9624
Epoch 24/500
12599/12599 [==============================] - 2s 160us/sample - loss: 0.1485
- accuracy: 0.9627
Epoch 25/500
12599/12599 [==============================] - 2s 169us/sample - loss: 0.1463
- accuracy: 0.9629
Epoch 26/500
12599/12599 [==============================] - 2s 149us/sample - loss: 0.1447
- accuracy: 0.9638
Epoch 27/500
12599/12599 [==============================] - 2s 169us/sample - loss: 0.1446

```
- accuracy: 0.9638
Epoch 28/500
12599/12599 [==============================] - 2s 160us/sample - loss: 0.1426
- accuracy: 0.9638
Epoch 29/500
12599/12599 [==============================] - 2s 166us/sample - loss: 0.1417
- accuracy: 0.9637
Epoch 30/500
12599/12599 [==============================] - 2s 152us/sample - loss: 0.1409
- accuracy: 0.9642
Epoch 31/500
12599/12599 [==============================] - 2s 179us/sample - loss: 0.1396
- accuracy: 0.9660
Epoch 32/500
12599/12599 [==============================] - 2s 158us/sample - loss: 0.1383
- accuracy: 0.9648
Epoch 33/500
12599/12599 [==============================] - 2s 137us/sample - loss: 0.1364
- accuracy: 0.9663
Epoch 34/500
12599/12599 [==============================] - 2s 155us/sample - loss: 0.1360
- accuracy: 0.9655
Epoch 35/500
12599/12599 [==============================] - 2s 152us/sample - loss: 0.1346
- accuracy: 0.9667
```

Epoch 36/500
12599/12599 [==============================] - 2s 170us/sample - loss: 0.1338
 - accuracy: 0.9671
Epoch 37/500
12599/12599 [==============================] - 2s 151us/sample - loss: 0.1326
 - accuracy: 0.9668
Epoch 38/500
12599/12599 [==============================] - 2s 168us/sample - loss: 0.1312
 - accuracy: 0.9668
Epoch 39/500
12599/12599 [==============================] - 2s 162us/sample - loss: 0.1302
 - accuracy: 0.9683
Epoch 40/500
12599/12599 [==============================] - 2s 150us/sample - loss: 0.1292
 - accuracy: 0.9683
Epoch 41/500
12599/12599 [==============================] - 2s 167us/sample - loss: 0.1283
 - accuracy: 0.9690
Epoch 42/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.1284
 - accuracy: 0.9667
Epoch 43/500
12599/12599 [==============================] - 2s 160us/sample - loss: 0.1261
 - accuracy: 0.9693
Epoch 44/500

12599/12599 [==============================] - 2s 157us/sample - loss: 0.1258
 - accuracy: 0.9694
Epoch 45/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.1243
 - accuracy: 0.9699
Epoch 46/500
12599/12599 [==============================] - 2s 150us/sample - loss: 0.1241
 - accuracy: 0.9703
Epoch 47/500
12599/12599 [==============================] - 2s 164us/sample - loss: 0.1228
 - accuracy: 0.9699
Epoch 48/500
12599/12599 [==============================] - 2s 162us/sample - loss: 0.1225
 - accuracy: 0.9703
Epoch 49/500
12599/12599 [==============================] - 2s 159us/sample - loss: 0.1211
 - accuracy: 0.9714
Epoch 50/500
12599/12599 [==============================] - 2s 161us/sample - loss: 0.1201
 - accuracy: 0.9714
Epoch 51/500
12599/12599 [==============================] - 2s 171us/sample - loss: 0.1188
 - accuracy: 0.9718
Epoch 52/500
12599/12599 [==============================] - 2s 159us/sample - loss: 0.1183

```
                                                      - accuracy: 0.9714
Epoch 53/500
12599/12599 [==============================] - 2s 195us/sample - loss: 0.1174
                                                      - accuracy: 0.9716
Epoch 54/500
12599/12599 [==============================] - 2s 155us/sample - loss: 0.1166
                                                      - accuracy: 0.9727
Epoch 55/500
12599/12599 [==============================] - 2s 135us/sample - loss: 0.1161
                                                      - accuracy: 0.9724
Epoch 56/500
12599/12599 [==============================] - 2s 169us/sample - loss: 0.1149
                                                      - accuracy: 0.9725
Epoch 57/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.1142
                                                      - accuracy: 0.9733
Epoch 58/500
12599/12599 [==============================] - 2s 175us/sample - loss: 0.1133
                                                      - accuracy: 0.9739
Epoch 59/500
12599/12599 [==============================] - 2s 164us/sample - loss: 0.1122
                                                      - accuracy: 0.9743
Epoch 60/500
12599/12599 [==============================] - 2s 159us/sample - loss: 0.1115
                                                      - accuracy: 0.9742
```

Epoch 61/500
12599/12599 [==============================] - 2s 157us/sample - loss: 0.1107
        - accuracy: 0.9742
Epoch 62/500
12599/12599 [==============================] - 2s 172us/sample - loss: 0.1095
        - accuracy: 0.9754
Epoch 63/500
12599/12599 [==============================] - 2s 157us/sample - loss: 0.1095
        - accuracy: 0.9742
Epoch 64/500
12599/12599 [==============================] - 2s 174us/sample - loss: 0.1079
        - accuracy: 0.9754
Epoch 65/500
12599/12599 [==============================] - 2s 148us/sample - loss: 0.1068
        - accuracy: 0.9758
Epoch 66/500
12599/12599 [==============================] - 2s 139us/sample - loss: 0.1074
        - accuracy: 0.9754
Epoch 67/500
12599/12599 [==============================] - 2s 124us/sample - loss: 0.1058
        - accuracy: 0.9757
Epoch 68/500
12599/12599 [==============================] - 2s 129us/sample - loss: 0.1054
        - accuracy: 0.9761
Epoch 69/500

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12599/12599 [==============================] - 2s 155us/sample - loss: 0.1036
 - accuracy: 0.9770
Epoch 70/500
12599/12599 [==============================] - 2s 172us/sample - loss: 0.1028
 - accuracy: 0.9770
Epoch 71/500
12599/12599 [==============================] - 2s 161us/sample - loss: 0.1025
 - accuracy: 0.9772
Epoch 72/500
12599/12599 [==============================] - 2s 172us/sample - loss: 0.1021
 - accuracy: 0.9773
Epoch 73/500
12599/12599 [==============================] - 2s 162us/sample - loss: 0.1010
 - accuracy: 0.9775
Epoch 74/500
12599/12599 [==============================] - 2s 167us/sample - loss: 0.1004
 - accuracy: 0.9777
Epoch 75/500
12599/12599 [==============================] - 2s 162us/sample - loss: 0.0991
 - accuracy: 0.9783
Epoch 76/500
12599/12599 [==============================] - 2s 174us/sample - loss: 0.0996
 - accuracy: 0.9787
Epoch 77/500
12599/12599 [==============================] - 2s 157us/sample - loss: 0.0976
```

- accuracy: 0.9783

Epoch 78/500
12599/12599 [==============================] - 2s 172us/sample - loss: 0.0971
- accuracy: 0.9784

Epoch 79/500
12599/12599 [==============================] - 2s 157us/sample - loss: 0.0957
- accuracy: 0.9798

Epoch 80/500
12599/12599 [==============================] - 2s 154us/sample - loss: 0.0958
- accuracy: 0.9778

Epoch 81/500
12599/12599 [==============================] - 2s 155us/sample - loss: 0.0946
- accuracy: 0.9795

Epoch 82/500
12599/12599 [==============================] - 2s 174us/sample - loss: 0.0940
- accuracy: 0.9802

Epoch 83/500
12599/12599 [==============================] - 2s 152us/sample - loss: 0.0936
- accuracy: 0.9799

Epoch 84/500
12599/12599 [==============================] - 2s 156us/sample - loss: 0.0931
- accuracy: 0.9794

Epoch 85/500
12599/12599 [==============================] - 2s 166us/sample - loss: 0.0913
- accuracy: 0.9795

Epoch 86/500
12599/12599 [==============================] - 2s 139us/sample - loss: 0.0928
       - accuracy: 0.9796
Epoch 87/500
12599/12599 [==============================] - 2s 178us/sample - loss: 0.0909
       - accuracy: 0.9804
Epoch 88/500
12599/12599 [==============================] - 2s 135us/sample - loss: 0.0896
       - accuracy: 0.9798
Epoch 89/500
12599/12599 [==============================] - 2s 174us/sample - loss: 0.0900
       - accuracy: 0.9806
Epoch 90/500
12599/12599 [==============================] - 2s 167us/sample - loss: 0.0881
       - accuracy: 0.9807
Epoch 91/500
12599/12599 [==============================] - 2s 161us/sample - loss: 0.0876
       - accuracy: 0.9810
Epoch 92/500
12599/12599 [==============================] - 2s 162us/sample - loss: 0.0871
       - accuracy: 0.9814
Epoch 93/500
12599/12599 [==============================] - 2s 173us/sample - loss: 0.0871
       - accuracy: 0.9817
Epoch 94/500

12599/12599 [==============================] - 2s 155us/sample - loss: 0.0870
- accuracy: 0.9818
Epoch 95/500
12599/12599 [==============================] - 2s 174us/sample - loss: 0.0862
- accuracy: 0.9808
Epoch 96/500
12599/12599 [==============================] - 2s 164us/sample - loss: 0.0854
- accuracy: 0.9817
Epoch 97/500
12599/12599 [==============================] - 2s 159us/sample - loss: 0.0848
- accuracy: 0.9821
Epoch 98/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.0846
- accuracy: 0.9815
Epoch 99/500
12599/12599 [==============================] - 2s 167us/sample - loss: 0.0842
- accuracy: 0.9829
Epoch 100/500
12599/12599 [==============================] - 2s 163us/sample - loss: 0.0834
- accuracy: 0.9819
Epoch 101/500
12599/12599 [==============================] - 2s 174us/sample - loss: 0.0830
- accuracy: 0.9830
Epoch 102/500
12599/12599 [==============================] - 2s 139us/sample - loss: 0.0820

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 - accuracy: 0.9830
Epoch 103/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.0821
 - accuracy: 0.9834
Epoch 104/500
12599/12599 [==============================] - 2s 155us/sample - loss: 0.0817
 - accuracy: 0.9822
Epoch 105/500
12599/12599 [==============================] - 2s 154us/sample - loss: 0.0808
 - accuracy: 0.9833
Epoch 106/500
12599/12599 [==============================] - 2s 179us/sample - loss: 0.0810
 - accuracy: 0.9832
Epoch 107/500
12599/12599 [==============================] - 2s 178us/sample - loss: 0.0803
 - accuracy: 0.9840
Epoch 108/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.0797
 - accuracy: 0.9843
Epoch 109/500
12599/12599 [==============================] - 2s 178us/sample - loss: 0.0792
 - accuracy: 0.9836
Epoch 110/500
12599/12599 [==============================] - 2s 156us/sample - loss: 0.0796
 - accuracy: 0.9837
```

Epoch 111/500
12599/12599 [==============================] - 2s 175us/sample - loss: 0.0792 - accuracy: 0.9833
Epoch 112/500
12599/12599 [==============================] - 2s 166us/sample - loss: 0.0790 - accuracy: 0.9842
Epoch 113/500
12599/12599 [==============================] - 2s 143us/sample - loss: 0.0783 - accuracy: 0.9833
Epoch 114/500
12599/12599 [==============================] - 2s 141us/sample - loss: 0.0776 - accuracy: 0.9840
Epoch 115/500
12599/12599 [==============================] - 2s 168us/sample - loss: 0.0780 - accuracy: 0.9840
Epoch 116/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0771 - accuracy: 0.9847
Epoch 117/500
12599/12599 [==============================] - 2s 159us/sample - loss: 0.0762 - accuracy: 0.9848
Epoch 118/500
12599/12599 [==============================] - 2s 156us/sample - loss: 0.0760 - accuracy: 0.9843
Epoch 119/500

12599/12599 [==============================] - 2s 153us/sample - loss: 0.0758 - accuracy: 0.9848
Epoch 120/500
12599/12599 [==============================] - 2s 172us/sample - loss: 0.0752 - accuracy: 0.9848
Epoch 121/500
12599/12599 [==============================] - 2s 154us/sample - loss: 0.0752 - accuracy: 0.9852
Epoch 122/500
12599/12599 [==============================] - 2s 173us/sample - loss: 0.0756 - accuracy: 0.9848
Epoch 123/500
12599/12599 [==============================] - 2s 158us/sample - loss: 0.0745 - accuracy: 0.9847
Epoch 124/500
12599/12599 [==============================] - 2s 155us/sample - loss: 0.0734 - accuracy: 0.9852
Epoch 125/500
12599/12599 [==============================] - 2s 161us/sample - loss: 0.0730 - accuracy: 0.9855
Epoch 126/500
12599/12599 [==============================] - 2s 169us/sample - loss: 0.0738 - accuracy: 0.9852
Epoch 127/500
12599/12599 [==============================] - 2s 156us/sample - loss: 0.0738

```
                     - accuracy: 0.9856
Epoch 128/500
12599/12599 [==============================] - 2s 158us/sample - loss: 0.0727
                     - accuracy: 0.9841
Epoch 129/500
12599/12599 [==============================] - 3s 207us/sample - loss: 0.0726
                     - accuracy: 0.9857
Epoch 130/500
12599/12599 [==============================] - 2s 149us/sample - loss: 0.0722
                     - accuracy: 0.9850
Epoch 131/500
12599/12599 [==============================] - 2s 156us/sample - loss: 0.0725
                     - accuracy: 0.9852
Epoch 132/500
12599/12599 [==============================] - 2s 174us/sample - loss: 0.0729
                     - accuracy: 0.9852
Epoch 133/500
12599/12599 [==============================] - 2s 190us/sample - loss: 0.0710
                     - accuracy: 0.9860
Epoch 134/500
12599/12599 [==============================] - 3s 205us/sample - loss: 0.0710
                     - accuracy: 0.9860
Epoch 135/500
12599/12599 [==============================] - 2s 166us/sample - loss: 0.0713
                     - accuracy: 0.9861
```

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Epoch 136/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.0713
 - accuracy: 0.9861
Epoch 137/500
12599/12599 [==============================] - 2s 151us/sample - loss: 0.0707
 - accuracy: 0.9852
Epoch 138/500
12599/12599 [==============================] - 2s 144us/sample - loss: 0.0696
 - accuracy: 0.9860
Epoch 139/500
12599/12599 [==============================] - 3s 211us/sample - loss: 0.0704
 - accuracy: 0.9864
Epoch 140/500
12599/12599 [==============================] - 2s 154us/sample - loss: 0.0699
 - accuracy: 0.9856
Epoch 141/500
12599/12599 [==============================] - 2s 145us/sample - loss: 0.0692
 - accuracy: 0.9864
Epoch 142/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0689
 - accuracy: 0.9867
Epoch 143/500
12599/12599 [==============================] - 2s 146us/sample - loss: 0.0687
 - accuracy: 0.9861
Epoch 144/500
```

12599/12599 [==============================] - 2s 142us/sample - loss: 0.0697 - accuracy: 0.9863
Epoch 145/500
12599/12599 [==============================] - 2s 156us/sample - loss: 0.0683 - accuracy: 0.9859
Epoch 146/500
12599/12599 [==============================] - 2s 143us/sample - loss: 0.0680 - accuracy: 0.9866
Epoch 147/500
12599/12599 [==============================] - 2s 142us/sample - loss: 0.0678 - accuracy: 0.9863
Epoch 148/500
12599/12599 [==============================] - 2s 145us/sample - loss: 0.0666 - accuracy: 0.9867
Epoch 149/500
12599/12599 [==============================] - 2s 146us/sample - loss: 0.0675 - accuracy: 0.9868
Epoch 150/500
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0674 - accuracy: 0.9867
Epoch 151/500
12599/12599 [==============================] - 2s 149us/sample - loss: 0.0669 - accuracy: 0.9867
Epoch 152/500
12599/12599 [==============================] - 2s 146us/sample - loss: 0.0670

```
                       - accuracy: 0.9866
Epoch 153/500
12599/12599 [==============================] - 2s 139us/sample - loss: 0.0662
                       - accuracy: 0.9872
Epoch 154/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0661
                       - accuracy: 0.9868
Epoch 155/500
12599/12599 [==============================] - 2s 142us/sample - loss: 0.0661
                       - accuracy: 0.9873
Epoch 156/500
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0659
                       - accuracy: 0.9869
Epoch 157/500
12599/12599 [==============================] - 2s 148us/sample - loss: 0.0660
                       - accuracy: 0.9874
Epoch 158/500
12599/12599 [==============================] - 2s 161us/sample - loss: 0.0655
                       - accuracy: 0.9863
Epoch 159/500
12599/12599 [==============================] - 2s 161us/sample - loss: 0.0658
                       - accuracy: 0.9867
Epoch 160/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0651
                       - accuracy: 0.9876
```

```
Epoch 161/500
12599/12599 [==============================] - 2s 151us/sample - loss: 0.0648
         - accuracy: 0.9875
Epoch 162/500
12599/12599 [==============================] - 2s 138us/sample - loss: 0.0645
         - accuracy: 0.9870
Epoch 163/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0636
         - accuracy: 0.9877
Epoch 164/500
12599/12599 [==============================] - 2s 154us/sample - loss: 0.0641
         - accuracy: 0.9872
Epoch 165/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.0647
         - accuracy: 0.9874
Epoch 166/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.0635
         - accuracy: 0.9877
Epoch 167/500
12599/12599 [==============================] - 2s 158us/sample - loss: 0.0636
         - accuracy: 0.9878
Epoch 168/500
12599/12599 [==============================] - 2s 138us/sample - loss: 0.0634
         - accuracy: 0.9879
Epoch 169/500
```

```
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0631
    - accuracy: 0.9880
Epoch 170/500
12599/12599 [==============================] - 2s 148us/sample - loss: 0.0631
    - accuracy: 0.9880
Epoch 171/500
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0629
    - accuracy: 0.9881
Epoch 172/500
12599/12599 [==============================] - 2s 145us/sample - loss: 0.0630
    - accuracy: 0.9873
Epoch 173/500
12599/12599 [==============================] - 2s 154us/sample - loss: 0.0621
    - accuracy: 0.9880
Epoch 174/500
12599/12599 [==============================] - 2s 142us/sample - loss: 0.0608
    - accuracy: 0.9884
Epoch 175/500
12599/12599 [==============================] - 2s 144us/sample - loss: 0.0627
    - accuracy: 0.9879
Epoch 176/500
12599/12599 [==============================] - 2s 151us/sample - loss: 0.0615
    - accuracy: 0.9880
Epoch 177/500
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0624
```

```
                - accuracy: 0.9875
Epoch 178/500
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0614
                - accuracy: 0.9879
Epoch 179/500
12599/12599 [==============================] - 2s 152us/sample - loss: 0.0608
                - accuracy: 0.9883
Epoch 180/500
12599/12599 [==============================] - 2s 144us/sample - loss: 0.0621
                - accuracy: 0.9881
Epoch 181/500
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0610
                - accuracy: 0.9877
Epoch 182/500
12599/12599 [==============================] - 2s 150us/sample - loss: 0.0605
                - accuracy: 0.9889
Epoch 183/500
12599/12599 [==============================] - 2s 144us/sample - loss: 0.0605
                - accuracy: 0.9886
Epoch 184/500
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0600
                - accuracy: 0.9886
Epoch 185/500
12599/12599 [==============================] - 2s 152us/sample - loss: 0.0614
                - accuracy: 0.9875
```

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Epoch 186/500
12599/12599 [==============================] - 2s 145us/sample - loss: 0.0598
        - accuracy: 0.9882
Epoch 187/500
12599/12599 [==============================] - 2s 142us/sample - loss: 0.0592
        - accuracy: 0.9883
Epoch 188/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.0601
        - accuracy: 0.9886
Epoch 189/500
12599/12599 [==============================] - 2s 146us/sample - loss: 0.0593
        - accuracy: 0.9888
Epoch 190/500
12599/12599 [==============================] - 2s 145us/sample - loss: 0.0606
        - accuracy: 0.9890
Epoch 191/500
12599/12599 [==============================] - 2s 154us/sample - loss: 0.0591
        - accuracy: 0.9885
Epoch 192/500
12599/12599 [==============================] - 2s 146us/sample - loss: 0.0595
        - accuracy: 0.9890
Epoch 193/500
12599/12599 [==============================] - 2s 142us/sample - loss: 0.0586
        - accuracy: 0.9890
Epoch 194/500
```

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12599/12599 [==============================] - 2s 146us/sample - loss: 0.0595
 - accuracy: 0.9887
Epoch 195/500
12599/12599 [==============================] - 2s 148us/sample - loss: 0.0586
 - accuracy: 0.9892
Epoch 196/500
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0577
 - accuracy: 0.9891
Epoch 197/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0579
 - accuracy: 0.9888
Epoch 198/500
12599/12599 [==============================] - 2s 148us/sample - loss: 0.0581
 - accuracy: 0.9890
Epoch 199/500
12599/12599 [==============================] - 2s 143us/sample - loss: 0.0577
 - accuracy: 0.9893
Epoch 200/500
12599/12599 [==============================] - 2s 143us/sample - loss: 0.0593
 - accuracy: 0.9885
Epoch 201/500
12599/12599 [==============================] - 2s 152us/sample - loss: 0.0581
 - accuracy: 0.9890
Epoch 202/500
12599/12599 [==============================] - 2s 139us/sample - loss: 0.0580
```

```
 - accuracy: 0.9887
Epoch 203/500
12599/12599 [==============================] - 2s 144us/sample - loss: 0.0576
 - accuracy: 0.9891
Epoch 204/500
12599/12599 [==============================] - 2s 162us/sample - loss: 0.0577
 - accuracy: 0.9884
Epoch 205/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0574
 - accuracy: 0.9894
Epoch 206/500
12599/12599 [==============================] - 2s 151us/sample - loss: 0.0567
 - accuracy: 0.9892
Epoch 207/500
12599/12599 [==============================] - 2s 149us/sample - loss: 0.0561
 - accuracy: 0.9896
Epoch 208/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0568
 - accuracy: 0.9894
Epoch 209/500
12599/12599 [==============================] - 2s 171us/sample - loss: 0.0572
 - accuracy: 0.9895
Epoch 210/500
12599/12599 [==============================] - 2s 154us/sample - loss: 0.0562
 - accuracy: 0.9892
```

Epoch 211/500
12599/12599 [==============================] - 2s 145us/sample - loss: 0.0557 - accuracy: 0.9894
Epoch 212/500
12599/12599 [==============================] - 2s 153us/sample - loss: 0.0564 - accuracy: 0.9898
Epoch 213/500
12599/12599 [==============================] - 2s 157us/sample - loss: 0.0565 - accuracy: 0.9898
Epoch 214/500
12599/12599 [==============================] - 2s 141us/sample - loss: 0.0564 - accuracy: 0.9895
Epoch 215/500
12599/12599 [==============================] - 2s 141us/sample - loss: 0.0562 - accuracy: 0.9897
Epoch 216/500
12599/12599 [==============================] - 2s 152us/sample - loss: 0.0550 - accuracy: 0.9898
Epoch 217/500
12599/12599 [==============================] - 2s 139us/sample - loss: 0.0557 - accuracy: 0.9892
Epoch 218/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0557 - accuracy: 0.9898
Epoch 219/500

```
12599/12599 [==============================] - 2s 150us/sample - loss: 0.0551
- accuracy: 0.9898
Epoch 220/500
12599/12599 [==============================] - 2s 133us/sample - loss: 0.0555
- accuracy: 0.9899
Epoch 221/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0543
- accuracy: 0.9905
Epoch 222/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0551
- accuracy: 0.9902
Epoch 223/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0556
- accuracy: 0.9890
Epoch 224/500
12599/12599 [==============================] - 1s 111us/sample - loss: 0.0552
- accuracy: 0.9894
Epoch 225/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0550
- accuracy: 0.9902
Epoch 226/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0544
- accuracy: 0.9901
Epoch 227/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0538
```

- accuracy: 0.9900
Epoch 228/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0541
- accuracy: 0.9898
Epoch 229/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0533
- accuracy: 0.9908
Epoch 230/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0540
- accuracy: 0.9894
Epoch 231/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0539
- accuracy: 0.9897
Epoch 232/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0539
- accuracy: 0.9902
Epoch 233/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0535
- accuracy: 0.9901
Epoch 234/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0532
- accuracy: 0.9909
Epoch 235/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0533
- accuracy: 0.9898

```
Epoch 236/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0545
 - accuracy: 0.9895
Epoch 237/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0527
 - accuracy: 0.9904
Epoch 238/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0538
 - accuracy: 0.9894
Epoch 239/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0534
 - accuracy: 0.9906
Epoch 240/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0518
 - accuracy: 0.9906
Epoch 241/500
12599/12599 [==============================] - 2s 128us/sample - loss: 0.0523
 - accuracy: 0.9906
Epoch 242/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0519
 - accuracy: 0.9905
Epoch 243/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0533
 - accuracy: 0.9899
Epoch 244/500
```

```
12599/12599 [==============================] - 2s 134us/sample - loss: 0.0518
 - accuracy: 0.9899
Epoch 245/500
12599/12599 [==============================] - 2s 132us/sample - loss: 0.0510
 - accuracy: 0.9907
Epoch 246/500
12599/12599 [==============================] - 2s 166us/sample - loss: 0.0520
 - accuracy: 0.9895
Epoch 247/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0517
 - accuracy: 0.9906
Epoch 248/500
12599/12599 [==============================] - 2s 128us/sample - loss: 0.0515
 - accuracy: 0.9912
Epoch 249/500
12599/12599 [==============================] - 2s 136us/sample - loss: 0.0517
 - accuracy: 0.9902
Epoch 250/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0513
 - accuracy: 0.9910
Epoch 251/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0512
 - accuracy: 0.9910
Epoch 252/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0515
```

```
    - accuracy: 0.9907
Epoch 253/500
12599/12599 [==============================] - 2s 133us/sample - loss: 0.0512
    - accuracy: 0.9910
Epoch 254/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0519
    - accuracy: 0.9902
Epoch 255/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0502
    - accuracy: 0.9906
Epoch 256/500
12599/12599 [==============================] - 2s 132us/sample - loss: 0.0521
    - accuracy: 0.9900
Epoch 257/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0509
    - accuracy: 0.9905
Epoch 258/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0510
    - accuracy: 0.9902
Epoch 259/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0515
    - accuracy: 0.9912
Epoch 260/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0507
    - accuracy: 0.9911
```

Epoch 261/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0498
 - accuracy: 0.9913
Epoch 262/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0496
 - accuracy: 0.9906
Epoch 263/500
12599/12599 [==============================] - 2s 134us/sample - loss: 0.0506
 - accuracy: 0.9906
Epoch 264/500
12599/12599 [==============================] - 2s 142us/sample - loss: 0.0497
 - accuracy: 0.9910
Epoch 265/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0501
 - accuracy: 0.9909
Epoch 266/500
12599/12599 [==============================] - 2s 131us/sample - loss: 0.0494
 - accuracy: 0.9910
Epoch 267/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0505
 - accuracy: 0.9900
Epoch 268/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0509
 - accuracy: 0.9906
Epoch 269/500

```
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0495
- accuracy: 0.9909
Epoch 270/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0495
- accuracy: 0.9909
Epoch 271/500
12599/12599 [==============================] - 2s 137us/sample - loss: 0.0490
- accuracy: 0.9909
Epoch 272/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0492
- accuracy: 0.9911
Epoch 273/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0495
- accuracy: 0.9906
Epoch 274/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0487
- accuracy: 0.9907
Epoch 275/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0490
- accuracy: 0.9912
Epoch 276/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0494
- accuracy: 0.9910
Epoch 277/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0479
```

```
 - accuracy: 0.9914
Epoch 278/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0499
 - accuracy: 0.9910
Epoch 279/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0489
 - accuracy: 0.9910
Epoch 280/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0486
 - accuracy: 0.9913
Epoch 281/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0485
 - accuracy: 0.9905
Epoch 282/500
12599/12599 [==============================] - 2s 126us/sample - loss: 0.0484
 - accuracy: 0.9913
Epoch 283/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0487
 - accuracy: 0.9912
Epoch 284/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0479
 - accuracy: 0.9914
Epoch 285/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0484
 - accuracy: 0.9916
```

```
Epoch 286/500
12599/12599 [==============================] - 2s 130us/sample - loss: 0.0477
 - accuracy: 0.9915
Epoch 287/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0492
 - accuracy: 0.9914
Epoch 288/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0478
 - accuracy: 0.9916
Epoch 289/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0478
 - accuracy: 0.9909
Epoch 290/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0469
 - accuracy: 0.9914
Epoch 291/500
12599/12599 [==============================] - 1s 111us/sample - loss: 0.0470
 - accuracy: 0.9919
Epoch 292/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0479
 - accuracy: 0.9917
Epoch 293/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0477
 - accuracy: 0.9906
Epoch 294/500
```

```
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0473
        - accuracy: 0.9911
Epoch 295/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0468
        - accuracy: 0.9914
Epoch 296/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0472
        - accuracy: 0.9917
Epoch 297/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0480
        - accuracy: 0.9917
Epoch 298/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0468
        - accuracy: 0.9912
Epoch 299/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0468
        - accuracy: 0.9911
Epoch 300/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0466
        - accuracy: 0.9917
Epoch 301/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0477
        - accuracy: 0.9913
Epoch 302/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0464
```

```
          - accuracy: 0.9917
Epoch 303/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0470
          - accuracy: 0.9913
Epoch 304/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0459
          - accuracy: 0.9917
Epoch 305/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0462
          - accuracy: 0.9917
Epoch 306/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0456
          - accuracy: 0.9917
Epoch 307/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0462
          - accuracy: 0.9920
Epoch 308/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0464
          - accuracy: 0.9916
Epoch 309/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0460
          - accuracy: 0.9917
Epoch 310/500
12599/12599 [==============================] - 1s 111us/sample - loss: 0.0464
          - accuracy: 0.9918
```

Epoch 311/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0465
    - accuracy: 0.9920
Epoch 312/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0454
    - accuracy: 0.9917
Epoch 313/500
12599/12599 [==============================] - 2s 126us/sample - loss: 0.0468
    - accuracy: 0.9915
Epoch 314/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0461
    - accuracy: 0.9917
Epoch 315/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0459
    - accuracy: 0.9921
Epoch 316/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0448
    - accuracy: 0.9921
Epoch 317/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0452
    - accuracy: 0.9921
Epoch 318/500
12599/12599 [==============================] - 1s 111us/sample - loss: 0.0451
    - accuracy: 0.9919
Epoch 319/500

```
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0451
 - accuracy: 0.9923
Epoch 320/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0456
 - accuracy: 0.9917
Epoch 321/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0449
 - accuracy: 0.9920
Epoch 322/500
12599/12599 [==============================] - 1s 111us/sample - loss: 0.0454
 - accuracy: 0.9921
Epoch 323/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0454
 - accuracy: 0.9922
Epoch 324/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0448
 - accuracy: 0.9920
Epoch 325/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0450
 - accuracy: 0.9919
Epoch 326/500
12599/12599 [==============================] - 1s 110us/sample - loss: 0.0446
 - accuracy: 0.9922
Epoch 327/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0456
```

```
 - accuracy: 0.9915
Epoch 328/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0449
 - accuracy: 0.9918
Epoch 329/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0443
 - accuracy: 0.9921
Epoch 330/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0436
 - accuracy: 0.9919
Epoch 331/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0439
 - accuracy: 0.9922
Epoch 332/500
12599/12599 [==============================] - 2s 124us/sample - loss: 0.0460
 - accuracy: 0.9917
Epoch 333/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0434
 - accuracy: 0.9921
Epoch 334/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0441
 - accuracy: 0.9922
Epoch 335/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0439
 - accuracy: 0.9922
```

```
Epoch 336/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0432
 - accuracy: 0.9924
Epoch 337/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0443
 - accuracy: 0.9918
Epoch 338/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0442
 - accuracy: 0.9921
Epoch 339/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0436
 - accuracy: 0.9917
Epoch 340/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0444
 - accuracy: 0.9922
Epoch 341/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0430
 - accuracy: 0.9922
Epoch 342/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0430
 - accuracy: 0.9923
Epoch 343/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0440
 - accuracy: 0.9917
Epoch 344/500
```

12599/12599 [==============================] - 1s 117us/sample - loss: 0.0438
- accuracy: 0.9919
Epoch 345/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0441
- accuracy: 0.9921
Epoch 346/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0433
- accuracy: 0.9921
Epoch 347/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0434
- accuracy: 0.9926
Epoch 348/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0435
- accuracy: 0.9921
Epoch 349/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0425
- accuracy: 0.9923
Epoch 350/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0431
- accuracy: 0.9928
Epoch 351/500
12599/12599 [==============================] - 2s 126us/sample - loss: 0.0428
- accuracy: 0.9921
Epoch 352/500
12599/12599 [==============================] - 2s 133us/sample - loss: 0.0432

- accuracy: 0.9920
Epoch 353/500
12599/12599 [==============================] - 2s 128us/sample - loss: 0.0427
- accuracy: 0.9927
Epoch 354/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0427
- accuracy: 0.9919
Epoch 355/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0424
- accuracy: 0.9922
Epoch 356/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0429
- accuracy: 0.9924
Epoch 357/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0422
- accuracy: 0.9929
Epoch 358/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0418
- accuracy: 0.9926
Epoch 359/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0420
- accuracy: 0.9925
Epoch 360/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0426
- accuracy: 0.9921

Epoch 361/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0419
 - accuracy: 0.9923
Epoch 362/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0426
 - accuracy: 0.9926
Epoch 363/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0421
 - accuracy: 0.9925
Epoch 364/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0425
 - accuracy: 0.9923
Epoch 365/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0420
 - accuracy: 0.9925
Epoch 366/500
12599/12599 [==============================] - 2s 124us/sample - loss: 0.0420
 - accuracy: 0.9925
Epoch 367/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0429
 - accuracy: 0.9919
Epoch 368/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0415
 - accuracy: 0.9926
Epoch 369/500

```
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0414
 - accuracy: 0.9929
Epoch 370/500
12599/12599 [==============================] - 2s 124us/sample - loss: 0.0419
 - accuracy: 0.9929
Epoch 371/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0415
 - accuracy: 0.9929
Epoch 372/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0411
 - accuracy: 0.9927
Epoch 373/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0421
 - accuracy: 0.9924
Epoch 374/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0415
 - accuracy: 0.9925
Epoch 375/500
12599/12599 [==============================] - 1s 110us/sample - loss: 0.0411
 - accuracy: 0.9926
Epoch 376/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0412
 - accuracy: 0.9925
Epoch 377/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0410
```

- accuracy: 0.9926
Epoch 378/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0422
- accuracy: 0.9924
Epoch 379/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0412
- accuracy: 0.9926
Epoch 380/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0401
- accuracy: 0.9931
Epoch 381/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0410
- accuracy: 0.9928
Epoch 382/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0420
- accuracy: 0.9920
Epoch 383/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0407
- accuracy: 0.9929
Epoch 384/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0404
- accuracy: 0.9929
Epoch 385/500
12599/12599 [==============================] - 2s 124us/sample - loss: 0.0409
- accuracy: 0.9928

Epoch 386/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0404
 - accuracy: 0.9923
Epoch 387/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0409
 - accuracy: 0.9923
Epoch 388/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0403
 - accuracy: 0.9931
Epoch 389/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0396
 - accuracy: 0.9927
Epoch 390/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0404
 - accuracy: 0.9926
Epoch 391/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0405
 - accuracy: 0.9928
Epoch 392/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0412
 - accuracy: 0.9920
Epoch 393/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0401
 - accuracy: 0.9926
Epoch 394/500

```
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0400
- accuracy: 0.9929
Epoch 395/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0398
- accuracy: 0.9925
Epoch 396/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0391
- accuracy: 0.9928
Epoch 397/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0400
- accuracy: 0.9927
Epoch 398/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0398
- accuracy: 0.9927
Epoch 399/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0404
- accuracy: 0.9931
Epoch 400/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0394
- accuracy: 0.9932
Epoch 401/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0403
- accuracy: 0.9925
Epoch 402/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0396
```

```
                                   - accuracy: 0.9930
Epoch 403/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0393
                                   - accuracy: 0.9933
Epoch 404/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0400
                                   - accuracy: 0.9929
Epoch 405/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0394
                                   - accuracy: 0.9930
Epoch 406/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0389
                                   - accuracy: 0.9930
Epoch 407/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0399
                                   - accuracy: 0.9931
Epoch 408/500
12599/12599 [==============================] - 2s 129us/sample - loss: 0.0400
                                   - accuracy: 0.9929
Epoch 409/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0393
                                   - accuracy: 0.9929
Epoch 410/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0394
                                   - accuracy: 0.9932
```

Epoch 411/500
12599/12599 [==============================] - 2s 124us/sample - loss: 0.0388
 - accuracy: 0.9934
Epoch 412/500
12599/12599 [==============================] - 2s 130us/sample - loss: 0.0385
 - accuracy: 0.9932
Epoch 413/500
12599/12599 [==============================] - 1s 118us/sample - loss: 0.0391
 - accuracy: 0.9932
Epoch 414/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0386
 - accuracy: 0.9936
Epoch 415/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0385
 - accuracy: 0.9932
Epoch 416/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0392
 - accuracy: 0.9932
Epoch 417/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0389
 - accuracy: 0.9931
Epoch 418/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0380
 - accuracy: 0.9937
Epoch 419/500

```
12599/12599 [==============================] - 2s 124us/sample - loss: 0.0387
    - accuracy: 0.9931
Epoch 420/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0389
    - accuracy: 0.9931
Epoch 421/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0395
    - accuracy: 0.9929
Epoch 422/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0378
    - accuracy: 0.9935
Epoch 423/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0385
    - accuracy: 0.9932
Epoch 424/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0388
    - accuracy: 0.9926
Epoch 425/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0380
    - accuracy: 0.9931
Epoch 426/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0382
    - accuracy: 0.9931
Epoch 427/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0389
```

```
- accuracy: 0.9930
Epoch 428/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0381
- accuracy: 0.9931
Epoch 429/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0385
- accuracy: 0.9929
Epoch 430/500
12599/12599 [==============================] - 2s 152us/sample - loss: 0.0375
- accuracy: 0.9930
Epoch 431/500
12599/12599 [==============================] - 2s 123us/sample - loss: 0.0375
- accuracy: 0.9932
Epoch 432/500
12599/12599 [==============================] - 2s 126us/sample - loss: 0.0380
- accuracy: 0.9935
Epoch 433/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0381
- accuracy: 0.9929
Epoch 434/500
12599/12599 [==============================] - 2s 126us/sample - loss: 0.0387
- accuracy: 0.9928
Epoch 435/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0383
- accuracy: 0.9935
```

Epoch 436/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0373
 - accuracy: 0.9933
Epoch 437/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0377
 - accuracy: 0.9929
Epoch 438/500
12599/12599 [==============================] - 2s 125us/sample - loss: 0.0374
 - accuracy: 0.9936
Epoch 439/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0374
 - accuracy: 0.9933
Epoch 440/500
12599/12599 [==============================] - 2s 137us/sample - loss: 0.0381
 - accuracy: 0.9933
Epoch 441/500
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0380
 - accuracy: 0.9937
Epoch 442/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0375
 - accuracy: 0.9937
Epoch 443/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0373
 - accuracy: 0.9935
Epoch 444/500

12599/12599 [==============================] - 2s 121us/sample - loss: 0.0372
- accuracy: 0.9935
Epoch 445/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0377
- accuracy: 0.9933
Epoch 446/500
12599/12599 [==============================] - 1s 114us/sample - loss: 0.0380
- accuracy: 0.9932
Epoch 447/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0364
- accuracy: 0.9934
Epoch 448/500
12599/12599 [==============================] - 2s 126us/sample - loss: 0.0379
- accuracy: 0.9926
Epoch 449/500
12599/12599 [==============================] - 1s 117us/sample - loss: 0.0370
- accuracy: 0.9936
Epoch 450/500
12599/12599 [==============================] - 1s 113us/sample - loss: 0.0375
- accuracy: 0.9933
Epoch 451/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0370
- accuracy: 0.9936
Epoch 452/500
12599/12599 [==============================] - 2s 128us/sample - loss: 0.0365

- accuracy: 0.9940
Epoch 453/500
12599/12599 [==============================] - 1s 112us/sample - loss: 0.0371
- accuracy: 0.9934
Epoch 454/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0373
- accuracy: 0.9934
Epoch 455/500
12599/12599 [==============================] - 2s 122us/sample - loss: 0.0363
- accuracy: 0.9937
Epoch 456/500
12599/12599 [==============================] - 2s 136us/sample - loss: 0.0367
- accuracy: 0.9937
Epoch 457/500
12599/12599 [==============================] - 2s 169us/sample - loss: 0.0364
- accuracy: 0.9938
Epoch 458/500
12599/12599 [==============================] - 2s 148us/sample - loss: 0.0369
- accuracy: 0.9935
Epoch 459/500
12599/12599 [==============================] - 2s 163us/sample - loss: 0.0366
- accuracy: 0.9934
Epoch 460/500
12599/12599 [==============================] - 2s 133us/sample - loss: 0.0368
- accuracy: 0.9937

Epoch 461/500
12599/12599 [==============================] - 2s 160us/sample - loss: 0.0365
 - accuracy: 0.9936
Epoch 462/500
12599/12599 [==============================] - 3s 211us/sample - loss: 0.0384
 - accuracy: 0.9929
Epoch 463/500
12599/12599 [==============================] - 2s 151us/sample - loss: 0.0364
 - accuracy: 0.9936
Epoch 464/500
12599/12599 [==============================] - 2s 135us/sample - loss: 0.0365
 - accuracy: 0.9933
Epoch 465/500
12599/12599 [==============================] - 3s 217us/sample - loss: 0.0360
 - accuracy: 0.9937
Epoch 466/500
12599/12599 [==============================] - 2s 187us/sample - loss: 0.0369
 - accuracy: 0.9933
Epoch 467/500
12599/12599 [==============================] - 2s 155us/sample - loss: 0.0356
 - accuracy: 0.9940
Epoch 468/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0361
 - accuracy: 0.9937
Epoch 469/500

12599/12599 [==============================] - 2s 165us/sample - loss: 0.0357
- accuracy: 0.9937
Epoch 470/500
12599/12599 [==============================] - 2s 124us/sample - loss: 0.0360
- accuracy: 0.9935
Epoch 471/500
12599/12599 [==============================] - 1s 119us/sample - loss: 0.0363
- accuracy: 0.9935
Epoch 472/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0358
- accuracy: 0.9935
Epoch 473/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0365
- accuracy: 0.9934
Epoch 474/500
12599/12599 [==============================] - 2s 126us/sample - loss: 0.0357
- accuracy: 0.9940
Epoch 475/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0360
- accuracy: 0.9941
Epoch 476/500
12599/12599 [==============================] - 1s 116us/sample - loss: 0.0369
- accuracy: 0.9933
Epoch 477/500
12599/12599 [==============================] - 2s 119us/sample - loss: 0.0360

- accuracy: 0.9933

Epoch 478/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0359
- accuracy: 0.9930

Epoch 479/500
12599/12599 [==============================] - 1s 115us/sample - loss: 0.0356
- accuracy: 0.9934

Epoch 480/500
12599/12599 [==============================] - 2s 127us/sample - loss: 0.0358
- accuracy: 0.9939

Epoch 481/500
12599/12599 [==============================] - 2s 137us/sample - loss: 0.0360
- accuracy: 0.9937

Epoch 482/500
12599/12599 [==============================] - 2s 137us/sample - loss: 0.0353
- accuracy: 0.9931

Epoch 483/500
12599/12599 [==============================] - 2s 141us/sample - loss: 0.0358
- accuracy: 0.9937

Epoch 484/500
12599/12599 [==============================] - 2s 143us/sample - loss: 0.0355
- accuracy: 0.9937

Epoch 485/500
12599/12599 [==============================] - 2s 161us/sample - loss: 0.0346
- accuracy: 0.9939

Epoch 486/500
12599/12599 [==============================] - 2s 126us/sample - loss: 0.0352
        - accuracy: 0.9933
Epoch 487/500
12599/12599 [==============================] - 2s 147us/sample - loss: 0.0357
        - accuracy: 0.9940
Epoch 488/500
12599/12599 [==============================] - 2s 139us/sample - loss: 0.0358
        - accuracy: 0.9935
Epoch 489/500
12599/12599 [==============================] - 2s 133us/sample - loss: 0.0353
        - accuracy: 0.9940
Epoch 490/500
12599/12599 [==============================] - 2s 131us/sample - loss: 0.0351
        - accuracy: 0.9937
Epoch 491/500
12599/12599 [==============================] - 2s 138us/sample - loss: 0.0358
        - accuracy: 0.9936
Epoch 492/500
12599/12599 [==============================] - 2s 130us/sample - loss: 0.0355
        - accuracy: 0.9938
Epoch 493/500
12599/12599 [==============================] - 2s 136us/sample - loss: 0.0355
        - accuracy: 0.9938
Epoch 494/500

```
12599/12599 [==============================] - 2s 140us/sample - loss: 0.0362
- accuracy: 0.9939
Epoch 495/500
12599/12599 [==============================] - 2s 132us/sample - loss: 0.0351
- accuracy: 0.9940
Epoch 496/500
12599/12599 [==============================] - 2s 128us/sample - loss: 0.0359
- accuracy: 0.9933
Epoch 497/500
12599/12599 [==============================] - 2s 134us/sample - loss: 0.0358
- accuracy: 0.9933
Epoch 498/500
12599/12599 [==============================] - 2s 130us/sample - loss: 0.0355
- accuracy: 0.9938
Epoch 499/500
12599/12599 [==============================] - 2s 121us/sample - loss: 0.0345
- accuracy: 0.9939
Epoch 500/500
12599/12599 [==============================] - 2s 120us/sample - loss: 0.0340
- accuracy: 0.9938
2891/2891 [==============================] - 0s 76us/sample

class_weight_Fold_2: {0: 0.10994851208656947, 1: 9.946578947736842}
```

pos_weight: 0.9
thresholdNum: 0.5

Average of train loss Fold_2: 0.0771
Average of yPredProbability Fold_2: 0.0522

classification_report_Fold_2:

	precision	recall	f1-score	support
Normal 0	1.00	0.96	0.98	2881
Anomaly 1	0.00	0.00	0.00	10
accuracy			0.96	2891
macro avg	0.50	0.48	0.49	2891
weighted avg	0.99	0.96	0.98	2891

confusion_matrix_Fold_2:
True Negatives: 2780
False Positives: 101
False Negatives: 10
True Positives: 0

End running time Fold_2: 210504_224056 ,------------------.

Start running time Fold_3: 210504_224056 ,-------------------:

Shape of Actual yXtrainRolled After Rolling Fold_3: (23080, 60)

Shape of Actual yXvalidShifted dataset: (2888, 60)
Shape of Actual yXvalidRolled After Rolling Fold_3: (5774, 60)
Start running time Data Augmentation_Fold_3: 210504_224056
,+++++++++++++++++++++++++++++++++++:

Data Augmentation MSE Label 1==> mean: 0.000615, min: 0.00025, max: 0.002563

Data Augmentation MSE Label 1==> mean: 0.000347, min: 1.6e-05, max: 0.001347

Data Augmentation MSE Label 1==> mean: 0.000412, min: 2e-06, max: 0.003186

Data Augmentation MSE Label 1==> mean: 0.000616, min: 0.0, max: 0.006548

Data Augmentation MSE Label 1==> mean: 0.000942, min: 0.0, max: 0.008053

Data Augmentation MSE Label 1==> mean: 0.001366, min: 0.0, max: 0.006347

Data Augmentation MSE Label 1==> mean: 0.001852, min: 0.0, max: 0.008437

Data Augmentation MSE Label 1==> mean: 0.002179, min: 0.0, max: 0.01028

Data Augmentation MSE Label 1==> mean: 0.002417, min: 0.0, max: 0.018783

Data Augmentation MSE Label 1==> mean: 0.002449, min: 0.0, max: 0.018414

Data Augmentation MSE Label 1==> mean: 0.002408, min: 0.0, max: 0.019876

Data Augmentation MSE Label 1==> mean: 0.002618, min: 0.0, max: 0.047709

Data Augmentation MSE Label 1==> mean: 0.003246, min: 0.0, max: 0.0817

Data Augmentation MSE Label 1==> mean: 0.002743, min: 0.0, max: 0.060362

MSE All generated Augmented data Fold_3:
mean: 0.001729
min: 1.9e-05
max: 0.020972

End running time Data Augmentation_Fold_3: 210504_224156
,++++++++++++++++++++++++++++++++++++.

Shape of data after Transform ToOneRow to give Cross Validation Model in fold_3:

xtrain: (12534, 118), ytrain: (12534,)
xvalid: (2887, 118), yvalid: (2887,)

Number of final label 0 in yXtrain_Fold_3: 11469

Number of final label 1 in yXtrain_Before_AddingAugedData_Fold_3: 71
Number of final label 1 in yXtrain_After_AddingAugedData_Fold_3: 1065

Train on 12534 samples
Epoch 1/500
12534/12534 [==============================] - 3s 261us/sample - loss: 3.2590
- accuracy: 0.9205
Epoch 2/500
12534/12534 [==============================] - 2s 127us/sample - loss: 1.6756
- accuracy: 0.9365
Epoch 3/500
12534/12534 [==============================] - 2s 129us/sample - loss: 0.8816
- accuracy: 0.9393
Epoch 4/500
12534/12534 [==============================] - 2s 123us/sample - loss: 0.5061
- accuracy: 0.9429
Epoch 5/500

```
12534/12534 [==============================] - 2s 132us/sample - loss: 0.3363
 - accuracy: 0.9442
Epoch 6/500
12534/12534 [==============================] - 1s 118us/sample - loss: 0.2584
 - accuracy: 0.9462
Epoch 7/500
12534/12534 [==============================] - 2s 126us/sample - loss: 0.2228
 - accuracy: 0.9469
Epoch 8/500
12534/12534 [==============================] - 2s 124us/sample - loss: 0.2050
 - accuracy: 0.9475
Epoch 9/500
12534/12534 [==============================] - 2s 127us/sample - loss: 0.1960
 - accuracy: 0.9490
Epoch 10/500
12534/12534 [==============================] - 2s 122us/sample - loss: 0.1893
 - accuracy: 0.9489
Epoch 11/500
12534/12534 [==============================] - 2s 125us/sample - loss: 0.1861
 - accuracy: 0.9481
Epoch 12/500
12534/12534 [==============================] - 2s 130us/sample - loss: 0.1827
 - accuracy: 0.9505
Epoch 13/500
12534/12534 [==============================] - 2s 121us/sample - loss: 0.1802
```

- accuracy: 0.9513
Epoch 14/500
12534/12534 [==============================] - 2s 125us/sample - loss: 0.1781
- accuracy: 0.9517
Epoch 15/500
12534/12534 [==============================] - 2s 126us/sample - loss: 0.1752
- accuracy: 0.9516
Epoch 16/500
12534/12534 [==============================] - 2s 129us/sample - loss: 0.1733
- accuracy: 0.9523
Epoch 17/500
12534/12534 [==============================] - 1s 117us/sample - loss: 0.1711
- accuracy: 0.9527
Epoch 18/500
12534/12534 [==============================] - 2s 130us/sample - loss: 0.1685
- accuracy: 0.9544
Epoch 19/500
12534/12534 [==============================] - 2s 129us/sample - loss: 0.1674
- accuracy: 0.9536
Epoch 20/500
12534/12534 [==============================] - 2s 131us/sample - loss: 0.1649
- accuracy: 0.9550
Epoch 21/500
12534/12534 [==============================] - 2s 129us/sample - loss: 0.1632
- accuracy: 0.9560

Epoch 22/500
12534/12534 [==============================] - 2s 121us/sample - loss: 0.1609
 - accuracy: 0.9556
Epoch 23/500
12534/12534 [==============================] - 2s 133us/sample - loss: 0.1597
 - accuracy: 0.9560
Epoch 24/500
12534/12534 [==============================] - 2s 181us/sample - loss: 0.1576
 - accuracy: 0.9564
Epoch 25/500
12534/12534 [==============================] - 2s 162us/sample - loss: 0.1553
 - accuracy: 0.9568
Epoch 26/500
12534/12534 [==============================] - 2s 172us/sample - loss: 0.1540
 - accuracy: 0.9579
Epoch 27/500
12534/12534 [==============================] - 2s 153us/sample - loss: 0.1522
 - accuracy: 0.9583
Epoch 28/500
12534/12534 [==============================] - 2s 144us/sample - loss: 0.1519
 - accuracy: 0.9586
Epoch 29/500
12534/12534 [==============================] - 2s 151us/sample - loss: 0.1487
 - accuracy: 0.9581
Epoch 30/500

12534/12534 [==============================] - 2s 142us/sample - loss: 0.1473
- accuracy: 0.9601
Epoch 31/500
12534/12534 [==============================] - 2s 148us/sample - loss: 0.1451
- accuracy: 0.9607
Epoch 32/500
12534/12534 [==============================] - 2s 147us/sample - loss: 0.1437
- accuracy: 0.9615
Epoch 33/500
12534/12534 [==============================] - 2s 145us/sample - loss: 0.1419
- accuracy: 0.9600
Epoch 34/500
12534/12534 [==============================] - 2s 165us/sample - loss: 0.1404
- accuracy: 0.9622
Epoch 35/500
12534/12534 [==============================] - 2s 162us/sample - loss: 0.1396
- accuracy: 0.9632
Epoch 36/500
12534/12534 [==============================] - 2s 178us/sample - loss: 0.1372
- accuracy: 0.9642
Epoch 37/500
12534/12534 [==============================] - 2s 179us/sample - loss: 0.1356
- accuracy: 0.9641
Epoch 38/500
12534/12534 [==============================] - 2s 178us/sample - loss: 0.1346

```
          - accuracy: 0.9653
Epoch 39/500
12534/12534 [==============================] - 2s 192us/sample - loss: 0.1336
          - accuracy: 0.9645
Epoch 40/500
12534/12534 [==============================] - 3s 203us/sample - loss: 0.1321
          - accuracy: 0.9646
Epoch 41/500
12534/12534 [==============================] - 2s 172us/sample - loss: 0.1300
          - accuracy: 0.9663
Epoch 42/500
12534/12534 [==============================] - 3s 216us/sample - loss: 0.1285
          - accuracy: 0.9678
Epoch 43/500
12534/12534 [==============================] - 2s 170us/sample - loss: 0.1283
          - accuracy: 0.9673
Epoch 44/500
12534/12534 [==============================] - 2s 198us/sample - loss: 0.1269
          - accuracy: 0.9681
Epoch 45/500
12534/12534 [==============================] - 2s 193us/sample - loss: 0.1252
          - accuracy: 0.9676
Epoch 46/500
12534/12534 [==============================] - 2s 168us/sample - loss: 0.1237
          - accuracy: 0.9684
```

Epoch 47/500
12534/12534 [==============================] - 3s 200us/sample - loss: 0.1220
 - accuracy: 0.9697
Epoch 48/500
12534/12534 [==============================] - 2s 167us/sample - loss: 0.1218
 - accuracy: 0.9695
Epoch 49/500
12534/12534 [==============================] - 2s 163us/sample - loss: 0.1201
 - accuracy: 0.9702
Epoch 50/500
12534/12534 [==============================] - 2s 187us/sample - loss: 0.1193
 - accuracy: 0.9706
Epoch 51/500
12534/12534 [==============================] - 2s 191us/sample - loss: 0.1177
 - accuracy: 0.9708
Epoch 52/500
12534/12534 [==============================] - 3s 247us/sample - loss: 0.1163
 - accuracy: 0.9718
Epoch 53/500
12534/12534 [==============================] - 3s 216us/sample - loss: 0.1165
 - accuracy: 0.9718
Epoch 54/500
12534/12534 [==============================] - 2s 194us/sample - loss: 0.1131
 - accuracy: 0.9723
Epoch 55/500

```
12534/12534 [==============================] - 2s 199us/sample - loss: 0.1131
 - accuracy: 0.9723
Epoch 56/500
12534/12534 [==============================] - 2s 168us/sample - loss: 0.1112
 - accuracy: 0.9729
Epoch 57/500
12534/12534 [==============================] - 3s 253us/sample - loss: 0.1103
 - accuracy: 0.9733
Epoch 58/500
12534/12534 [==============================] - 2s 159us/sample - loss: 0.1095
 - accuracy: 0.9741
Epoch 59/500
12534/12534 [==============================] - 2s 197us/sample - loss: 0.1092
 - accuracy: 0.9734
Epoch 60/500
12534/12534 [==============================] - 2s 162us/sample - loss: 0.1095
 - accuracy: 0.9735
Epoch 61/500
12534/12534 [==============================] - 2s 190us/sample - loss: 0.1068
 - accuracy: 0.9742
Epoch 62/500
12534/12534 [==============================] - 2s 171us/sample - loss: 0.1049
 - accuracy: 0.9750
Epoch 63/500
12534/12534 [==============================] - 2s 153us/sample - loss: 0.1040
```

```
                                  - accuracy: 0.9757
Epoch 64/500
12534/12534 [==============================] - 2s 152us/sample - loss: 0.1042
                                  - accuracy: 0.9761
Epoch 65/500
12534/12534 [==============================] - 2s 164us/sample - loss: 0.1015
                                  - accuracy: 0.9765
Epoch 66/500
12534/12534 [==============================] - 2s 153us/sample - loss: 0.1011
                                  - accuracy: 0.9775
Epoch 67/500
12534/12534 [==============================] - 2s 156us/sample - loss: 0.1001
                                  - accuracy: 0.9768
Epoch 68/500
12534/12534 [==============================] - 2s 189us/sample - loss: 0.0995
                                  - accuracy: 0.9767
Epoch 69/500
12534/12534 [==============================] - 2s 163us/sample - loss: 0.0998
                                  - accuracy: 0.9775
Epoch 70/500
12534/12534 [==============================] - 3s 240us/sample - loss: 0.0978
                                  - accuracy: 0.9780
Epoch 71/500
12534/12534 [==============================] - 3s 208us/sample - loss: 0.0981
                                  - accuracy: 0.9779
```

Epoch 72/500
12534/12534 [==============================] - 2s 198us/sample - loss: 0.0961
- accuracy: 0.9773
Epoch 73/500
12534/12534 [==============================] - 5s 374us/sample - loss: 0.0954
- accuracy: 0.9777
Epoch 74/500
12534/12534 [==============================] - 2s 152us/sample - loss: 0.0953
- accuracy: 0.9793
Epoch 75/500
12534/12534 [==============================] - 2s 162us/sample - loss: 0.0941
- accuracy: 0.9787
Epoch 76/500
12534/12534 [==============================] - 2s 143us/sample - loss: 0.0942
- accuracy: 0.9793
Epoch 77/500
12534/12534 [==============================] - 2s 152us/sample - loss: 0.0924
- accuracy: 0.9797
Epoch 78/500
12534/12534 [==============================] - 2s 155us/sample - loss: 0.0909
- accuracy: 0.9808
Epoch 79/500
12534/12534 [==============================] - 2s 142us/sample - loss: 0.0918
- accuracy: 0.9797
Epoch 80/500

```
12534/12534 [==============================] - 2s 135us/sample - loss: 0.0907
 - accuracy: 0.9811
Epoch 81/500
12534/12534 [==============================] - 2s 128us/sample - loss: 0.0894
 - accuracy: 0.9817
Epoch 82/500
12534/12534 [==============================] - 2s 164us/sample - loss: 0.0894
 - accuracy: 0.9814
Epoch 83/500
12534/12534 [==============================] - 2s 132us/sample - loss: 0.0896
 - accuracy: 0.9802
Epoch 84/500
12534/12534 [==============================] - 2s 131us/sample - loss: 0.0872
 - accuracy: 0.9828
Epoch 85/500
12534/12534 [==============================] - 2s 169us/sample - loss: 0.0868
 - accuracy: 0.9819
Epoch 86/500
12534/12534 [==============================] - 2s 131us/sample - loss: 0.0856
 - accuracy: 0.9828
Epoch 87/500
12534/12534 [==============================] - 2s 143us/sample - loss: 0.0859
 - accuracy: 0.9821
Epoch 88/500
12534/12534 [==============================] - 3s 211us/sample - loss: 0.0853
```

```
- accuracy: 0.9819
Epoch 89/500
12534/12534 [==============================] - 3s 229us/sample - loss: 0.0847
- accuracy: 0.9836
Epoch 90/500
12534/12534 [==============================] - 3s 217us/sample - loss: 0.0848
- accuracy: 0.9829
Epoch 91/500
12534/12534 [==============================] - 2s 164us/sample - loss: 0.0832
- accuracy: 0.9830
Epoch 92/500
12534/12534 [==============================] - 2s 138us/sample - loss: 0.0826
- accuracy: 0.9829
Epoch 93/500
12534/12534 [==============================] - 2s 194us/sample - loss: 0.0820
- accuracy: 0.9836
Epoch 94/500
12534/12534 [==============================] - 2s 136us/sample - loss: 0.0821
- accuracy: 0.9834
Epoch 95/500
12534/12534 [==============================] - 2s 146us/sample - loss: 0.0814
- accuracy: 0.9842
Epoch 96/500
12534/12534 [==============================] - 2s 169us/sample - loss: 0.0815
- accuracy: 0.9838
```

Epoch 97/500
12534/12534 [==============================] - 2s 133us/sample - loss: 0.0808
 - accuracy: 0.9847
Epoch 98/500
12534/12534 [==============================] - 2s 131us/sample - loss: 0.0795
 - accuracy: 0.9849
Epoch 99/500
12534/12534 [==============================] - 2s 190us/sample - loss: 0.0796
 - accuracy: 0.9832
Epoch 100/500
12534/12534 [==============================] - 2s 186us/sample - loss: 0.0781
 - accuracy: 0.9847
Epoch 101/500
12534/12534 [==============================] - 2s 170us/sample - loss: 0.0780
 - accuracy: 0.9852
Epoch 102/500
12534/12534 [==============================] - 2s 168us/sample - loss: 0.0782
 - accuracy: 0.9848
Epoch 103/500
12534/12534 [==============================] - 2s 131us/sample - loss: 0.0773
 - accuracy: 0.9852
Epoch 104/500
12534/12534 [==============================] - 2s 181us/sample - loss: 0.0773
 - accuracy: 0.9850
Epoch 105/500

```
12534/12534 [==============================] - 3s 233us/sample - loss: 0.0768
 - accuracy: 0.9849
Epoch 106/500
12534/12534 [==============================] - 3s 219us/sample - loss: 0.0761
 - accuracy: 0.9851
Epoch 107/500
12534/12534 [==============================] - 3s 229us/sample - loss: 0.0747
 - accuracy: 0.9853
Epoch 108/500
12534/12534 [==============================] - 2s 175us/sample - loss: 0.0763
 - accuracy: 0.9855
Epoch 109/500
12534/12534 [==============================] - 2s 181us/sample - loss: 0.0748
 - accuracy: 0.9858
Epoch 110/500
12534/12534 [==============================] - 3s 205us/sample - loss: 0.0749
 - accuracy: 0.9857
Epoch 111/500
12534/12534 [==============================] - 2s 171us/sample - loss: 0.0740
 - accuracy: 0.9864
Epoch 112/500
12534/12534 [==============================] - 3s 209us/sample - loss: 0.0746
 - accuracy: 0.9863
Epoch 113/500
12534/12534 [==============================] - 2s 174us/sample - loss: 0.0733
```

```
                   - accuracy: 0.9856
Epoch 114/500
12534/12534 [==============================] - 2s 173us/sample - loss: 0.0730
                   - accuracy: 0.9861
Epoch 115/500
12534/12534 [==============================] - 3s 209us/sample - loss: 0.0722
                   - accuracy: 0.9868
Epoch 116/500
12534/12534 [==============================] - 2s 178us/sample - loss: 0.0717
                   - accuracy: 0.9865
Epoch 117/500
12534/12534 [==============================] - 3s 216us/sample - loss: 0.0715
                   - accuracy: 0.9868
Epoch 118/500
12534/12534 [==============================] - 2s 172us/sample - loss: 0.0709
                   - accuracy: 0.9867
Epoch 119/500
12534/12534 [==============================] - 2s 171us/sample - loss: 0.0712
                   - accuracy: 0.9871
Epoch 120/500
12534/12534 [==============================] - 3s 258us/sample - loss: 0.0701
                   - accuracy: 0.9868
Epoch 121/500
12534/12534 [==============================] - 3s 220us/sample - loss: 0.0709
                   - accuracy: 0.9860
```

```
Epoch 122/500
12534/12534 [==============================] - 3s 210us/sample - loss: 0.0695
 - accuracy: 0.9869
Epoch 123/500
12534/12534 [==============================] - 2s 177us/sample - loss: 0.0686
 - accuracy: 0.9879
Epoch 124/500
12534/12534 [==============================] - 3s 256us/sample - loss: 0.0683
 - accuracy: 0.9872
Epoch 125/500
12534/12534 [==============================] - 2s 197us/sample - loss: 0.0685
 - accuracy: 0.9877
Epoch 126/500
12534/12534 [==============================] - 2s 196us/sample - loss: 0.0685
 - accuracy: 0.9875
Epoch 127/500
12534/12534 [==============================] - 2s 158us/sample - loss: 0.0679
 - accuracy: 0.9876
Epoch 128/500
12534/12534 [==============================] - 2s 175us/sample - loss: 0.0669
 - accuracy: 0.9881
Epoch 129/500
12534/12534 [==============================] - 3s 215us/sample - loss: 0.0676
 - accuracy: 0.9880
Epoch 130/500
```

```
12534/12534 [==============================] - 2s 192us/sample - loss: 0.0661
 - accuracy: 0.9884
Epoch 131/500
12534/12534 [==============================] - 2s 198us/sample - loss: 0.0665
 - accuracy: 0.9877
Epoch 132/500
12534/12534 [==============================] - 2s 175us/sample - loss: 0.0660
 - accuracy: 0.9880
Epoch 133/500
12534/12534 [==============================] - 2s 194us/sample - loss: 0.0658
 - accuracy: 0.9872
Epoch 134/500
12534/12534 [==============================] - 3s 216us/sample - loss: 0.0653
 - accuracy: 0.9878
Epoch 135/500
12534/12534 [==============================] - 3s 237us/sample - loss: 0.0642
 - accuracy: 0.9890
Epoch 136/500
12534/12534 [==============================] - 3s 216us/sample - loss: 0.0654
 - accuracy: 0.9880
Epoch 137/500
12534/12534 [==============================] - 2s 177us/sample - loss: 0.0647
 - accuracy: 0.9879
Epoch 138/500
12534/12534 [==============================] - 3s 202us/sample - loss: 0.0640
```

```
- accuracy: 0.9876
Epoch 139/500
12534/12534 [==============================] - 2s 173us/sample - loss: 0.0633
- accuracy: 0.9891
Epoch 140/500
12534/12534 [==============================] - 2s 175us/sample - loss: 0.0643
- accuracy: 0.9883
Epoch 141/500
12534/12534 [==============================] - 3s 216us/sample - loss: 0.0624
- accuracy: 0.9887
Epoch 142/500
12534/12534 [==============================] - 2s 171us/sample - loss: 0.0641
- accuracy: 0.9893
Epoch 143/500
12534/12534 [==============================] - 3s 200us/sample - loss: 0.0629
- accuracy: 0.9887
Epoch 144/500
12534/12534 [==============================] - 2s 166us/sample - loss: 0.0624
- accuracy: 0.9895
Epoch 145/500
12534/12534 [==============================] - 3s 228us/sample - loss: 0.0621
- accuracy: 0.9881
Epoch 146/500
12534/12534 [==============================] - 3s 204us/sample - loss: 0.0612
- accuracy: 0.9891
```

Epoch 147/500
12534/12534 [==============================] - 2s 179us/sample - loss: 0.0617
 - accuracy: 0.9895
Epoch 148/500
12534/12534 [==============================] - 3s 235us/sample - loss: 0.0611
 - accuracy: 0.9899
Epoch 149/500
12534/12534 [==============================] - 2s 175us/sample - loss: 0.0621
 - accuracy: 0.9892
Epoch 150/500
12534/12534 [==============================] - 2s 197us/sample - loss: 0.0612
 - accuracy: 0.9889
Epoch 151/500
12534/12534 [==============================] - 2s 168us/sample - loss: 0.0613
 - accuracy: 0.9891
Epoch 152/500
12534/12534 [==============================] - 2s 172us/sample - loss: 0.0603
 - accuracy: 0.9898
Epoch 153/500
12534/12534 [==============================] - 3s 211us/sample - loss: 0.0606
 - accuracy: 0.9891
Epoch 154/500
12534/12534 [==============================] - 2s 176us/sample - loss: 0.0589
 - accuracy: 0.9903
Epoch 155/500

```
12534/12534 [==============================] - 3s 215us/sample - loss: 0.0592
 - accuracy: 0.9895
Epoch 156/500
12534/12534 [==============================] - 2s 179us/sample - loss: 0.0600
 - accuracy: 0.9892
Epoch 157/500
12534/12534 [==============================] - 2s 187us/sample - loss: 0.0592
 - accuracy: 0.9898
Epoch 158/500
12534/12534 [==============================] - 4s 340us/sample - loss: 0.0587
 - accuracy: 0.9900
Epoch 159/500
12534/12534 [==============================] - 4s 318us/sample - loss: 0.0590
 - accuracy: 0.9891
Epoch 160/500
12534/12534 [==============================] - 4s 301us/sample - loss: 0.0582
 - accuracy: 0.9892
Epoch 161/500
12534/12534 [==============================] - 4s 316us/sample - loss: 0.0581
 - accuracy: 0.9898
Epoch 162/500
12534/12534 [==============================] - 4s 310us/sample - loss: 0.0581
 - accuracy: 0.9895
Epoch 163/500
12534/12534 [==============================] - 3s 256us/sample - loss: 0.0571
```

```
- accuracy: 0.9905
Epoch 164/500
12534/12534 [==============================] - 4s 304us/sample - loss: 0.0580
- accuracy: 0.9896
Epoch 165/500
12534/12534 [==============================] - 3s 229us/sample - loss: 0.0573
- accuracy: 0.9899
Epoch 166/500
12534/12534 [==============================] - 3s 241us/sample - loss: 0.0570
- accuracy: 0.9906
Epoch 167/500
12534/12534 [==============================] - 3s 224us/sample - loss: 0.0566
- accuracy: 0.9900
Epoch 168/500
12534/12534 [==============================] - 3s 269us/sample - loss: 0.0560
- accuracy: 0.9900
Epoch 169/500
12534/12534 [==============================] - 4s 286us/sample - loss: 0.0562
- accuracy: 0.9899
Epoch 170/500
12534/12534 [==============================] - 3s 239us/sample - loss: 0.0553
- accuracy: 0.9908
Epoch 171/500
12534/12534 [==============================] - 3s 269us/sample - loss: 0.0556
- accuracy: 0.9899
```

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Epoch 172/500
12534/12534 [==============================] - 3s 214us/sample - loss: 0.0549
      - accuracy: 0.9907
Epoch 173/500
12534/12534 [==============================] - 3s 250us/sample - loss: 0.0558
      - accuracy: 0.9895
Epoch 174/500
12534/12534 [==============================] - 3s 209us/sample - loss: 0.0554
      - accuracy: 0.9903
Epoch 175/500
12534/12534 [==============================] - 3s 273us/sample - loss: 0.0550
      - accuracy: 0.9905
Epoch 176/500
12534/12534 [==============================] - 3s 241us/sample - loss: 0.0542
      - accuracy: 0.9904
Epoch 177/500
12534/12534 [==============================] - 3s 254us/sample - loss: 0.0540
      - accuracy: 0.9906
Epoch 178/500
12534/12534 [==============================] - 3s 220us/sample - loss: 0.0540
      - accuracy: 0.9909
Epoch 179/500
12534/12534 [==============================] - 5s 411us/sample - loss: 0.0539
      - accuracy: 0.9902
Epoch 180/500
```

```
12534/12534 [==============================] - 6s 513us/sample - loss: 0.0531
 - accuracy: 0.9911
Epoch 181/500
12534/12534 [==============================] - 7s 576us/sample - loss: 0.0537
 - accuracy: 0.9906
Epoch 182/500
12534/12534 [==============================] - 3s 254us/sample - loss: 0.0533
 - accuracy: 0.9910
Epoch 183/500
12534/12534 [==============================] - 3s 206us/sample - loss: 0.0532
 - accuracy: 0.9912
Epoch 184/500
12534/12534 [==============================] - 3s 250us/sample - loss: 0.0528
 - accuracy: 0.9910
Epoch 185/500
12534/12534 [==============================] - 3s 236us/sample - loss: 0.0533
 - accuracy: 0.9911
Epoch 186/500
12534/12534 [==============================] - 3s 264us/sample - loss: 0.0521
 - accuracy: 0.9915
Epoch 187/500
12534/12534 [==============================] - 3s 253us/sample - loss: 0.0514
 - accuracy: 0.9909
Epoch 188/500
12534/12534 [==============================] - 4s 282us/sample - loss: 0.0525
```

- accuracy: 0.9910
Epoch 189/500
12534/12534 [==============================] - 3s 250us/sample - loss: 0.0533
- accuracy: 0.9909
Epoch 190/500
12534/12534 [==============================] - 3s 273us/sample - loss: 0.0512
- accuracy: 0.9912
Epoch 191/500
12534/12534 [==============================] - 4s 330us/sample - loss: 0.0531
- accuracy: 0.9906
Epoch 192/500
12534/12534 [==============================] - 3s 225us/sample - loss: 0.0505
- accuracy: 0.9915
Epoch 193/500
12534/12534 [==============================] - 3s 234us/sample - loss: 0.0515
- accuracy: 0.9913
Epoch 194/500
12534/12534 [==============================] - 3s 211us/sample - loss: 0.0510
- accuracy: 0.9916
Epoch 195/500
12534/12534 [==============================] - 3s 264us/sample - loss: 0.0509
- accuracy: 0.9911
Epoch 196/500
12534/12534 [==============================] - 3s 201us/sample - loss: 0.0510
- accuracy: 0.9911

Epoch 197/500
12534/12534 [==============================] - 3s 256us/sample - loss: 0.0503 - accuracy: 0.9917
Epoch 198/500
12534/12534 [==============================] - 3s 207us/sample - loss: 0.0507 - accuracy: 0.9911
Epoch 199/500
12534/12534 [==============================] - 3s 222us/sample - loss: 0.0511 - accuracy: 0.9911
Epoch 200/500
12534/12534 [==============================] - 3s 263us/sample - loss: 0.0494 - accuracy: 0.9919
Epoch 201/500
12534/12534 [==============================] - 3s 269us/sample - loss: 0.0498 - accuracy: 0.9912
Epoch 202/500
12534/12534 [==============================] - 3s 233us/sample - loss: 0.0494 - accuracy: 0.9919
Epoch 203/500
12534/12534 [==============================] - 3s 268us/sample - loss: 0.0495 - accuracy: 0.9920
Epoch 204/500
12534/12534 [==============================] - 4s 310us/sample - loss: 0.0512 - accuracy: 0.9915
Epoch 205/500

12534/12534 [==============================] - 3s 239us/sample - loss: 0.0490
- accuracy: 0.9913
Epoch 206/500
12534/12534 [==============================] - 4s 293us/sample - loss: 0.0490
- accuracy: 0.9922
Epoch 207/500
12534/12534 [==============================] - 3s 270us/sample - loss: 0.0487
- accuracy: 0.9918
Epoch 208/500
12534/12534 [==============================] - 4s 309us/sample - loss: 0.0491
- accuracy: 0.9921
Epoch 209/500
12534/12534 [==============================] - 3s 262us/sample - loss: 0.0488
- accuracy: 0.9922
Epoch 210/500
12534/12534 [==============================] - 4s 296us/sample - loss: 0.0481
- accuracy: 0.9921
Epoch 211/500
12534/12534 [==============================] - 4s 319us/sample - loss: 0.0483
- accuracy: 0.9919
Epoch 212/500
12534/12534 [==============================] - 7s 591us/sample - loss: 0.0485
- accuracy: 0.9919
Epoch 213/500
12534/12534 [==============================] - 5s 404us/sample - loss: 0.0474

```
                   - accuracy: 0.9918
Epoch 214/500
12534/12534 [==============================] - 5s 381us/sample - loss: 0.0479
                   - accuracy: 0.9922
Epoch 215/500
12534/12534 [==============================] - 3s 238us/sample - loss: 0.0491
                   - accuracy: 0.9918
Epoch 216/500
12534/12534 [==============================] - 4s 289us/sample - loss: 0.0480
                   - accuracy: 0.9918
Epoch 217/500
12534/12534 [==============================] - 3s 231us/sample - loss: 0.0478
                   - accuracy: 0.9922
Epoch 218/500
12534/12534 [==============================] - 4s 284us/sample - loss: 0.0476
                   - accuracy: 0.9919
Epoch 219/500
12534/12534 [==============================] - 3s 216us/sample - loss: 0.0477
                   - accuracy: 0.9919
Epoch 220/500
12534/12534 [==============================] - 4s 309us/sample - loss: 0.0480
                   - accuracy: 0.9923
Epoch 221/500
12534/12534 [==============================] - 3s 277us/sample - loss: 0.0476
                   - accuracy: 0.9915
```

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Epoch 222/500
12534/12534 [==============================] - 4s 301us/sample - loss: 0.0470
            - accuracy: 0.9925
Epoch 223/500
12534/12534 [==============================] - 4s 305us/sample - loss: 0.0467
            - accuracy: 0.9921
Epoch 224/500
12534/12534 [==============================] - 4s 280us/sample - loss: 0.0459
            - accuracy: 0.9924
Epoch 225/500
12534/12534 [==============================] - 4s 318us/sample - loss: 0.0466
            - accuracy: 0.9927
Epoch 226/500
12534/12534 [==============================] - 4s 310us/sample - loss: 0.0462
            - accuracy: 0.9921
Epoch 227/500
12534/12534 [==============================] - 4s 284us/sample - loss: 0.0465
            - accuracy: 0.9923
Epoch 228/500
12534/12534 [==============================] - 3s 268us/sample - loss: 0.0459
            - accuracy: 0.9918
Epoch 229/500
12534/12534 [==============================] - 3s 239us/sample - loss: 0.0462
            - accuracy: 0.9915
Epoch 230/500
```

```
12534/12534 [==============================] - 4s 307us/sample - loss: 0.0451
 - accuracy: 0.9927
Epoch 231/500
12534/12534 [==============================] - 4s 303us/sample - loss: 0.0456
 - accuracy: 0.9919
Epoch 232/500
12534/12534 [==============================] - 3s 232us/sample - loss: 0.0462
 - accuracy: 0.9924
Epoch 233/500
12534/12534 [==============================] - 3s 276us/sample - loss: 0.0453
 - accuracy: 0.9921
Epoch 234/500
12534/12534 [==============================] - 3s 232us/sample - loss: 0.0450
 - accuracy: 0.9921
Epoch 235/500
12534/12534 [==============================] - 4s 346us/sample - loss: 0.0454
 - accuracy: 0.9927
Epoch 236/500
12534/12534 [==============================] - 4s 306us/sample - loss: 0.0452
 - accuracy: 0.9923
Epoch 237/500
12534/12534 [==============================] - 5s 423us/sample - loss: 0.0449
 - accuracy: 0.9923
Epoch 238/500
12534/12534 [==============================] - 4s 290us/sample - loss: 0.0450
```

```
- accuracy: 0.9927
Epoch 239/500
12534/12534 [==============================] - 4s 330us/sample - loss: 0.0448
- accuracy: 0.9921
Epoch 240/500
12534/12534 [==============================] - 3s 268us/sample - loss: 0.0445
- accuracy: 0.9924
Epoch 241/500
12534/12534 [==============================] - 3s 271us/sample - loss: 0.0447
- accuracy: 0.9925
Epoch 242/500
12534/12534 [==============================] - 4s 289us/sample - loss: 0.0453
- accuracy: 0.9923
Epoch 243/500
12534/12534 [==============================] - 3s 235us/sample - loss: 0.0443
- accuracy: 0.9925
Epoch 244/500
12534/12534 [==============================] - 4s 280us/sample - loss: 0.0447
- accuracy: 0.9920
Epoch 245/500
12534/12534 [==============================] - 3s 256us/sample - loss: 0.0450
- accuracy: 0.9926
Epoch 246/500
12534/12534 [==============================] - 4s 357us/sample - loss: 0.0437
- accuracy: 0.9927
```

Epoch 247/500
12534/12534 [==============================] - 4s 306us/sample - loss: 0.0438
          - accuracy: 0.9927
Epoch 248/500
12534/12534 [==============================] - 4s 289us/sample - loss: 0.0444
          - accuracy: 0.9930
Epoch 249/500
12534/12534 [==============================] - 4s 301us/sample - loss: 0.0436
          - accuracy: 0.9927
Epoch 250/500
12534/12534 [==============================] - 3s 211us/sample - loss: 0.0429
          - accuracy: 0.9927
Epoch 251/500
12534/12534 [==============================] - 3s 248us/sample - loss: 0.0429
          - accuracy: 0.9931
Epoch 252/500
12534/12534 [==============================] - 3s 207us/sample - loss: 0.0426
          - accuracy: 0.9927
Epoch 253/500
12534/12534 [==============================] - 3s 253us/sample - loss: 0.0440
          - accuracy: 0.9925
Epoch 254/500
12534/12534 [==============================] - 3s 219us/sample - loss: 0.0429
          - accuracy: 0.9927
Epoch 255/500

```
12534/12534 [==============================] - 3s 264us/sample - loss: 0.0422
 - accuracy: 0.9931
Epoch 256/500
12534/12534 [==============================] - 3s 202us/sample - loss: 0.0429
 - accuracy: 0.9929
Epoch 257/500
12534/12534 [==============================] - 3s 240us/sample - loss: 0.0427
 - accuracy: 0.9931
Epoch 258/500
12534/12534 [==============================] - 3s 206us/sample - loss: 0.0434
 - accuracy: 0.9931
Epoch 259/500
12534/12534 [==============================] - 3s 251us/sample - loss: 0.0422
 - accuracy: 0.9931
Epoch 260/500
12534/12534 [==============================] - 3s 206us/sample - loss: 0.0422
 - accuracy: 0.9931
Epoch 261/500
12534/12534 [==============================] - 3s 257us/sample - loss: 0.0426
 - accuracy: 0.9928
Epoch 262/500
12534/12534 [==============================] - 3s 206us/sample - loss: 0.0425
 - accuracy: 0.9927
Epoch 263/500
12534/12534 [==============================] - 3s 249us/sample - loss: 0.0418
```

- accuracy: 0.9931
Epoch 264/500
12534/12534 [==============================] - 3s 218us/sample - loss: 0.0420
- accuracy: 0.9928
Epoch 265/500
12534/12534 [==============================] - 3s 261us/sample - loss: 0.0415
- accuracy: 0.9932
Epoch 266/500
12534/12534 [==============================] - 3s 211us/sample - loss: 0.0415
- accuracy: 0.9928
Epoch 267/500
12534/12534 [==============================] - 3s 250us/sample - loss: 0.0418
- accuracy: 0.9928
Epoch 268/500
12534/12534 [==============================] - 3s 237us/sample - loss: 0.0417
- accuracy: 0.9932
Epoch 269/500
12534/12534 [==============================] - 3s 271us/sample - loss: 0.0409
- accuracy: 0.9933
Epoch 270/500
12534/12534 [==============================] - 2s 192us/sample - loss: 0.0413
- accuracy: 0.9931
Epoch 271/500
12534/12534 [==============================] - 3s 243us/sample - loss: 0.0419
- accuracy: 0.9933

```
Epoch 272/500
12534/12534 [==============================] - 3s 200us/sample - loss: 0.0410
 - accuracy: 0.9932
Epoch 273/500
12534/12534 [==============================] - 3s 228us/sample - loss: 0.0413
 - accuracy: 0.9931
Epoch 274/500
12534/12534 [==============================] - 2s 191us/sample - loss: 0.0414
 - accuracy: 0.9931
Epoch 275/500
12534/12534 [==============================] - 3s 234us/sample - loss: 0.0411
 - accuracy: 0.9930
Epoch 276/500
12534/12534 [==============================] - 2s 199us/sample - loss: 0.0411
 - accuracy: 0.9929
Epoch 277/500
12534/12534 [==============================] - 3s 204us/sample - loss: 0.0402
 - accuracy: 0.9931
Epoch 278/500
12534/12534 [==============================] - 3s 257us/sample - loss: 0.0404
 - accuracy: 0.9935
Epoch 279/500
12534/12534 [==============================] - 3s 226us/sample - loss: 0.0403
 - accuracy: 0.9935
Epoch 280/500
```

```
12534/12534 [==============================] - 3s 235us/sample - loss: 0.0407
  - accuracy: 0.9933
Epoch 281/500
12534/12534 [==============================] - 2s 174us/sample - loss: 0.0403
  - accuracy: 0.9928
Epoch 282/500
12534/12534 [==============================] - 2s 198us/sample - loss: 0.0405
  - accuracy: 0.9932
Epoch 283/500
12534/12534 [==============================] - 2s 177us/sample - loss: 0.0398
  - accuracy: 0.9937
Epoch 284/500
12534/12534 [==============================] - 3s 217us/sample - loss: 0.0394
  - accuracy: 0.9937
Epoch 285/500
12534/12534 [==============================] - 2s 172us/sample - loss: 0.0399
  - accuracy: 0.9932
Epoch 286/500
12534/12534 [==============================] - 2s 174us/sample - loss: 0.0400
  - accuracy: 0.9935
Epoch 287/500
12534/12534 [==============================] - 3s 222us/sample - loss: 0.0394
  - accuracy: 0.9931
Epoch 288/500
12534/12534 [==============================] - 3s 217us/sample - loss: 0.0398
```

```
 - accuracy: 0.9934
Epoch 289/500
12534/12534 [==============================] - 3s 270us/sample - loss: 0.0404
 - accuracy: 0.9931
Epoch 290/500
12534/12534 [==============================] - 3s 219us/sample - loss: 0.0394
 - accuracy: 0.9936
Epoch 291/500
12534/12534 [==============================] - 3s 279us/sample - loss: 0.0391
 - accuracy: 0.9931
Epoch 292/500
12534/12534 [==============================] - 2s 177us/sample - loss: 0.0397
 - accuracy: 0.9932
Epoch 293/500
12534/12534 [==============================] - 3s 229us/sample - loss: 0.0396
 - accuracy: 0.9931
Epoch 294/500
12534/12534 [==============================] - 2s 168us/sample - loss: 0.0393
 - accuracy: 0.9937
Epoch 295/500
12534/12534 [==============================] - 3s 201us/sample - loss: 0.0387
 - accuracy: 0.9940
Epoch 296/500
12534/12534 [==============================] - 2s 173us/sample - loss: 0.0391
 - accuracy: 0.9938
```

Epoch 297/500
12534/12534 [==============================] - 3s 217us/sample - loss: 0.0392 - accuracy: 0.9933
Epoch 298/500
12534/12534 [==============================] - 3s 244us/sample - loss: 0.0387 - accuracy: 0.9934
Epoch 299/500
12534/12534 [==============================] - 2s 159us/sample - loss: 0.0396 - accuracy: 0.9934
Epoch 300/500
12534/12534 [==============================] - 3s 206us/sample - loss: 0.0386 - accuracy: 0.9935
Epoch 301/500
12534/12534 [==============================] - 2s 159us/sample - loss: 0.0393 - accuracy: 0.9931
Epoch 302/500
12534/12534 [==============================] - 2s 165us/sample - loss: 0.0380 - accuracy: 0.9939
Epoch 303/500
12534/12534 [==============================] - 2s 194us/sample - loss: 0.0386 - accuracy: 0.9935
Epoch 304/500
12534/12534 [==============================] - 2s 161us/sample - loss: 0.0392 - accuracy: 0.9935
Epoch 305/500

```
12534/12534 [==============================] - 2s 166us/sample - loss: 0.0385
 - accuracy: 0.9938
Epoch 306/500
12534/12534 [==============================] - 2s 188us/sample - loss: 0.0385
 - accuracy: 0.9940
Epoch 307/500
12534/12534 [==============================] - 2s 160us/sample - loss: 0.0380
 - accuracy: 0.9936
Epoch 308/500
12534/12534 [==============================] - 2s 191us/sample - loss: 0.0383
 - accuracy: 0.9937
Epoch 309/500
12534/12534 [==============================] - 2s 166us/sample - loss: 0.0381
 - accuracy: 0.9936
Epoch 310/500
12534/12534 [==============================] - 2s 152us/sample - loss: 0.0379
 - accuracy: 0.9939
Epoch 311/500
12534/12534 [==============================] - 2s 193us/sample - loss: 0.0386
 - accuracy: 0.9931
Epoch 312/500
12534/12534 [==============================] - 2s 164us/sample - loss: 0.0375
 - accuracy: 0.9939
Epoch 313/500
12534/12534 [==============================] - 2s 160us/sample - loss: 0.0376
```

```
    - accuracy: 0.9937
Epoch 314/500
12534/12534 [==============================] - 2s 199us/sample - loss: 0.0372
    - accuracy: 0.9939
Epoch 315/500
12534/12534 [==============================] - 2s 164us/sample - loss: 0.0379
    - accuracy: 0.9939
Epoch 316/500
12534/12534 [==============================] - 3s 205us/sample - loss: 0.0381
    - accuracy: 0.9937
Epoch 317/500
12534/12534 [==============================] - 2s 167us/sample - loss: 0.0383
    - accuracy: 0.9937
Epoch 318/500
12534/12534 [==============================] - 2s 158us/sample - loss: 0.0373
    - accuracy: 0.9937
Epoch 319/500
12534/12534 [==============================] - 2s 189us/sample - loss: 0.0374
    - accuracy: 0.9935
Epoch 320/500
12534/12534 [==============================] - 2s 169us/sample - loss: 0.0376
    - accuracy: 0.9935
Epoch 321/500
12534/12534 [==============================] - 2s 158us/sample - loss: 0.0373
    - accuracy: 0.9935
```

```
Epoch 322/500
12534/12534 [==============================] - 3s 200us/sample - loss: 0.0379
    - accuracy: 0.9935
Epoch 323/500
12534/12534 [==============================] - 2s 170us/sample - loss: 0.0365
    - accuracy: 0.9941
Epoch 324/500
12534/12534 [==============================] - 3s 214us/sample - loss: 0.0366
    - accuracy: 0.9937
Epoch 325/500
12534/12534 [==============================] - 2s 179us/sample - loss: 0.0366
    - accuracy: 0.9937
Epoch 326/500
12534/12534 [==============================] - 2s 168us/sample - loss: 0.0369
    - accuracy: 0.9939
Epoch 327/500
12534/12534 [==============================] - 3s 214us/sample - loss: 0.0370
    - accuracy: 0.9937
Epoch 328/500
12534/12534 [==============================] - 2s 161us/sample - loss: 0.0361
    - accuracy: 0.9939
Epoch 329/500
12534/12534 [==============================] - 3s 229us/sample - loss: 0.0370
    - accuracy: 0.9936
Epoch 330/500
```

```
12534/12534 [==============================] - 2s 167us/sample - loss: 0.0371
 - accuracy: 0.9942
Epoch 331/500
12534/12534 [==============================] - 2s 173us/sample - loss: 0.0374
 - accuracy: 0.9936
Epoch 332/500
12534/12534 [==============================] - 2s 193us/sample - loss: 0.0365
 - accuracy: 0.9938
Epoch 333/500
12534/12534 [==============================] - 2s 135us/sample - loss: 0.0367
 - accuracy: 0.9936
Epoch 334/500
12534/12534 [==============================] - 2s 140us/sample - loss: 0.0366
 - accuracy: 0.9935
Epoch 335/500
12534/12534 [==============================] - 3s 208us/sample - loss: 0.0360
 - accuracy: 0.9940
Epoch 336/500
12534/12534 [==============================] - 2s 140us/sample - loss: 0.0355
 - accuracy: 0.9937
Epoch 337/500
12534/12534 [==============================] - 2s 156us/sample - loss: 0.0360
 - accuracy: 0.9939
Epoch 338/500
12534/12534 [==============================] - 2s 166us/sample - loss: 0.0363
```

```
                    - accuracy: 0.9938
Epoch 339/500
12534/12534 [==============================] - 2s 147us/sample - loss: 0.0354
                    - accuracy: 0.9935
Epoch 340/500
12534/12534 [==============================] - 2s 176us/sample - loss: 0.0367
                    - accuracy: 0.9938
Epoch 341/500
12534/12534 [==============================] - 2s 186us/sample - loss: 0.0358
                    - accuracy: 0.9935
Epoch 342/500
12534/12534 [==============================] - 2s 136us/sample - loss: 0.0351
                    - accuracy: 0.9942
Epoch 343/500
12534/12534 [==============================] - 2s 143us/sample - loss: 0.0366
                    - accuracy: 0.9940
Epoch 344/500
12534/12534 [==============================] - 2s 199us/sample - loss: 0.0353
                    - accuracy: 0.9940
Epoch 345/500
12534/12534 [==============================] - 2s 152us/sample - loss: 0.0357
                    - accuracy: 0.9936
Epoch 346/500
12534/12534 [==============================] - 2s 172us/sample - loss: 0.0346
                    - accuracy: 0.9940
```

Epoch 347/500
12534/12534 [==============================] - 2s 184us/sample - loss: 0.0355 - accuracy: 0.9939
Epoch 348/500
12534/12534 [==============================] - 2s 165us/sample - loss: 0.0357 - accuracy: 0.9941
Epoch 349/500
12534/12534 [==============================] - 2s 180us/sample - loss: 0.0348 - accuracy: 0.9939
Epoch 350/500
12534/12534 [==============================] - 2s 147us/sample - loss: 0.0361 - accuracy: 0.9939
Epoch 351/500
12534/12534 [==============================] - 2s 159us/sample - loss: 0.0348 - accuracy: 0.9939
Epoch 352/500
12534/12534 [==============================] - 2s 182us/sample - loss: 0.0363 - accuracy: 0.9932
Epoch 353/500
12534/12534 [==============================] - 2s 153us/sample - loss: 0.0346 - accuracy: 0.9939
Epoch 354/500
12534/12534 [==============================] - 2s 155us/sample - loss: 0.0354 - accuracy: 0.9939
Epoch 355/500

```
12534/12534 [==============================] - 3s 241us/sample - loss: 0.0354
 - accuracy: 0.9939
Epoch 356/500
12534/12534 [==============================] - 2s 193us/sample - loss: 0.0347
 - accuracy: 0.9940
Epoch 357/500
12534/12534 [==============================] - 3s 208us/sample - loss: 0.0348
 - accuracy: 0.9938
Epoch 358/500
12534/12534 [==============================] - 2s 153us/sample - loss: 0.0346
 - accuracy: 0.9943
Epoch 359/500
12534/12534 [==============================] - 2s 144us/sample - loss: 0.0350
 - accuracy: 0.9938
Epoch 360/500
12534/12534 [==============================] - 2s 183us/sample - loss: 0.0347
 - accuracy: 0.9942
Epoch 361/500
12534/12534 [==============================] - 2s 148us/sample - loss: 0.0347
 - accuracy: 0.9944
Epoch 362/500
12534/12534 [==============================] - 2s 157us/sample - loss: 0.0343
 - accuracy: 0.9939
Epoch 363/500
12534/12534 [==============================] - 2s 191us/sample - loss: 0.0348
```

```
- accuracy: 0.9940
Epoch 364/500
12534/12534 [==============================] - 2s 161us/sample - loss: 0.0356
- accuracy: 0.9935
Epoch 365/500
12534/12534 [==============================] - 2s 153us/sample - loss: 0.0354
- accuracy: 0.9938
Epoch 366/500
12534/12534 [==============================] - 2s 178us/sample - loss: 0.0341
- accuracy: 0.9939
Epoch 367/500
12534/12534 [==============================] - 2s 145us/sample - loss: 0.0342
- accuracy: 0.9943
Epoch 368/500
12534/12534 [==============================] - 2s 154us/sample - loss: 0.0343
- accuracy: 0.9942
Epoch 369/500
12534/12534 [==============================] - 2s 184us/sample - loss: 0.0341
- accuracy: 0.9943
Epoch 370/500
12534/12534 [==============================] - 2s 149us/sample - loss: 0.0338
- accuracy: 0.9943
Epoch 371/500
12534/12534 [==============================] - 2s 143us/sample - loss: 0.0341
- accuracy: 0.9938
```

Epoch 372/500
12534/12534 [==============================] - 2s 187us/sample - loss: 0.0336 - accuracy: 0.9942
Epoch 373/500
12534/12534 [==============================] - 2s 166us/sample - loss: 0.0335 - accuracy: 0.9940
Epoch 374/500
12534/12534 [==============================] - 2s 178us/sample - loss: 0.0342 - accuracy: 0.9939
Epoch 375/500
12534/12534 [==============================] - 2s 151us/sample - loss: 0.0335 - accuracy: 0.9941
Epoch 376/500
12534/12534 [==============================] - 2s 147us/sample - loss: 0.0334 - accuracy: 0.9940
Epoch 377/500
12534/12534 [==============================] - 2s 160us/sample - loss: 0.0335 - accuracy: 0.9937
Epoch 378/500
12534/12534 [==============================] - 2s 160us/sample - loss: 0.0329 - accuracy: 0.9943
Epoch 379/500
12534/12534 [==============================] - 2s 135us/sample - loss: 0.0336 - accuracy: 0.9939
Epoch 380/500

```
12534/12534 [==============================] - 2s 136us/sample - loss: 0.0333
- accuracy: 0.9942
Epoch 381/500
12534/12534 [==============================] - 2s 161us/sample - loss: 0.0338
- accuracy: 0.9946
Epoch 382/500
12534/12534 [==============================] - 2s 145us/sample - loss: 0.0338
- accuracy: 0.9943
Epoch 383/500
12534/12534 [==============================] - 2s 149us/sample - loss: 0.0339
- accuracy: 0.9939
Epoch 384/500
12534/12534 [==============================] - 2s 178us/sample - loss: 0.0343
- accuracy: 0.9941
Epoch 385/500
12534/12534 [==============================] - 2s 136us/sample - loss: 0.0334
- accuracy: 0.9943
Epoch 386/500
12534/12534 [==============================] - 2s 143us/sample - loss: 0.0334
- accuracy: 0.9942
Epoch 387/500
12534/12534 [==============================] - 2s 176us/sample - loss: 0.0325
- accuracy: 0.9945
Epoch 388/500
12534/12534 [==============================] - 2s 140us/sample - loss: 0.0329
```

```
- accuracy: 0.9942
Epoch 389/500
12534/12534 [==============================] - 2s 136us/sample - loss: 0.0324
- accuracy: 0.9946
Epoch 390/500
12534/12534 [==============================] - 2s 194us/sample - loss: 0.0332
- accuracy: 0.9945
Epoch 391/500
12534/12534 [==============================] - 2s 170us/sample - loss: 0.0334
- accuracy: 0.9946
Epoch 392/500
12534/12534 [==============================] - 2s 139us/sample - loss: 0.0338
- accuracy: 0.9943
Epoch 393/500
12534/12534 [==============================] - 2s 161us/sample - loss: 0.0334
- accuracy: 0.9939
Epoch 394/500
12534/12534 [==============================] - 2s 135us/sample - loss: 0.0324
- accuracy: 0.9943
Epoch 395/500
12534/12534 [==============================] - 2s 152us/sample - loss: 0.0332
- accuracy: 0.9941
Epoch 396/500
12534/12534 [==============================] - 3s 222us/sample - loss: 0.0343
- accuracy: 0.9941
```

```
Epoch 397/500
12534/12534 [==============================] - 3s 241us/sample - loss: 0.0328
             - accuracy: 0.9946
Epoch 398/500
12534/12534 [==============================] - 2s 191us/sample - loss: 0.0330
             - accuracy: 0.9939
Epoch 399/500
12534/12534 [==============================] - 2s 137us/sample - loss: 0.0324
             - accuracy: 0.9944
Epoch 400/500
12534/12534 [==============================] - 2s 146us/sample - loss: 0.0327
             - accuracy: 0.9941
Epoch 401/500
12534/12534 [==============================] - 2s 186us/sample - loss: 0.0327
             - accuracy: 0.9941
Epoch 402/500
12534/12534 [==============================] - 2s 169us/sample - loss: 0.0322
             - accuracy: 0.9941
Epoch 403/500
12534/12534 [==============================] - 2s 158us/sample - loss: 0.0326
             - accuracy: 0.9943
Epoch 404/500
12534/12534 [==============================] - 2s 171us/sample - loss: 0.0323
             - accuracy: 0.9943
Epoch 405/500
```

```
12534/12534 [==============================] - 2s 150us/sample - loss: 0.0324
 - accuracy: 0.9944
Epoch 406/500
12534/12534 [==============================] - 2s 188us/sample - loss: 0.0317
 - accuracy: 0.9944
Epoch 407/500
12534/12534 [==============================] - 2s 158us/sample - loss: 0.0322
 - accuracy: 0.9946
Epoch 408/500
12534/12534 [==============================] - 2s 133us/sample - loss: 0.0318
 - accuracy: 0.9943
Epoch 409/500
12534/12534 [==============================] - 2s 131us/sample - loss: 0.0323
 - accuracy: 0.9946
Epoch 410/500
12534/12534 [==============================] - 2s 163us/sample - loss: 0.0326
 - accuracy: 0.9943
Epoch 411/500
12534/12534 [==============================] - 2s 127us/sample - loss: 0.0314
 - accuracy: 0.9947
Epoch 412/500
12534/12534 [==============================] - 2s 132us/sample - loss: 0.0320
 - accuracy: 0.9945
Epoch 413/500
12534/12534 [==============================] - 2s 159us/sample - loss: 0.0322
```

```
                - accuracy: 0.9942
Epoch 414/500
12534/12534 [==============================] - 2s 129us/sample - loss: 0.0326
                - accuracy: 0.9948
Epoch 415/500
12534/12534 [==============================] - 2s 135us/sample - loss: 0.0313
                - accuracy: 0.9944
Epoch 416/500
12534/12534 [==============================] - 2s 148us/sample - loss: 0.0321
                - accuracy: 0.9943
Epoch 417/500
12534/12534 [==============================] - 2s 145us/sample - loss: 0.0315
                - accuracy: 0.9946
Epoch 418/500
12534/12534 [==============================] - 2s 131us/sample - loss: 0.0315
                - accuracy: 0.9945
Epoch 419/500
12534/12534 [==============================] - 2s 128us/sample - loss: 0.0314
                - accuracy: 0.9940
Epoch 420/500
12534/12534 [==============================] - 2s 149us/sample - loss: 0.0309
                - accuracy: 0.9945
Epoch 421/500
12534/12534 [==============================] - 2s 122us/sample - loss: 0.0314
                - accuracy: 0.9945
```

```
Epoch 422/500
12534/12534 [==============================] - 2s 136us/sample - loss: 0.0317
 - accuracy: 0.9944
Epoch 423/500
12534/12534 [==============================] - 2s 167us/sample - loss: 0.0318
 - accuracy: 0.9943
Epoch 424/500
12534/12534 [==============================] - 2s 127us/sample - loss: 0.0317
 - accuracy: 0.9944
Epoch 425/500
12534/12534 [==============================] - 2s 120us/sample - loss: 0.0318
 - accuracy: 0.9943
Epoch 426/500
12534/12534 [==============================] - 2s 127us/sample - loss: 0.0312
 - accuracy: 0.9942
Epoch 427/500
12534/12534 [==============================] - 2s 162us/sample - loss: 0.0320
 - accuracy: 0.9942
Epoch 428/500
12534/12534 [==============================] - 2s 127us/sample - loss: 0.0305
 - accuracy: 0.9947
Epoch 429/500
12534/12534 [==============================] - 2s 143us/sample - loss: 0.0314
 - accuracy: 0.9947
Epoch 430/500
```

```
12534/12534 [==============================] - 2s 198us/sample - loss: 0.0312
 - accuracy: 0.9944
Epoch 431/500
12534/12534 [==============================] - 2s 141us/sample - loss: 0.0310
 - accuracy: 0.9950
Epoch 432/500
12534/12534 [==============================] - 2s 124us/sample - loss: 0.0312
 - accuracy: 0.9949
Epoch 433/500
12534/12534 [==============================] - 2s 151us/sample - loss: 0.0305
 - accuracy: 0.9945
Epoch 434/500
12534/12534 [==============================] - 2s 128us/sample - loss: 0.0320
 - accuracy: 0.9941
Epoch 435/500
12534/12534 [==============================] - 2s 146us/sample - loss: 0.0309
 - accuracy: 0.9943
Epoch 436/500
12534/12534 [==============================] - 2s 155us/sample - loss: 0.0305
 - accuracy: 0.9947
Epoch 437/500
12534/12534 [==============================] - 2s 133us/sample - loss: 0.0310
 - accuracy: 0.9944
Epoch 438/500
12534/12534 [==============================] - 2s 132us/sample - loss: 0.0306
```

```
- accuracy: 0.9947
Epoch 439/500
12534/12534 [==============================] - 2s 132us/sample - loss: 0.0307
- accuracy: 0.9946
Epoch 440/500
12534/12534 [==============================] - 2s 170us/sample - loss: 0.0308
- accuracy: 0.9945
Epoch 441/500
12534/12534 [==============================] - 2s 144us/sample - loss: 0.0307
- accuracy: 0.9947
Epoch 442/500
12534/12534 [==============================] - 2s 135us/sample - loss: 0.0310
- accuracy: 0.9944
Epoch 443/500
12534/12534 [==============================] - 2s 159us/sample - loss: 0.0315
- accuracy: 0.9943
Epoch 444/500
12534/12534 [==============================] - 2s 133us/sample - loss: 0.0304
- accuracy: 0.9943
Epoch 445/500
12534/12534 [==============================] - 2s 129us/sample - loss: 0.0303
- accuracy: 0.9945
Epoch 446/500
12534/12534 [==============================] - 2s 167us/sample - loss: 0.0305
- accuracy: 0.9944
```

```
Epoch 447/500
12534/12534 [==============================] - 2s 138us/sample - loss: 0.0312
    - accuracy: 0.9947
Epoch 448/500
12534/12534 [==============================] - 2s 133us/sample - loss: 0.0303
    - accuracy: 0.9945
Epoch 449/500
12534/12534 [==============================] - 2s 163us/sample - loss: 0.0302
    - accuracy: 0.9946
Epoch 450/500
12534/12534 [==============================] - 2s 130us/sample - loss: 0.0307
    - accuracy: 0.9947
Epoch 451/500
12534/12534 [==============================] - 2s 133us/sample - loss: 0.0300
    - accuracy: 0.9947
Epoch 452/500
12534/12534 [==============================] - 2s 147us/sample - loss: 0.0298
    - accuracy: 0.9946
Epoch 453/500
12534/12534 [==============================] - 2s 154us/sample - loss: 0.0313
    - accuracy: 0.9939
Epoch 454/500
12534/12534 [==============================] - 2s 133us/sample - loss: 0.0298
    - accuracy: 0.9946
Epoch 455/500
```

```
12534/12534 [==============================] - 2s 135us/sample - loss: 0.0296
 - accuracy: 0.9951
Epoch 456/500
12534/12534 [==============================] - 2s 161us/sample - loss: 0.0298
 - accuracy: 0.9950
Epoch 457/500
12534/12534 [==============================] - 2s 127us/sample - loss: 0.0307
 - accuracy: 0.9943
Epoch 458/500
12534/12534 [==============================] - 1s 116us/sample - loss: 0.0299
 - accuracy: 0.9948
Epoch 459/500
12534/12534 [==============================] - 2s 141us/sample - loss: 0.0296
 - accuracy: 0.9946
Epoch 460/500
12534/12534 [==============================] - 1s 107us/sample - loss: 0.0304
 - accuracy: 0.9945
Epoch 461/500
12534/12534 [==============================] - 1s 99us/sample - loss: 0.0309
 - accuracy: 0.9943
Epoch 462/500
12534/12534 [==============================] - 1s 106us/sample - loss: 0.0301
 - accuracy: 0.9942
Epoch 463/500
12534/12534 [==============================] - 1s 117us/sample - loss: 0.0296
```

```
    - accuracy: 0.9947
Epoch 464/500
12534/12534 [==============================] - 1s 110us/sample - loss: 0.0296
    - accuracy: 0.9944
Epoch 465/500
12534/12534 [==============================] - 1s 102us/sample - loss: 0.0294
    - accuracy: 0.9946
Epoch 466/500
12534/12534 [==============================] - 1s 119us/sample - loss: 0.0306
    - accuracy: 0.9947
Epoch 467/500
12534/12534 [==============================] - 2s 181us/sample - loss: 0.0292
    - accuracy: 0.9950
Epoch 468/500
12534/12534 [==============================] - 2s 160us/sample - loss: 0.0295
    - accuracy: 0.9947
Epoch 469/500
12534/12534 [==============================] - 1s 117us/sample - loss: 0.0292
    - accuracy: 0.9950
Epoch 470/500
12534/12534 [==============================] - 2s 132us/sample - loss: 0.0300
    - accuracy: 0.9948
Epoch 471/500
12534/12534 [==============================] - 2s 129us/sample - loss: 0.0300
    - accuracy: 0.9946
```

```
Epoch 472/500
12534/12534 [==============================] - 1s 112us/sample - loss: 0.0294
- accuracy: 0.9945
Epoch 473/500
12534/12534 [==============================] - 1s 114us/sample - loss: 0.0296
- accuracy: 0.9950
Epoch 474/500
12534/12534 [==============================] - 1s 115us/sample - loss: 0.0289
- accuracy: 0.9949
Epoch 475/500
12534/12534 [==============================] - 2s 124us/sample - loss: 0.0296
- accuracy: 0.9951
Epoch 476/500
12534/12534 [==============================] - 1s 113us/sample - loss: 0.0289
- accuracy: 0.9949
Epoch 477/500
12534/12534 [==============================] - 1s 107us/sample - loss: 0.0291
- accuracy: 0.9947
Epoch 478/500
12534/12534 [==============================] - 2s 123us/sample - loss: 0.0293
- accuracy: 0.9947
Epoch 479/500
12534/12534 [==============================] - 2s 124us/sample - loss: 0.0293
- accuracy: 0.9945
Epoch 480/500
```

```
12534/12534 [==============================] - 1s 107us/sample - loss: 0.0292
 - accuracy: 0.9951
Epoch 481/500
12534/12534 [==============================] - 1s 116us/sample - loss: 0.0287
 - accuracy: 0.9943
Epoch 482/500
12534/12534 [==============================] - 1s 116us/sample - loss: 0.0295
 - accuracy: 0.9947
Epoch 483/500
12534/12534 [==============================] - 1s 119us/sample - loss: 0.0292
 - accuracy: 0.9950
Epoch 484/500
12534/12534 [==============================] - 1s 109us/sample - loss: 0.0288
 - accuracy: 0.9951
Epoch 485/500
12534/12534 [==============================] - 1s 108us/sample - loss: 0.0293
 - accuracy: 0.9948
Epoch 486/500
12534/12534 [==============================] - 1s 105us/sample - loss: 0.0290
 - accuracy: 0.9947
Epoch 487/500
12534/12534 [==============================] - 2s 133us/sample - loss: 0.0287
 - accuracy: 0.9947
Epoch 488/500
12534/12534 [==============================] - 1s 106us/sample - loss: 0.0283
```

```
                                              - accuracy: 0.9951
Epoch 489/500
12534/12534 [==============================] - 1s 100us/sample - loss: 0.0284
                                              - accuracy: 0.9947
Epoch 490/500
12534/12534 [==============================] - 1s 103us/sample - loss: 0.0293
                                              - accuracy: 0.9947
Epoch 491/500
12534/12534 [==============================] - 2s 130us/sample - loss: 0.0289
                                              - accuracy: 0.9950
Epoch 492/500
12534/12534 [==============================] - 1s 108us/sample - loss: 0.0286
                                              - accuracy: 0.9952
Epoch 493/500
12534/12534 [==============================] - 1s 108us/sample - loss: 0.0285
                                              - accuracy: 0.9952
Epoch 494/500
12534/12534 [==============================] - 1s 99us/sample - loss: 0.0286
                                              - accuracy: 0.9949
Epoch 495/500
12534/12534 [==============================] - 1s 112us/sample - loss: 0.0281
                                              - accuracy: 0.9947
Epoch 496/500
12534/12534 [==============================] - 1s 106us/sample - loss: 0.0283
                                              - accuracy: 0.9950
```

```
Epoch 497/500
12534/12534 [==============================] - 1s 98us/sample - loss: 0.0286
- accuracy: 0.9948
Epoch 498/500
12534/12534 [==============================] - 1s 107us/sample - loss: 0.0286
- accuracy: 0.9947
Epoch 499/500
12534/12534 [==============================] - 2s 129us/sample - loss: 0.0282
- accuracy: 0.9950
Epoch 500/500
12534/12534 [==============================] - 1s 105us/sample - loss: 0.0286
- accuracy: 0.9951
2887/2887 [==============================] - 0s 79us/sample

class_weight_Fold_3: {0: 0.10928590112477109, 1: 10.592112676056338}

pos_weight: 0.9
thresholdNum: 0.5

Average of train loss Fold_3: 0.0711
Average of yPredProbability Fold_3: 0.0391
```

classification_report_Fold_3:

	precision	recall	f1-score	support
Normal 0	0.99	0.97	0.98	2871
Anomaly 1	0.01	0.06	0.02	16
accuracy			0.97	2887
macro avg	0.50	0.52	0.50	2887
weighted avg	0.99	0.97	0.98	2887

confusion_matrix_Fold_3:
True Negatives: 2793
False Positives: 78
False Negatives: 15
True Positives: 1

End running time Fold_3: 210504_230150 ,------------------.

Start running time Fold_4: 210504_230150 ,------------------:

Shape of Actual yXtrainRolled After Rolling Fold_4: (23094, 60)

Shape of Actual yXvalidShifted dataset: (2881, 60)

Shape of Actual yXvalidRolled After Rolling Fold_4: (5760, 60)
Start running time Data Augmentation_Fold_4: 210504_230150
,++++++++++++++++++++++++++++++++++:

Data Augmentation MSE Label 1==> mean: 0.001157, min: 0.000356, max: 0.003496

Data Augmentation MSE Label 1==> mean: 0.000548, min: 7.7e-05, max: 0.001905

Data Augmentation MSE Label 1==> mean: 0.000522, min: 3.2e-05, max: 0.001932

Data Augmentation MSE Label 1==> mean: 0.000557, min: 1.7e-05, max: 0.001989

Data Augmentation MSE Label 1==> mean: 0.000584, min: 9e-06, max: 0.001873

Data Augmentation MSE Label 1==> mean: 0.000629, min: 5e-06, max: 0.00321

Data Augmentation MSE Label 1==> mean: 0.000701, min: 3e-06, max: 0.004721

Data Augmentation MSE Label 1==> mean: 0.000737, min: 2e-06, max: 0.002846

Data Augmentation MSE Label 1==> mean: 0.000807, min: 1e-06, max: 0.003456

Data Augmentation MSE Label 1==> mean: 0.000885, min: 1e-06, max: 0.006189

Data Augmentation MSE Label 1==> mean: 0.000993, min: 0.0, max: 0.01075

Data Augmentation MSE Label 1==> mean: 0.001145, min: 0.0, max: 0.016131

Data Augmentation MSE Label 1==> mean: 0.001106, min: 0.0, max: 0.0098

Data Augmentation MSE Label 1==> mean: 0.000949, min: 0.0, max: 0.006316

MSE All generated Augmented data Fold_4:
mean: 0.000809
min: 3.6e-05
max: 0.00533

End running time Data Augmentation_Fold_4: 210504_230230
,++.

Shape of data after Transform ToOneRow to give Cross Validation Model in fold_4:

xtrain: (12443, 118), ytrain: (12443,)
xvalid: (2880, 118), yvalid: (2880,)

Number of final Label 0 in yXtrain_Fold_4: 11483

Number of final label 1 in yXtrain_Before_AddingAugedData_Fold_4: 64
Number of final label 1 in yXtrain_After_AddingAugedData_Fold_4: 960

Train on 12443 samples
Epoch 1/500
12443/12443 [==============================] - 2s 155us/sample - loss: 3.1771
    - accuracy: 0.9238
Epoch 2/500
12443/12443 [==============================] - 2s 124us/sample - loss: 1.6056
    - accuracy: 0.9392
Epoch 3/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.8360
    - accuracy: 0.9473
Epoch 4/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.4763
    - accuracy: 0.9530
Epoch 5/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.3116
    - accuracy: 0.9547
Epoch 6/500
12443/12443 [==============================] - 1s 116us/sample - loss: 0.2350
    - accuracy: 0.9568
Epoch 7/500
12443/12443 [==============================] - 1s 102us/sample - loss: 0.1979
    - accuracy: 0.9586

Epoch 8/500
12443/12443 [==============================] - 1s 108us/sample - loss: 0.1790
 - accuracy: 0.9600
Epoch 9/500
12443/12443 [==============================] - 1s 105us/sample - loss: 0.1678
 - accuracy: 0.9624
Epoch 10/500
12443/12443 [==============================] - 2s 121us/sample - loss: 0.1613
 - accuracy: 0.9629
Epoch 11/500
12443/12443 [==============================] - 1s 116us/sample - loss: 0.1565
 - accuracy: 0.9650
Epoch 12/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.1526
 - accuracy: 0.9650
Epoch 13/500
12443/12443 [==============================] - 1s 104us/sample - loss: 0.1484
 - accuracy: 0.9666
Epoch 14/500
12443/12443 [==============================] - 1s 114us/sample - loss: 0.1451
 - accuracy: 0.9672
Epoch 15/500
12443/12443 [==============================] - 2s 126us/sample - loss: 0.1426
 - accuracy: 0.9686
Epoch 16/500

```
12443/12443 [==============================] - 1s 104us/sample - loss: 0.1400
 - accuracy: 0.9686
Epoch 17/500
12443/12443 [==============================] - 1s 108us/sample - loss: 0.1377
 - accuracy: 0.9690
Epoch 18/500
12443/12443 [==============================] - 1s 109us/sample - loss: 0.1352
 - accuracy: 0.9691
Epoch 19/500
12443/12443 [==============================] - 2s 122us/sample - loss: 0.1331
 - accuracy: 0.9708
Epoch 20/500
12443/12443 [==============================] - 2s 121us/sample - loss: 0.1302
 - accuracy: 0.9707
Epoch 21/500
12443/12443 [==============================] - 1s 118us/sample - loss: 0.1285
 - accuracy: 0.9714
Epoch 22/500
12443/12443 [==============================] - 1s 115us/sample - loss: 0.1264
 - accuracy: 0.9717
Epoch 23/500
12443/12443 [==============================] - 2s 148us/sample - loss: 0.1250
 - accuracy: 0.9725
Epoch 24/500
12443/12443 [==============================] - 1s 113us/sample - loss: 0.1226
```

```
- accuracy: 0.9738
Epoch 25/500
12443/12443 [==============================] - 1s 108us/sample - loss: 0.1204
- accuracy: 0.9736
Epoch 26/500
12443/12443 [==============================] - 2s 134us/sample - loss: 0.1184
- accuracy: 0.9736
Epoch 27/500
12443/12443 [==============================] - 2s 124us/sample - loss: 0.1167
- accuracy: 0.9746
Epoch 28/500
12443/12443 [==============================] - 1s 116us/sample - loss: 0.1158
- accuracy: 0.9754
Epoch 29/500
12443/12443 [==============================] - 2s 131us/sample - loss: 0.1135
- accuracy: 0.9754
Epoch 30/500
12443/12443 [==============================] - 2s 127us/sample - loss: 0.1125
- accuracy: 0.9756
Epoch 31/500
12443/12443 [==============================] - 1s 102us/sample - loss: 0.1110
- accuracy: 0.9759
Epoch 32/500
12443/12443 [==============================] - 1s 103us/sample - loss: 0.1087
- accuracy: 0.9762
```

Epoch 33/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.1079
 - accuracy: 0.9771
Epoch 34/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.1062
 - accuracy: 0.9776
Epoch 35/500
12443/12443 [==============================] - 1s 109us/sample - loss: 0.1048
 - accuracy: 0.9781
Epoch 36/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.1039
 - accuracy: 0.9784
Epoch 37/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.1025
 - accuracy: 0.9790
Epoch 38/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.1015
 - accuracy: 0.9793
Epoch 39/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.1003
 - accuracy: 0.9786
Epoch 40/500
12443/12443 [==============================] - 1s 103us/sample - loss: 0.0994
 - accuracy: 0.9791
Epoch 41/500

```
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0979
   - accuracy: 0.9801
Epoch 42/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0962
   - accuracy: 0.9807
Epoch 43/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0954
   - accuracy: 0.9801
Epoch 44/500
12443/12443 [==============================] - 1s 112us/sample - loss: 0.0946
   - accuracy: 0.9815
Epoch 45/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0935
   - accuracy: 0.9814
Epoch 46/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0915
   - accuracy: 0.9818
Epoch 47/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0909
   - accuracy: 0.9824
Epoch 48/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0911
   - accuracy: 0.9818
Epoch 49/500
12443/12443 [==============================] - 1s 112us/sample - loss: 0.0891
```

- accuracy: 0.9827
Epoch 50/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0886
- accuracy: 0.9821
Epoch 51/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0871
- accuracy: 0.9836
Epoch 52/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0861
- accuracy: 0.9838
Epoch 53/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0856
- accuracy: 0.9830
Epoch 54/500
12443/12443 [==============================] - 1s 111us/sample - loss: 0.0851
- accuracy: 0.9828
Epoch 55/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0841
- accuracy: 0.9843
Epoch 56/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0824
- accuracy: 0.9844
Epoch 57/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0823
- accuracy: 0.9847

```
Epoch 58/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0823
            - accuracy: 0.9850
Epoch 59/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.0811
            - accuracy: 0.9851
Epoch 60/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0805
            - accuracy: 0.9847
Epoch 61/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0792
            - accuracy: 0.9854
Epoch 62/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0787
            - accuracy: 0.9854
Epoch 63/500
12443/12443 [==============================] - 1s 103us/sample - loss: 0.0785
            - accuracy: 0.9859
Epoch 64/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0774
            - accuracy: 0.9859
Epoch 65/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0774
            - accuracy: 0.9855
Epoch 66/500
```

```
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0768
 - accuracy: 0.9857
Epoch 67/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0751
 - accuracy: 0.9866
Epoch 68/500
12443/12443 [==============================] - 1s 108us/sample - loss: 0.0752
 - accuracy: 0.9861
Epoch 69/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0746
 - accuracy: 0.9867
Epoch 70/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0743
 - accuracy: 0.9869
Epoch 71/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0729
 - accuracy: 0.9871
Epoch 72/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0742
 - accuracy: 0.9867
Epoch 73/500
12443/12443 [==============================] - 1s 110us/sample - loss: 0.0725
 - accuracy: 0.9867
Epoch 74/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0715
```

```
- accuracy: 0.9871
Epoch 75/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0717
- accuracy: 0.9870
Epoch 76/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0708
- accuracy: 0.9879
Epoch 77/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0701
- accuracy: 0.9874
Epoch 78/500
12443/12443 [==============================] - 1s 111us/sample - loss: 0.0694
- accuracy: 0.9872
Epoch 79/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0697
- accuracy: 0.9877
Epoch 80/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0682
- accuracy: 0.9875
Epoch 81/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0685
- accuracy: 0.9879
Epoch 82/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0689
- accuracy: 0.9878
```

Epoch 83/500
12443/12443 [==============================] - 1s 111us/sample - loss: 0.0680
 - accuracy: 0.9880
Epoch 84/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0676
 - accuracy: 0.9884
Epoch 85/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0673
 - accuracy: 0.9884
Epoch 86/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0659
 - accuracy: 0.9877
Epoch 87/500
12443/12443 [==============================] - 1s 106us/sample - loss: 0.0660
 - accuracy: 0.9884
Epoch 88/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0656
 - accuracy: 0.9885
Epoch 89/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0652
 - accuracy: 0.9886
Epoch 90/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0650
 - accuracy: 0.9882
Epoch 91/500

```
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0643
- accuracy: 0.9892
Epoch 92/500
12443/12443 [==============================] - 1s 111us/sample - loss: 0.0638
- accuracy: 0.9893
Epoch 93/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0636
- accuracy: 0.9889
Epoch 94/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0631
- accuracy: 0.9888
Epoch 95/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0638
- accuracy: 0.9891
Epoch 96/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0639
- accuracy: 0.9892
Epoch 97/500
12443/12443 [==============================] - 1s 109us/sample - loss: 0.0621
- accuracy: 0.9892
Epoch 98/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0625
- accuracy: 0.9887
Epoch 99/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0624
```

```
        - accuracy: 0.9888
Epoch 100/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0613
        - accuracy: 0.9897
Epoch 101/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0620
        - accuracy: 0.9887
Epoch 102/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.0605
        - accuracy: 0.9900
Epoch 103/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0616
        - accuracy: 0.9893
Epoch 104/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0597
        - accuracy: 0.9896
Epoch 105/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0605
        - accuracy: 0.9896
Epoch 106/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0605
        - accuracy: 0.9900
Epoch 107/500
12443/12443 [==============================] - 1s 106us/sample - loss: 0.0597
        - accuracy: 0.9897
```

Epoch 108/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0595
 - accuracy: 0.9895
Epoch 109/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0593
 - accuracy: 0.9895
Epoch 110/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0580
 - accuracy: 0.9904
Epoch 111/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0582
 - accuracy: 0.9897
Epoch 112/500
12443/12443 [==============================] - 1s 109us/sample - loss: 0.0576
 - accuracy: 0.9905
Epoch 113/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0580
 - accuracy: 0.9901
Epoch 114/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0581
 - accuracy: 0.9896
Epoch 115/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0577
 - accuracy: 0.9904
Epoch 116/500

12443/12443 [==============================] - 1s 96us/sample - loss: 0.0575
 - accuracy: 0.9896
Epoch 117/500
12443/12443 [==============================] - 1s 103us/sample - loss: 0.0574
 - accuracy: 0.9902
Epoch 118/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0569
 - accuracy: 0.9902
Epoch 119/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0566
 - accuracy: 0.9905
Epoch 120/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0560
 - accuracy: 0.9905
Epoch 121/500
12443/12443 [==============================] - 1s 105us/sample - loss: 0.0560
 - accuracy: 0.9902
Epoch 122/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0565
 - accuracy: 0.9905
Epoch 123/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0559
 - accuracy: 0.9904
Epoch 124/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0562

```
- accuracy: 0.9897
Epoch 125/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0552
- accuracy: 0.9908
Epoch 126/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.0553
- accuracy: 0.9900
Epoch 127/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0548
- accuracy: 0.9908
Epoch 128/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0547
- accuracy: 0.9912
Epoch 129/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0547
- accuracy: 0.9900
Epoch 130/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0542
- accuracy: 0.9908
Epoch 131/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.0539
- accuracy: 0.9908
Epoch 132/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0543
- accuracy: 0.9904
```

```
Epoch 133/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0536
 - accuracy: 0.9911
Epoch 134/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0537
 - accuracy: 0.9907
Epoch 135/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0537
 - accuracy: 0.9912
Epoch 136/500
12443/12443 [==============================] - 1s 104us/sample - loss: 0.0530
 - accuracy: 0.9911
Epoch 137/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0535
 - accuracy: 0.9905
Epoch 138/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0528
 - accuracy: 0.9908
Epoch 139/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0520
 - accuracy: 0.9909
Epoch 140/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0532
 - accuracy: 0.9908
Epoch 141/500
```

12443/12443 [==============================] - 1s 102us/sample - loss: 0.0523
    - accuracy: 0.9906
Epoch 142/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0526
    - accuracy: 0.9906
Epoch 143/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0522
    - accuracy: 0.9913
Epoch 144/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0519
    - accuracy: 0.9914
Epoch 145/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0524
    - accuracy: 0.9909
Epoch 146/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0521
    - accuracy: 0.9916
Epoch 147/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0513
    - accuracy: 0.9909
Epoch 148/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0512
    - accuracy: 0.9914
Epoch 149/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0508

```
                                                    - accuracy: 0.9914
Epoch 150/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0503
                                                    - accuracy: 0.9916
Epoch 151/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0510
                                                    - accuracy: 0.9918
Epoch 152/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0509
                                                    - accuracy: 0.9912
Epoch 153/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0508
                                                    - accuracy: 0.9912
Epoch 154/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0500
                                                    - accuracy: 0.9912
Epoch 155/500
12443/12443 [==============================] - 1s 104us/sample - loss: 0.0508
                                                    - accuracy: 0.9915
Epoch 156/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0496
                                                    - accuracy: 0.9916
Epoch 157/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0500
                                                    - accuracy: 0.9915
```

```
Epoch 158/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0494
 - accuracy: 0.9911
Epoch 159/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0494
 - accuracy: 0.9918
Epoch 160/500
12443/12443 [==============================] - 1s 106us/sample - loss: 0.0487
 - accuracy: 0.9917
Epoch 161/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0492
 - accuracy: 0.9915
Epoch 162/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0488
 - accuracy: 0.9914
Epoch 163/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0488
 - accuracy: 0.9917
Epoch 164/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0491
 - accuracy: 0.9917
Epoch 165/500
12443/12443 [==============================] - 1s 103us/sample - loss: 0.0490
 - accuracy: 0.9915
Epoch 166/500
```

```
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0488
    - accuracy: 0.9917
Epoch 167/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0478
    - accuracy: 0.9917
Epoch 168/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0478
    - accuracy: 0.9920
Epoch 169/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0487
    - accuracy: 0.9911
Epoch 170/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0478
    - accuracy: 0.9918
Epoch 171/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0477
    - accuracy: 0.9920
Epoch 172/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0477
    - accuracy: 0.9917
Epoch 173/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0470
    - accuracy: 0.9921
Epoch 174/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0478
```

```
- accuracy: 0.9921
Epoch 175/500
12443/12443 [==============================] - 1s 102us/sample - loss: 0.0473
- accuracy: 0.9922
Epoch 176/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0466
- accuracy: 0.9920
Epoch 177/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0471
- accuracy: 0.9918
Epoch 178/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0469
- accuracy: 0.9922
Epoch 179/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0463
- accuracy: 0.9923
Epoch 180/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0465
- accuracy: 0.9924
Epoch 181/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0474
- accuracy: 0.9916
Epoch 182/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0464
- accuracy: 0.9927
```

Epoch 183/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0467
  - accuracy: 0.9920
Epoch 184/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0461
  - accuracy: 0.9923
Epoch 185/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0460
  - accuracy: 0.9927
Epoch 186/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0460
  - accuracy: 0.9920
Epoch 187/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0459
  - accuracy: 0.9922
Epoch 188/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0454
  - accuracy: 0.9922
Epoch 189/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.0452
  - accuracy: 0.9923
Epoch 190/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0461
  - accuracy: 0.9919
Epoch 191/500

```
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0457
    - accuracy: 0.9921
Epoch 192/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0451
    - accuracy: 0.9928
Epoch 193/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0454
    - accuracy: 0.9920
Epoch 194/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0452
    - accuracy: 0.9920
Epoch 195/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0443
    - accuracy: 0.9925
Epoch 196/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0453
    - accuracy: 0.9920
Epoch 197/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0454
    - accuracy: 0.9924
Epoch 198/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0446
    - accuracy: 0.9924
Epoch 199/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0443
```

```
    - accuracy: 0.9922
Epoch 200/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0453
    - accuracy: 0.9926
Epoch 201/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0445
    - accuracy: 0.9925
Epoch 202/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0436
    - accuracy: 0.9923
Epoch 203/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0439
    - accuracy: 0.9925
Epoch 204/500
12443/12443 [==============================] - 1s 103us/sample - loss: 0.0442
    - accuracy: 0.9924
Epoch 205/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0448
    - accuracy: 0.9925
Epoch 206/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0437
    - accuracy: 0.9924
Epoch 207/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0430
    - accuracy: 0.9927
```

Epoch 208/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0432
 - accuracy: 0.9926
Epoch 209/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0434
 - accuracy: 0.9928
Epoch 210/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0435
 - accuracy: 0.9927
Epoch 211/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0425
 - accuracy: 0.9928
Epoch 212/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0439
 - accuracy: 0.9926
Epoch 213/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0434
 - accuracy: 0.9927
Epoch 214/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0434
 - accuracy: 0.9923
Epoch 215/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0431
 - accuracy: 0.9931
Epoch 216/500

```
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0428
  - accuracy: 0.9924
Epoch 217/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0426
  - accuracy: 0.9928
Epoch 218/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0426
  - accuracy: 0.9928
Epoch 219/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0432
  - accuracy: 0.9925
Epoch 220/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0423
  - accuracy: 0.9929
Epoch 221/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0421
  - accuracy: 0.9924
Epoch 222/500
12443/12443 [==============================] - 1s 110us/sample - loss: 0.0421
  - accuracy: 0.9930
Epoch 223/500
12443/12443 [==============================] - 1s 106us/sample - loss: 0.0422
  - accuracy: 0.9932
Epoch 224/500
12443/12443 [==============================] - 1s 114us/sample - loss: 0.0424
```

```
- accuracy: 0.9927
Epoch 225/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0420
- accuracy: 0.9933
Epoch 226/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0418
- accuracy: 0.9927
Epoch 227/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0420
- accuracy: 0.9928
Epoch 228/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0418
- accuracy: 0.9931
Epoch 229/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0414
- accuracy: 0.9932
Epoch 230/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0408
- accuracy: 0.9930
Epoch 231/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0415
- accuracy: 0.9927
Epoch 232/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0410
- accuracy: 0.9928
```

```
Epoch 233/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0422
 - accuracy: 0.9931
Epoch 234/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0414
 - accuracy: 0.9929
Epoch 235/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0410
 - accuracy: 0.9930
Epoch 236/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0407
 - accuracy: 0.9929
Epoch 237/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0412
 - accuracy: 0.9930
Epoch 238/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0409
 - accuracy: 0.9931
Epoch 239/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0403
 - accuracy: 0.9926
Epoch 240/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0403
 - accuracy: 0.9932
Epoch 241/500
```

```
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0403
- accuracy: 0.9933
Epoch 242/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0405
- accuracy: 0.9932
Epoch 243/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0403
- accuracy: 0.9931
Epoch 244/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0404
- accuracy: 0.9934
Epoch 245/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0403
- accuracy: 0.9932
Epoch 246/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0400
- accuracy: 0.9933
Epoch 247/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0398
- accuracy: 0.9929
Epoch 248/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0400
- accuracy: 0.9930
Epoch 249/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0407
```

```
- accuracy: 0.9936
Epoch 250/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0401
- accuracy: 0.9927
Epoch 251/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0403
- accuracy: 0.9929
Epoch 252/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0397
- accuracy: 0.9936
Epoch 253/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0403
- accuracy: 0.9931
Epoch 254/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0393
- accuracy: 0.9929
Epoch 255/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0394
- accuracy: 0.9933
Epoch 256/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0396
- accuracy: 0.9931
Epoch 257/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0395
- accuracy: 0.9929
```

Epoch 258/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0390
       - accuracy: 0.9937
Epoch 259/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0393
       - accuracy: 0.9936
Epoch 260/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0390
       - accuracy: 0.9930
Epoch 261/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0391
       - accuracy: 0.9931
Epoch 262/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0401
       - accuracy: 0.9932
Epoch 263/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0389
       - accuracy: 0.9936
Epoch 264/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0385
       - accuracy: 0.9932
Epoch 265/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0387
       - accuracy: 0.9937
Epoch 266/500

12443/12443 [==============================] - 1s 87us/sample - loss: 0.0388
- accuracy: 0.9937
Epoch 267/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0384
- accuracy: 0.9936
Epoch 268/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0386
- accuracy: 0.9939
Epoch 269/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0384
- accuracy: 0.9933
Epoch 270/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0384
- accuracy: 0.9937
Epoch 271/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0383
- accuracy: 0.9936
Epoch 272/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0378
- accuracy: 0.9934
Epoch 273/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0380
- accuracy: 0.9936
Epoch 274/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0378

```
- accuracy: 0.9932
Epoch 275/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0384
- accuracy: 0.9937
Epoch 276/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0377
- accuracy: 0.9940
Epoch 277/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0384
- accuracy: 0.9934
Epoch 278/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0376
- accuracy: 0.9938
Epoch 279/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0379
- accuracy: 0.9933
Epoch 280/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0383
- accuracy: 0.9932
Epoch 281/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0375
- accuracy: 0.9938
Epoch 282/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0372
- accuracy: 0.9939
```

Epoch 283/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0371
    - accuracy: 0.9938
Epoch 284/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0372
    - accuracy: 0.9941
Epoch 285/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0370
    - accuracy: 0.9942
Epoch 286/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0378
    - accuracy: 0.9939
Epoch 287/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0373
    - accuracy: 0.9940
Epoch 288/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0370
    - accuracy: 0.9940
Epoch 289/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0378
    - accuracy: 0.9936
Epoch 290/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0373
    - accuracy: 0.9936
Epoch 291/500

```
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0371
 - accuracy: 0.9938
Epoch 292/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0371
 - accuracy: 0.9937
Epoch 293/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0371
 - accuracy: 0.9937
Epoch 294/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0377
 - accuracy: 0.9931
Epoch 295/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0368
 - accuracy: 0.9936
Epoch 296/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0372
 - accuracy: 0.9938
Epoch 297/500
12443/12443 [==============================] - 1s 106us/sample - loss: 0.0364
 - accuracy: 0.9937
Epoch 298/500
12443/12443 [==============================] - 2s 125us/sample - loss: 0.0369
 - accuracy: 0.9934
Epoch 299/500
12443/12443 [==============================] - 1s 106us/sample - loss: 0.0361
```

```
 - accuracy: 0.9941
Epoch 300/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0365
 - accuracy: 0.9937
Epoch 301/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0373
 - accuracy: 0.9932
Epoch 302/500
12443/12443 [==============================] - 1s 105us/sample - loss: 0.0362
 - accuracy: 0.9941
Epoch 303/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0364
 - accuracy: 0.9938
Epoch 304/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0363
 - accuracy: 0.9937
Epoch 305/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0367
 - accuracy: 0.9937
Epoch 306/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0367
 - accuracy: 0.9937
Epoch 307/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.0359
 - accuracy: 0.9937
```

```
Epoch 308/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0358
 - accuracy: 0.9941
Epoch 309/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0359
 - accuracy: 0.9936
Epoch 310/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0367
 - accuracy: 0.9940
Epoch 311/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0363
 - accuracy: 0.9937
Epoch 312/500
12443/12443 [==============================] - 1s 102us/sample - loss: 0.0355
 - accuracy: 0.9939
Epoch 313/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0359
 - accuracy: 0.9937
Epoch 314/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0355
 - accuracy: 0.9941
Epoch 315/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0352
 - accuracy: 0.9937
Epoch 316/500
```

```
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0355
 - accuracy: 0.9938
Epoch 317/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0350
 - accuracy: 0.9940
Epoch 318/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0351
 - accuracy: 0.9942
Epoch 319/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0351
 - accuracy: 0.9941
Epoch 320/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0357
 - accuracy: 0.9938
Epoch 321/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0359
 - accuracy: 0.9937
Epoch 322/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0351
 - accuracy: 0.9939
Epoch 323/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0352
 - accuracy: 0.9940
Epoch 324/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0356
```

```
- accuracy: 0.9943
Epoch 325/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0350
- accuracy: 0.9937
Epoch 326/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0346
- accuracy: 0.9943
Epoch 327/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0350
- accuracy: 0.9940
Epoch 328/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0351
- accuracy: 0.9941
Epoch 329/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0345
- accuracy: 0.9943
Epoch 330/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0345
- accuracy: 0.9942
Epoch 331/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0339
- accuracy: 0.9943
Epoch 332/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0342
- accuracy: 0.9941
```

Epoch 333/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0356
 - accuracy: 0.9942
Epoch 334/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0346
 - accuracy: 0.9944
Epoch 335/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0342
 - accuracy: 0.9940
Epoch 336/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0339
 - accuracy: 0.9944
Epoch 337/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0348
 - accuracy: 0.9937
Epoch 338/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0340
 - accuracy: 0.9944
Epoch 339/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0345
 - accuracy: 0.9939
Epoch 340/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0338
 - accuracy: 0.9942
Epoch 341/500

```
12443/12443 [==============================] - 1s 113us/sample - loss: 0.0347
 - accuracy: 0.9943
Epoch 342/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0342
 - accuracy: 0.9940
Epoch 343/500
12443/12443 [==============================] - 1s 109us/sample - loss: 0.0340
 - accuracy: 0.9942
Epoch 344/500
12443/12443 [==============================] - 1s 105us/sample - loss: 0.0337
 - accuracy: 0.9945
Epoch 345/500
12443/12443 [==============================] - 1s 104us/sample - loss: 0.0345
 - accuracy: 0.9941
Epoch 346/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0340
 - accuracy: 0.9940
Epoch 347/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0335
 - accuracy: 0.9944
Epoch 348/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0347
 - accuracy: 0.9939
Epoch 349/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0339
```

```
    - accuracy: 0.9946
Epoch 350/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0340
    - accuracy: 0.9941
Epoch 351/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0335
    - accuracy: 0.9943
Epoch 352/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0338
    - accuracy: 0.9945
Epoch 353/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0336
    - accuracy: 0.9942
Epoch 354/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0336
    - accuracy: 0.9941
Epoch 355/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0338
    - accuracy: 0.9940
Epoch 356/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0334
    - accuracy: 0.9947
Epoch 357/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0339
    - accuracy: 0.9940
```

```
Epoch 358/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0338
    - accuracy: 0.9941
Epoch 359/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0336
    - accuracy: 0.9945
Epoch 360/500
12443/12443 [==============================] - 1s 105us/sample - loss: 0.0329
    - accuracy: 0.9945
Epoch 361/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0324
    - accuracy: 0.9945
Epoch 362/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0325
    - accuracy: 0.9944
Epoch 363/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0331
    - accuracy: 0.9942
Epoch 364/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0338
    - accuracy: 0.9939
Epoch 365/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0335
    - accuracy: 0.9939
Epoch 366/500
```

```
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0332
 - accuracy: 0.9944
Epoch 367/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0335
 - accuracy: 0.9941
Epoch 368/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0333
 - accuracy: 0.9942
Epoch 369/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0328
 - accuracy: 0.9945
Epoch 370/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0329
 - accuracy: 0.9949
Epoch 371/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0330
 - accuracy: 0.9944
Epoch 372/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0333
 - accuracy: 0.9942
Epoch 373/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0323
 - accuracy: 0.9943
Epoch 374/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0324
```

```
- accuracy: 0.9941
Epoch 375/500
12443/12443 [==============================] - 1s 102us/sample - loss: 0.0324
- accuracy: 0.9946
Epoch 376/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0331
- accuracy: 0.9946
Epoch 377/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0320
- accuracy: 0.9945
Epoch 378/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0327
- accuracy: 0.9945
Epoch 379/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0335
- accuracy: 0.9943
Epoch 380/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0320
- accuracy: 0.9942
Epoch 381/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0320
- accuracy: 0.9948
Epoch 382/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0320
- accuracy: 0.9941
```

Epoch 383/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0322
 - accuracy: 0.9943
Epoch 384/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0330
 - accuracy: 0.9941
Epoch 385/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0323
 - accuracy: 0.9943
Epoch 386/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0314
 - accuracy: 0.9949
Epoch 387/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0317
 - accuracy: 0.9947
Epoch 388/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0325
 - accuracy: 0.9943
Epoch 389/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0320
 - accuracy: 0.9944
Epoch 390/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0314
 - accuracy: 0.9948
Epoch 391/500

```
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0315
     - accuracy: 0.9947
Epoch 392/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0323
     - accuracy: 0.9943
Epoch 393/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0315
     - accuracy: 0.9947
Epoch 394/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0315
     - accuracy: 0.9944
Epoch 395/500
12443/12443 [==============================] - 2s 123us/sample - loss: 0.0317
     - accuracy: 0.9945
Epoch 396/500
12443/12443 [==============================] - 1s 109us/sample - loss: 0.0320
     - accuracy: 0.9939
Epoch 397/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0323
     - accuracy: 0.9943
Epoch 398/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0314
     - accuracy: 0.9946
Epoch 399/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0318
```

```
- accuracy: 0.9945
Epoch 400/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0308
- accuracy: 0.9945
Epoch 401/500
12443/12443 [==============================] - 1s 86us/sample - loss: 0.0309
- accuracy: 0.9945
Epoch 402/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0314
- accuracy: 0.9942
Epoch 403/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0314
- accuracy: 0.9948
Epoch 404/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0309
- accuracy: 0.9948
Epoch 405/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0313
- accuracy: 0.9946
Epoch 406/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0313
- accuracy: 0.9947
Epoch 407/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0315
- accuracy: 0.9947
```

Epoch 408/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0312
- accuracy: 0.9946
Epoch 409/500
12443/12443 [==============================] - 1s 98us/sample - loss: 0.0317
- accuracy: 0.9943
Epoch 410/500
12443/12443 [==============================] - 1s 86us/sample - loss: 0.0311
- accuracy: 0.9945
Epoch 411/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0308
- accuracy: 0.9946
Epoch 412/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0310
- accuracy: 0.9945
Epoch 413/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0308
- accuracy: 0.9949
Epoch 414/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0312
- accuracy: 0.9945
Epoch 415/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0304
- accuracy: 0.9944
Epoch 416/500

```
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0311
 - accuracy: 0.9945
Epoch 417/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0307
 - accuracy: 0.9944
Epoch 418/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0313
 - accuracy: 0.9945
Epoch 419/500
12443/12443 [==============================] - 1s 108us/sample - loss: 0.0308
 - accuracy: 0.9949
Epoch 420/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0312
 - accuracy: 0.9941
Epoch 421/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0304
 - accuracy: 0.9949
Epoch 422/500
12443/12443 [==============================] - 1s 109us/sample - loss: 0.0309
 - accuracy: 0.9944
Epoch 423/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0308
 - accuracy: 0.9945
Epoch 424/500
12443/12443 [==============================] - 1s 110us/sample - loss: 0.0305
```

```
- accuracy: 0.9950
Epoch 425/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0310
- accuracy: 0.9945
Epoch 426/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0304
- accuracy: 0.9948
Epoch 427/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0304
- accuracy: 0.9948
Epoch 428/500
12443/12443 [==============================] - 2s 122us/sample - loss: 0.0305
- accuracy: 0.9945
Epoch 429/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0299
- accuracy: 0.9949
Epoch 430/500
12443/12443 [==============================] - 2s 139us/sample - loss: 0.0299
- accuracy: 0.9947
Epoch 431/500
12443/12443 [==============================] - 2s 141us/sample - loss: 0.0299
- accuracy: 0.9949
Epoch 432/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.0304
- accuracy: 0.9949
```

Epoch 433/500
12443/12443 [==============================] - 1s 99us/sample - loss: 0.0301
- accuracy: 0.9945
Epoch 434/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0300
- accuracy: 0.9947
Epoch 435/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0301
- accuracy: 0.9945
Epoch 436/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0298
- accuracy: 0.9949
Epoch 437/500
12443/12443 [==============================] - 1s 102us/sample - loss: 0.0300
- accuracy: 0.9946
Epoch 438/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0298
- accuracy: 0.9948
Epoch 439/500
12443/12443 [==============================] - 1s 109us/sample - loss: 0.0295
- accuracy: 0.9946
Epoch 440/500
12443/12443 [==============================] - 1s 105us/sample - loss: 0.0305
- accuracy: 0.9950
Epoch 441/500

```
12443/12443 [==============================] - 1s 106us/sample - loss: 0.0300
- accuracy: 0.9946
Epoch 442/500
12443/12443 [==============================] - 1s 110us/sample - loss: 0.0310
- accuracy: 0.9945
Epoch 443/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0298
- accuracy: 0.9949
Epoch 444/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0292
- accuracy: 0.9948
Epoch 445/500
12443/12443 [==============================] - 1s 103us/sample - loss: 0.0299
- accuracy: 0.9952
Epoch 446/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.0290
- accuracy: 0.9949
Epoch 447/500
12443/12443 [==============================] - 1s 109us/sample - loss: 0.0305
- accuracy: 0.9946
Epoch 448/500
12443/12443 [==============================] - 1s 107us/sample - loss: 0.0294
- accuracy: 0.9950
Epoch 449/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0296
```

- accuracy: 0.9948
Epoch 450/500
12443/12443 [==============================] - 1s 103us/sample - loss: 0.0301
- accuracy: 0.9946
Epoch 451/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0299
- accuracy: 0.9948
Epoch 452/500
12443/12443 [==============================] - 1s 94us/sample - loss: 0.0288
- accuracy: 0.9948
Epoch 453/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0290
- accuracy: 0.9947
Epoch 454/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0300
- accuracy: 0.9945
Epoch 455/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0295
- accuracy: 0.9941
Epoch 456/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0294
- accuracy: 0.9948
Epoch 457/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0293
- accuracy: 0.9945

Epoch 458/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0290
 - accuracy: 0.9948
Epoch 459/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0296
 - accuracy: 0.9949
Epoch 460/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0292
 - accuracy: 0.9949
Epoch 461/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0288
 - accuracy: 0.9947
Epoch 462/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0294
 - accuracy: 0.9952
Epoch 463/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0290
 - accuracy: 0.9949
Epoch 464/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0294
 - accuracy: 0.9945
Epoch 465/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0292
 - accuracy: 0.9950
Epoch 466/500

```
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0290
 - accuracy: 0.9952
Epoch 467/500
12443/12443 [==============================] - 1s 93us/sample - loss: 0.0288
 - accuracy: 0.9948
Epoch 468/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0289
 - accuracy: 0.9945
Epoch 469/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0287
 - accuracy: 0.9948
Epoch 470/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0293
 - accuracy: 0.9952
Epoch 471/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0295
 - accuracy: 0.9950
Epoch 472/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0290
 - accuracy: 0.9948
Epoch 473/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0297
 - accuracy: 0.9945
Epoch 474/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0290
```

- accuracy: 0.9951
Epoch 475/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0292
- accuracy: 0.9945
Epoch 476/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0290
- accuracy: 0.9949
Epoch 477/500
12443/12443 [==============================] - 1s 101us/sample - loss: 0.0290
- accuracy: 0.9949
Epoch 478/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0287
- accuracy: 0.9949
Epoch 479/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0285
- accuracy: 0.9952
Epoch 480/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0288
- accuracy: 0.9949
Epoch 481/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0286
- accuracy: 0.9949
Epoch 482/500
12443/12443 [==============================] - 1s 92us/sample - loss: 0.0289
- accuracy: 0.9947

Epoch 483/500
12443/12443 [==============================] - 1s 88us/sample - loss: 0.0282
 - accuracy: 0.9947
Epoch 484/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0285
 - accuracy: 0.9949
Epoch 485/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0289
 - accuracy: 0.9943
Epoch 486/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0290
 - accuracy: 0.9946
Epoch 487/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0285
 - accuracy: 0.9949
Epoch 488/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0281
 - accuracy: 0.9948
Epoch 489/500
12443/12443 [==============================] - 2s 121us/sample - loss: 0.0287
 - accuracy: 0.9949
Epoch 490/500
12443/12443 [==============================] - 1s 91us/sample - loss: 0.0284
 - accuracy: 0.9949
Epoch 491/500

12443/12443 [==============================] - 1s 115us/sample - loss: 0.0281 - accuracy: 0.9949
Epoch 492/500
12443/12443 [==============================] - 1s 95us/sample - loss: 0.0281 - accuracy: 0.9951
Epoch 493/500
12443/12443 [==============================] - 1s 90us/sample - loss: 0.0282 - accuracy: 0.9950
Epoch 494/500
12443/12443 [==============================] - 1s 97us/sample - loss: 0.0279 - accuracy: 0.9953
Epoch 495/500
12443/12443 [==============================] - 1s 87us/sample - loss: 0.0290 - accuracy: 0.9949
Epoch 496/500
12443/12443 [==============================] - 1s 100us/sample - loss: 0.0278 - accuracy: 0.9951
Epoch 497/500
12443/12443 [==============================] - 1s 96us/sample - loss: 0.0280 - accuracy: 0.9948
Epoch 498/500
12443/12443 [==============================] - 1s 118us/sample - loss: 0.0288 - accuracy: 0.9952
Epoch 499/500
12443/12443 [==============================] - 1s 89us/sample - loss: 0.0279

```
 - accuracy: 0.9949
Epoch 500/500
12443/12443 [==============================] - 1s 120us/sample - loss: 0.0285
 - accuracy: 0.9947
2880/2880 [==============================] - 0s 59us/sample

class_weight_Fold_4: {0: 0.10836018462074369, 1: 11.6653125}

pos_weight: 0.9
thresholdNum: 0.5


Average of train loss Fold_4: 0.0621
Average of yPredProbability Fold_4: 0.5218


classification_report_Fold_4:
              precision    recall  f1-score   support

    Normal 0       0.99      0.45      0.62      2857
   Anomaly 1       0.00      0.26      0.01        23

    accuracy                          0.45      2880
   macro avg       0.50      0.36      0.31      2880
```

weighted avg	0.98	0.45	0.62	2880

confusion_matrix_Fold_4:
True Negatives: 1298
False Positives: 1559
False Negatives: 17
True Positives: 6

End running time Fold_4: 210504_231227 ,------------------------.

Start running time Fold_5: 210504_231227 ,------------------------:

Shape of Actual yXtrainRolled After Rolling Fold_5: (23068, 60)

Shape of Actual yXvalidShifted dataset: (2894, 60)
Shape of Actual yXvalidRolled After Rolling Fold_5: (5786, 60)
Start running time Data Augmentation_Fold_5: 210504_231228
,+++++++++++++++++++++++++++++++++++++:

Data Augmentation MSE Label 1==> mean: 0.000737, min: 0.000331, max: 0.001734

Data Augmentation MSE Label 1==> mean: 0.00043, min: 1.4e-05, max: 0.002102

Data Augmentation MSE Label 1==> mean: 0.00049, min: 2e-06, max: 0.003686

Data Augmentation MSE Label 1==> mean: 0.00063, min: 1e-06, max: 0.005143

Data Augmentation MSE Label 1==> mean: 0.000876, min: 0.0, max: 0.007539

Data Augmentation MSE Label 1==> mean: 0.001253, min: 0.0, max: 0.011073

Data Augmentation MSE Label 1==> mean: 0.001601, min: 0.0, max: 0.018395

Data Augmentation MSE Label 1==> mean: 0.00168, min: 0.0, max: 0.012449

Data Augmentation MSE Label 1==> mean: 0.001864, min: 0.0, max: 0.015557

Data Augmentation MSE Label 1==> mean: 0.001899, min: 0.0, max: 0.009483

Data Augmentation MSE Label 1==> mean: 0.002163, min: 0.0, max: 0.015981

Data Augmentation MSE Label 1==> mean: 0.002593, min: 0.0, max: 0.019501

Data Augmentation MSE Label 1==> mean: 0.002827, min: 0.0, max: 0.020239

Data Augmentation MSE Label 1==> mean: 0.002772, min: 0.0, max: 0.016763

MSE All generated Augmented data Fold_5:

mean: 0.001558

min: 2.5e-05

max: 0.011403

End running time Data Augmentation_Fold_5: 210504_231307

,+++++++++++++++++++++++++++++++++++.

    Shape of data after Transform ToOneRow to give Cross Validation Model in fold_5:

    xtrain: (12612, 118), ytrain: (12612,)
    xvalid: (2893, 118), yvalid: (2893,)

Number of final label 0 in yXtrain_Fold_5: 11457

Number of final label 1 in yXtrain_Before_AddingAugedData_Fold_5: 77
Number of final label 1 in yXtrain_After_AddingAugedData_Fold_5: 1155

Train on 12612 samples
Epoch 1/500
12612/12612 [==============================] - 2s 141us/sample - loss: 3.2401
 - accuracy: 0.9242
Epoch 2/500

```
12612/12612 [==============================] - 1s 98us/sample - loss: 1.6509
 - accuracy: 0.9462
Epoch 3/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.8580
 - accuracy: 0.9527
Epoch 4/500
12612/12612 [==============================] - 1s 103us/sample - loss: 0.4799
 - accuracy: 0.9559
Epoch 5/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.3052
 - accuracy: 0.9579
Epoch 6/500
12612/12612 [==============================] - 1s 104us/sample - loss: 0.2248
 - accuracy: 0.9604
Epoch 7/500
12612/12612 [==============================] - 1s 106us/sample - loss: 0.1856
 - accuracy: 0.9609
Epoch 8/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.1661
 - accuracy: 0.9624
Epoch 9/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.1550
 - accuracy: 0.9645
Epoch 10/500
12612/12612 [==============================] - 1s 105us/sample - loss: 0.1492
```

- accuracy: 0.9649
Epoch 11/500
12612/12612 [==============================] - 1s 103us/sample - loss: 0.1452
- accuracy: 0.9650
Epoch 12/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.1413
- accuracy: 0.9661
Epoch 13/500
12612/12612 [==============================] - 1s 106us/sample - loss: 0.1377
- accuracy: 0.9673
Epoch 14/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.1356
- accuracy: 0.9669
Epoch 15/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.1334
- accuracy: 0.9680
Epoch 16/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.1330
- accuracy: 0.9677
Epoch 17/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.1294
- accuracy: 0.9687
Epoch 18/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.1282
- accuracy: 0.9688

```
Epoch 19/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.1267
    - accuracy: 0.9696
Epoch 20/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.1254
    - accuracy: 0.9704
Epoch 21/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.1234
    - accuracy: 0.9707
Epoch 22/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.1214
    - accuracy: 0.9713
Epoch 23/500
12613/12612 [==============================] - 1s 88us/sample - loss: 0.1203
    - accuracy: 0.9715
Epoch 24/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.1200
    - accuracy: 0.9717
Epoch 25/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.1183
    - accuracy: 0.9714
Epoch 26/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.1174
    - accuracy: 0.9723
Epoch 27/500
```

```
12612/12612 [==============================] - 1s 91us/sample - loss: 0.1155
 - accuracy: 0.9726
Epoch 28/500
12612/12612 [==============================] - 2s 159us/sample - loss: 0.1137
 - accuracy: 0.9739
Epoch 29/500
12612/12612 [==============================] - 1s 103us/sample - loss: 0.1133
 - accuracy: 0.9734
Epoch 30/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.1113
 - accuracy: 0.9742
Epoch 31/500
12612/12612 [==============================] - 1s 104us/sample - loss: 0.1114
 - accuracy: 0.9741
Epoch 32/500
12612/12612 [==============================] - 2s 129us/sample - loss: 0.1103
 - accuracy: 0.9752
Epoch 33/500
12612/12612 [==============================] - 1s 117us/sample - loss: 0.1095
 - accuracy: 0.9747
Epoch 34/500
12612/12612 [==============================] - 1s 118us/sample - loss: 0.1084
 - accuracy: 0.9750
Epoch 35/500
12612/12612 [==============================] - 1s 105us/sample - loss: 0.1084
```

```
- accuracy: 0.9757
Epoch 36/500
12612/12612 [==============================] - 2s 128us/sample - loss: 0.1070
- accuracy: 0.9761
Epoch 37/500
12612/12612 [==============================] - 1s 110us/sample - loss: 0.1058
- accuracy: 0.9765
Epoch 38/500
12612/12612 [==============================] - 1s 114us/sample - loss: 0.1050
- accuracy: 0.9756
Epoch 39/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.1036
- accuracy: 0.9760
Epoch 40/500
12612/12612 [==============================] - 2s 123us/sample - loss: 0.1033
- accuracy: 0.9761
Epoch 41/500
12612/12612 [==============================] - 1s 106us/sample - loss: 0.1025
- accuracy: 0.9770
Epoch 42/500
12612/12612 [==============================] - 1s 112us/sample - loss: 0.1015
- accuracy: 0.9772
Epoch 43/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.1006
- accuracy: 0.9772
```

```
Epoch 44/500
12612/12612 [==============================] - 2s 121us/sample - loss: 0.1001
 - accuracy: 0.9778
Epoch 45/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.0991
 - accuracy: 0.9777
Epoch 46/500
12612/12612 [==============================] - 1s 112us/sample - loss: 0.0986
 - accuracy: 0.9784
Epoch 47/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.0976
 - accuracy: 0.9785
Epoch 48/500
12612/12612 [==============================] - 2s 125us/sample - loss: 0.0972
 - accuracy: 0.9779
Epoch 49/500
12612/12612 [==============================] - 1s 110us/sample - loss: 0.0965
 - accuracy: 0.9786
Epoch 50/500
12612/12612 [==============================] - 1s 113us/sample - loss: 0.0959
 - accuracy: 0.9787
Epoch 51/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.0948
 - accuracy: 0.9793
Epoch 52/500
```

```
12612/12612 [==============================] - 1s 104us/sample - loss: 0.0948
  - accuracy: 0.9795
Epoch 53/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0937
  - accuracy: 0.9797
Epoch 54/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0937
  - accuracy: 0.9784
Epoch 55/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0927
  - accuracy: 0.9800
Epoch 56/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0924
  - accuracy: 0.9810
Epoch 57/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0921
  - accuracy: 0.9799
Epoch 58/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0915
  - accuracy: 0.9794
Epoch 59/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0902
  - accuracy: 0.9800
Epoch 60/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0902
```

```
 - accuracy: 0.9810
Epoch 61/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0889
 - accuracy: 0.9799
Epoch 62/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0882
 - accuracy: 0.9813
Epoch 63/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0884
 - accuracy: 0.9809
Epoch 64/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0873
 - accuracy: 0.9819
Epoch 65/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0867
 - accuracy: 0.9813
Epoch 66/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0863
 - accuracy: 0.9814
Epoch 67/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0858
 - accuracy: 0.9816
Epoch 68/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0852
 - accuracy: 0.9818
```

Epoch 69/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0846
      - accuracy: 0.9820
Epoch 70/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0844
      - accuracy: 0.9810
Epoch 71/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0835
      - accuracy: 0.9823
Epoch 72/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0842
      - accuracy: 0.9824
Epoch 73/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0828
      - accuracy: 0.9821
Epoch 74/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0821
      - accuracy: 0.9822
Epoch 75/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0815
      - accuracy: 0.9837
Epoch 76/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0816
      - accuracy: 0.9830
Epoch 77/500

```
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0810
 - accuracy: 0.9824
Epoch 78/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0813
 - accuracy: 0.9822
Epoch 79/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0804
 - accuracy: 0.9833
Epoch 80/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0793
 - accuracy: 0.9833
Epoch 81/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0797
 - accuracy: 0.9836
Epoch 82/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0791
 - accuracy: 0.9836
Epoch 83/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0780
 - accuracy: 0.9842
Epoch 84/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0781
 - accuracy: 0.9844
Epoch 85/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0779
```

- accuracy: 0.9841
Epoch 86/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0770
- accuracy: 0.9839
Epoch 87/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0780
- accuracy: 0.9839
Epoch 88/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0768
- accuracy: 0.9838
Epoch 89/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0755
- accuracy: 0.9846
Epoch 90/500
12612/12612 [==============================] - 1s 103us/sample - loss: 0.0764
- accuracy: 0.9839
Epoch 91/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0752
- accuracy: 0.9849
Epoch 92/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0749
- accuracy: 0.9843
Epoch 93/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0740
- accuracy: 0.9853

```
Epoch 94/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0745
 - accuracy: 0.9849
Epoch 95/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0746
 - accuracy: 0.9849
Epoch 96/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0735
 - accuracy: 0.9850
Epoch 97/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0732
 - accuracy: 0.9849
Epoch 98/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0728
 - accuracy: 0.9850
Epoch 99/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.0723
 - accuracy: 0.9849
Epoch 100/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0719
 - accuracy: 0.9853
Epoch 101/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0717
 - accuracy: 0.9856
Epoch 102/500
```

```
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0717
    - accuracy: 0.9858
Epoch 103/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0714
    - accuracy: 0.9860
Epoch 104/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.0713
    - accuracy: 0.9862
Epoch 105/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0707
    - accuracy: 0.9860
Epoch 106/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0703
    - accuracy: 0.9856
Epoch 107/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0714
    - accuracy: 0.9853
Epoch 108/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0699
    - accuracy: 0.9868
Epoch 109/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0691
    - accuracy: 0.9858
Epoch 110/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0697
```

- accuracy: 0.9860
Epoch 111/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0686
- accuracy: 0.9870
Epoch 112/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0688
- accuracy: 0.9862
Epoch 113/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0677
- accuracy: 0.9872
Epoch 114/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0675
- accuracy: 0.9874
Epoch 115/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0695
- accuracy: 0.9857
Epoch 116/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0680
- accuracy: 0.9867
Epoch 117/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0680
- accuracy: 0.9868
Epoch 118/500
12612/12612 [==============================] - 1s 103us/sample - loss: 0.0669
- accuracy: 0.9872

Epoch 119/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0666
    - accuracy: 0.9872
Epoch 120/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0665
    - accuracy: 0.9870
Epoch 121/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0665
    - accuracy: 0.9872
Epoch 122/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0657
    - accuracy: 0.9877
Epoch 123/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0658
    - accuracy: 0.9875
Epoch 124/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0652
    - accuracy: 0.9874
Epoch 125/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0652
    - accuracy: 0.9878
Epoch 126/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0650
    - accuracy: 0.9873
Epoch 127/500

12612/12612 [==============================] - 1s 98us/sample - loss: 0.0652
 - accuracy: 0.9879
Epoch 128/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0648
 - accuracy: 0.9879
Epoch 129/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0640
 - accuracy: 0.9874
Epoch 130/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0640
 - accuracy: 0.9872
Epoch 131/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0638
 - accuracy: 0.9877
Epoch 132/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0635
 - accuracy: 0.9881
Epoch 133/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0629
 - accuracy: 0.9876
Epoch 134/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0626
 - accuracy: 0.9884
Epoch 135/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0633

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        - accuracy: 0.9878
Epoch 136/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0625
        - accuracy: 0.9881
Epoch 137/500
12612/12612 [==============================] - 1s 103us/sample - loss: 0.0627
        - accuracy: 0.9882
Epoch 138/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0629
        - accuracy: 0.9884
Epoch 139/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0620
        - accuracy: 0.9882
Epoch 140/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0622
        - accuracy: 0.9883
Epoch 141/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0617
        - accuracy: 0.9886
Epoch 142/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0623
        - accuracy: 0.9882
Epoch 143/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0610
        - accuracy: 0.9887
```

Epoch 144/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0608
        - accuracy: 0.9887
Epoch 145/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0615
        - accuracy: 0.9884
Epoch 146/500
12612/12612 [==============================] - 1s 104us/sample - loss: 0.0608
        - accuracy: 0.9882
Epoch 147/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0611
        - accuracy: 0.9882
Epoch 148/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0602
        - accuracy: 0.9895
Epoch 149/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0600
        - accuracy: 0.9894
Epoch 150/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0604
        - accuracy: 0.9888
Epoch 151/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.0600
        - accuracy: 0.9893
Epoch 152/500

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12612/12612 [==============================] - 1s 106us/sample - loss: 0.0593
    - accuracy: 0.9888
Epoch 153/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0602
    - accuracy: 0.9888
Epoch 154/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0602
    - accuracy: 0.9891
Epoch 155/500
12612/12612 [==============================] - 1s 114us/sample - loss: 0.0589
    - accuracy: 0.9893
Epoch 156/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0588
    - accuracy: 0.9889
Epoch 157/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0592
    - accuracy: 0.9889
Epoch 158/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0586
    - accuracy: 0.9891
Epoch 159/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.0584
    - accuracy: 0.9892
Epoch 160/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0586
```

- accuracy: 0.9891
Epoch 161/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0588
- accuracy: 0.9894
Epoch 162/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0577
- accuracy: 0.9892
Epoch 163/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0578
- accuracy: 0.9893
Epoch 164/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.0580
- accuracy: 0.9896
Epoch 165/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0572
- accuracy: 0.9897
Epoch 166/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0577
- accuracy: 0.9891
Epoch 167/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0576
- accuracy: 0.9895
Epoch 168/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0571
- accuracy: 0.9895

Epoch 169/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0566
       - accuracy: 0.9895
Epoch 170/500
12612/12612 [==============================] - 1s 111us/sample - loss: 0.0561
       - accuracy: 0.9896
Epoch 171/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0566
       - accuracy: 0.9894
Epoch 172/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0566
       - accuracy: 0.9895
Epoch 173/500
12612/12612 [==============================] - 1s 109us/sample - loss: 0.0560
       - accuracy: 0.9897
Epoch 174/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.0564
       - accuracy: 0.9903
Epoch 175/500
12612/12612 [==============================] - 1s 105us/sample - loss: 0.0561
       - accuracy: 0.9899
Epoch 176/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0566
       - accuracy: 0.9899
Epoch 177/500

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12612/12612 [==============================] - 1s 103us/sample - loss: 0.0558
 - accuracy: 0.9895
Epoch 178/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0556
 - accuracy: 0.9897
Epoch 179/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0551
 - accuracy: 0.9905
Epoch 180/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0551
 - accuracy: 0.9901
Epoch 181/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0554
 - accuracy: 0.9903
Epoch 182/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0555
 - accuracy: 0.9899
Epoch 183/500
12612/12612 [==============================] - 1s 104us/sample - loss: 0.0550
 - accuracy: 0.9899
Epoch 184/500
12612/12612 [==============================] - 1s 106us/sample - loss: 0.0549
 - accuracy: 0.9902
Epoch 185/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0547
```

- accuracy: 0.9904
Epoch 186/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0544
- accuracy: 0.9900
Epoch 187/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0547
- accuracy: 0.9906
Epoch 188/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0543
- accuracy: 0.9902
Epoch 189/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0534
- accuracy: 0.9900
Epoch 190/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0555
- accuracy: 0.9902
Epoch 191/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.0545
- accuracy: 0.9898
Epoch 192/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0533
- accuracy: 0.9905
Epoch 193/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0533
- accuracy: 0.9906

Epoch 194/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0544
 - accuracy: 0.9906
Epoch 195/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0536
 - accuracy: 0.9902
Epoch 196/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0529
 - accuracy: 0.9909
Epoch 197/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0534
 - accuracy: 0.9904
Epoch 198/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0532
 - accuracy: 0.9904
Epoch 199/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0531
 - accuracy: 0.9904
Epoch 200/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.0533
 - accuracy: 0.9907
Epoch 201/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0525
 - accuracy: 0.9902
Epoch 202/500

12612/12612 [==============================] - 1s 99us/sample - loss: 0.0523
- accuracy: 0.9904
Epoch 203/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0524
- accuracy: 0.9903
Epoch 204/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0525
- accuracy: 0.9907
Epoch 205/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0526
- accuracy: 0.9906
Epoch 206/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0520
- accuracy: 0.9912
Epoch 207/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0519
- accuracy: 0.9904
Epoch 208/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0526
- accuracy: 0.9910
Epoch 209/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0515
- accuracy: 0.9911
Epoch 210/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0513

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- accuracy: 0.9909
Epoch 211/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0512
- accuracy: 0.9907
Epoch 212/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0515
- accuracy: 0.9909
Epoch 213/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0529
- accuracy: 0.9904
Epoch 214/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0514
- accuracy: 0.9909
Epoch 215/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0511
- accuracy: 0.9910
Epoch 216/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0515
- accuracy: 0.9910
Epoch 217/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0509
- accuracy: 0.9914
Epoch 218/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0504
- accuracy: 0.9911
```

Epoch 219/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.0512
 - accuracy: 0.9912
Epoch 220/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.0506
 - accuracy: 0.9907
Epoch 221/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0507
 - accuracy: 0.9912
Epoch 222/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0498
 - accuracy: 0.9917
Epoch 223/500
12612/12612 [==============================] - 1s 109us/sample - loss: 0.0504
 - accuracy: 0.9910
Epoch 224/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0504
 - accuracy: 0.9908
Epoch 225/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0503
 - accuracy: 0.9910
Epoch 226/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0504
 - accuracy: 0.9906
Epoch 227/500

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12612/12612 [==============================] - 1s 90us/sample - loss: 0.0502
   - accuracy: 0.9913
Epoch 228/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0499
   - accuracy: 0.9910
Epoch 229/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0502
   - accuracy: 0.9914
Epoch 230/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0500
   - accuracy: 0.9913
Epoch 231/500
12612/12612 [==============================] - 1s 86us/sample - loss: 0.0496
   - accuracy: 0.9914
Epoch 232/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0496
   - accuracy: 0.9914
Epoch 233/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0498
   - accuracy: 0.9913
Epoch 234/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0499
   - accuracy: 0.9914
Epoch 235/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.0501
```

```
 - accuracy: 0.9909
Epoch 236/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0496
 - accuracy: 0.9908
Epoch 237/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0491
 - accuracy: 0.9916
Epoch 238/500
12612/12612 [==============================] - 2s 171us/sample - loss: 0.0491
 - accuracy: 0.9912
Epoch 239/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0499
 - accuracy: 0.9912
Epoch 240/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0486
 - accuracy: 0.9914
Epoch 241/500
12612/12612 [==============================] - 1s 112us/sample - loss: 0.0488
 - accuracy: 0.9914
Epoch 242/500
12612/12612 [==============================] - 1s 105us/sample - loss: 0.0485
 - accuracy: 0.9915
Epoch 243/500
12612/12612 [==============================] - 1s 104us/sample - loss: 0.0485
 - accuracy: 0.9915
```

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Epoch 244/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0483
 - accuracy: 0.9915
Epoch 245/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0480
 - accuracy: 0.9914
Epoch 246/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0477
 - accuracy: 0.9917
Epoch 247/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0487
 - accuracy: 0.9915
Epoch 248/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0483
 - accuracy: 0.9913
Epoch 249/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0479
 - accuracy: 0.9918
Epoch 250/500
12612/12612 [==============================] - 1s 107us/sample - loss: 0.0483
 - accuracy: 0.9918
Epoch 251/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0478
 - accuracy: 0.9913
Epoch 252/500
```

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12612/12612 [==============================] - 1s 103us/sample - loss: 0.0475
 - accuracy: 0.9918
Epoch 253/500
12612/12612 [==============================] - 1s 111us/sample - loss: 0.0473
 - accuracy: 0.9914
Epoch 254/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0480
 - accuracy: 0.9919
Epoch 255/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0484
 - accuracy: 0.9915
Epoch 256/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0483
 - accuracy: 0.9916
Epoch 257/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0476
 - accuracy: 0.9918
Epoch 258/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0475
 - accuracy: 0.9915
Epoch 259/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0475
 - accuracy: 0.9918
Epoch 260/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0471
```

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- accuracy: 0.9918
Epoch 261/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0473
- accuracy: 0.9918
Epoch 262/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0468
- accuracy: 0.9922
Epoch 263/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0466
- accuracy: 0.9918
Epoch 264/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0464
- accuracy: 0.9920
Epoch 265/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0480
- accuracy: 0.9914
Epoch 266/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0469
- accuracy: 0.9921
Epoch 267/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0464
- accuracy: 0.9921
Epoch 268/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0470
- accuracy: 0.9922
```

Epoch 269/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0467
 - accuracy: 0.9920
Epoch 270/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0464
 - accuracy: 0.9920
Epoch 271/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0470
 - accuracy: 0.9918
Epoch 272/500
12612/12612 [==============================] - 1s 86us/sample - loss: 0.0468
 - accuracy: 0.9918
Epoch 273/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0463
 - accuracy: 0.9922
Epoch 274/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0461
 - accuracy: 0.9918
Epoch 275/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0461
 - accuracy: 0.9915
Epoch 276/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0459
 - accuracy: 0.9918
Epoch 277/500

12612/12612 [==============================] - 1s 87us/sample - loss: 0.0465 - accuracy: 0.9914
Epoch 278/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0458 - accuracy: 0.9922
Epoch 279/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0455 - accuracy: 0.9919
Epoch 280/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0456 - accuracy: 0.9920
Epoch 281/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0459 - accuracy: 0.9923
Epoch 282/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0454 - accuracy: 0.9918
Epoch 283/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0456 - accuracy: 0.9921
Epoch 284/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0452 - accuracy: 0.9919
Epoch 285/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0453

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                                            - accuracy: 0.9925
Epoch 286/500
12612/12612 [==============================] - 2s 170us/sample - loss: 0.0455
                                            - accuracy: 0.9924
Epoch 287/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0451
                                            - accuracy: 0.9921
Epoch 288/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0453
                                            - accuracy: 0.9921
Epoch 289/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0460
                                            - accuracy: 0.9918
Epoch 290/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0454
                                            - accuracy: 0.9925
Epoch 291/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0444
                                            - accuracy: 0.9920
Epoch 292/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0448
                                            - accuracy: 0.9920
Epoch 293/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0470
                                            - accuracy: 0.9917
```

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Epoch 294/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0444
 - accuracy: 0.9922
Epoch 295/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0445
 - accuracy: 0.9925
Epoch 296/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0444
 - accuracy: 0.9922
Epoch 297/500
12612/12612 [==============================] - 1s 103us/sample - loss: 0.0445
 - accuracy: 0.9926
Epoch 298/500
12612/12612 [==============================] - 1s 109us/sample - loss: 0.0441
 - accuracy: 0.9921
Epoch 299/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0445
 - accuracy: 0.9924
Epoch 300/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0447
 - accuracy: 0.9924
Epoch 301/500
12612/12612 [==============================] - 1s 104us/sample - loss: 0.0445
 - accuracy: 0.9923
Epoch 302/500
```

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12612/12612 [==============================] - 1s 115us/sample - loss: 0.0449
 - accuracy: 0.9922
Epoch 303/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0444
 - accuracy: 0.9921
Epoch 304/500
12612/12612 [==============================] - 1s 114us/sample - loss: 0.0439
 - accuracy: 0.9922
Epoch 305/500
12612/12612 [==============================] - 2s 133us/sample - loss: 0.0441
 - accuracy: 0.9925
Epoch 306/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0435
 - accuracy: 0.9925
Epoch 307/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0434
 - accuracy: 0.9925
Epoch 308/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0438
 - accuracy: 0.9927
Epoch 309/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0442
 - accuracy: 0.9925
Epoch 310/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0445
```

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- accuracy: 0.9923
Epoch 311/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0439
- accuracy: 0.9925
Epoch 312/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0441
- accuracy: 0.9922
Epoch 313/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0435
- accuracy: 0.9922
Epoch 314/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0437
- accuracy: 0.9925
Epoch 315/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0437
- accuracy: 0.9922
Epoch 316/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0433
- accuracy: 0.9922
Epoch 317/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0436
- accuracy: 0.9926
Epoch 318/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0435
- accuracy: 0.9930
```

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Epoch 319/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0432
    - accuracy: 0.9929
Epoch 320/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0435
    - accuracy: 0.9927
Epoch 321/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0431
    - accuracy: 0.9924
Epoch 322/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0437
    - accuracy: 0.9925
Epoch 323/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0432
    - accuracy: 0.9923
Epoch 324/500
12612/12612 [==============================] - 2s 186us/sample - loss: 0.0429
    - accuracy: 0.9926
Epoch 325/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0437
    - accuracy: 0.9922
Epoch 326/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0433
    - accuracy: 0.9925
Epoch 327/500
```

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12612/12612 [==============================] - 1s 93us/sample - loss: 0.0431
            - accuracy: 0.9926
Epoch 328/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0427
            - accuracy: 0.9923
Epoch 329/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0425
            - accuracy: 0.9929
Epoch 330/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0429
            - accuracy: 0.9924
Epoch 331/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0429
            - accuracy: 0.9926
Epoch 332/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0425
            - accuracy: 0.9926
Epoch 333/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0426
            - accuracy: 0.9924
Epoch 334/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0426
            - accuracy: 0.9926
Epoch 335/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0432
```

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- accuracy: 0.9925
Epoch 336/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0423
- accuracy: 0.9925
Epoch 337/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.0423
- accuracy: 0.9923
Epoch 338/500
12612/12612 [==============================] - 1s 113us/sample - loss: 0.0421
- accuracy: 0.9925
Epoch 339/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0421
- accuracy: 0.9927
Epoch 340/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0424
- accuracy: 0.9926
Epoch 341/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0418
- accuracy: 0.9932
Epoch 342/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0422
- accuracy: 0.9929
Epoch 343/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0419
- accuracy: 0.9924
```

```
Epoch 344/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0421
 - accuracy: 0.9929
Epoch 345/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0423
 - accuracy: 0.9928
Epoch 346/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0417
 - accuracy: 0.9932
Epoch 347/500
12612/12612 [==============================] - 1s 106us/sample - loss: 0.0413
 - accuracy: 0.9927
Epoch 348/500
12612/12612 [==============================] - 1s 114us/sample - loss: 0.0418
 - accuracy: 0.9929
Epoch 349/500
12612/12612 [==============================] - 1s 108us/sample - loss: 0.0422
 - accuracy: 0.9922
Epoch 350/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0412
 - accuracy: 0.9929
Epoch 351/500
12612/12612 [==============================] - 1s 114us/sample - loss: 0.0413
 - accuracy: 0.9926
Epoch 352/500
```

```
12612/12612 [==============================] - 1s 119us/sample - loss: 0.0429
 - accuracy: 0.9928
Epoch 353/500
12612/12612 [==============================] - 1s 117us/sample - loss: 0.0408
 - accuracy: 0.9927
Epoch 354/500
12612/12612 [==============================] - 2s 172us/sample - loss: 0.0410
 - accuracy: 0.9928
Epoch 355/500
12612/12612 [==============================] - 2s 122us/sample - loss: 0.0412
 - accuracy: 0.9928
Epoch 356/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0409
 - accuracy: 0.9926
Epoch 357/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0409
 - accuracy: 0.9929
Epoch 358/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0414
 - accuracy: 0.9926
Epoch 359/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0412
 - accuracy: 0.9929
Epoch 360/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0410
```

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- accuracy: 0.9928
Epoch 361/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0420
- accuracy: 0.9926
Epoch 362/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0408
- accuracy: 0.9930
Epoch 363/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0425
- accuracy: 0.9927
Epoch 364/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0406
- accuracy: 0.9931
Epoch 365/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0402
- accuracy: 0.9926
Epoch 366/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0410
- accuracy: 0.9926
Epoch 367/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0407
- accuracy: 0.9934
Epoch 368/500
12612/12612 [==============================] - 1s 117us/sample - loss: 0.0402
- accuracy: 0.9933
```

Epoch 369/500
12612/12612 [==============================] - 1s 104us/sample - loss: 0.0408
 - accuracy: 0.9926
Epoch 370/500
12612/12612 [==============================] - 1s 111us/sample - loss: 0.0403
 - accuracy: 0.9931
Epoch 371/500
12612/12612 [==============================] - 1s 106us/sample - loss: 0.0403
 - accuracy: 0.9930
Epoch 372/500
12612/12612 [==============================] - 2s 123us/sample - loss: 0.0404
 - accuracy: 0.9931
Epoch 373/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0399
 - accuracy: 0.9928
Epoch 374/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0409
 - accuracy: 0.9930
Epoch 375/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0398
 - accuracy: 0.9929
Epoch 376/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0406
 - accuracy: 0.9929
Epoch 377/500

```
12612/12612 [==============================] - 1s 106us/sample - loss: 0.0402
  - accuracy: 0.9929
Epoch 378/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0403
  - accuracy: 0.9929
Epoch 379/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0400
  - accuracy: 0.9931
Epoch 380/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0402
  - accuracy: 0.9929
Epoch 381/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0400
  - accuracy: 0.9931
Epoch 382/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0397
  - accuracy: 0.9929
Epoch 383/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0399
  - accuracy: 0.9928
Epoch 384/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0398
  - accuracy: 0.9930
Epoch 385/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0398
```

```
- accuracy: 0.9925
Epoch 386/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0398
- accuracy: 0.9929
Epoch 387/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0399
- accuracy: 0.9930
Epoch 388/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0401
- accuracy: 0.9932
Epoch 389/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0396
- accuracy: 0.9932
Epoch 390/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0393
- accuracy: 0.9927
Epoch 391/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0398
- accuracy: 0.9931
Epoch 392/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0402
- accuracy: 0.9929
Epoch 393/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0405
- accuracy: 0.9933
```

Epoch 394/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0391
    - accuracy: 0.9934
Epoch 395/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0397
    - accuracy: 0.9929
Epoch 396/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0394
    - accuracy: 0.9932
Epoch 397/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0394
    - accuracy: 0.9936
Epoch 398/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0394
    - accuracy: 0.9930
Epoch 399/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0395
    - accuracy: 0.9929
Epoch 400/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0395
    - accuracy: 0.9933
Epoch 401/500
12612/12612 [==============================] - 1s 111us/sample - loss: 0.0396
    - accuracy: 0.9926
Epoch 402/500

```
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0397
  - accuracy: 0.9930
Epoch 403/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0387
  - accuracy: 0.9936
Epoch 404/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0388
  - accuracy: 0.9931
Epoch 405/500
12612/12612 [==============================] - 1s 106us/sample - loss: 0.0391
  - accuracy: 0.9934
Epoch 406/500
12612/12612 [==============================] - 1s 104us/sample - loss: 0.0395
  - accuracy: 0.9932
Epoch 407/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0388
  - accuracy: 0.9932
Epoch 408/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0386
  - accuracy: 0.9932
Epoch 409/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0387
  - accuracy: 0.9932
Epoch 410/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0385
```

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- accuracy: 0.9933
Epoch 411/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0383
- accuracy: 0.9931
Epoch 412/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0389
- accuracy: 0.9933
Epoch 413/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0391
- accuracy: 0.9932
Epoch 414/500
12612/12612 [==============================] - 1s 103us/sample - loss: 0.0388
- accuracy: 0.9928
Epoch 415/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0386
- accuracy: 0.9931
Epoch 416/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0380
- accuracy: 0.9928
Epoch 417/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0383
- accuracy: 0.9932
Epoch 418/500
12612/12612 [==============================] - 1s 103us/sample - loss: 0.0382
- accuracy: 0.9935
```

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Epoch 419/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0380
        - accuracy: 0.9932
Epoch 420/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0385
        - accuracy: 0.9929
Epoch 421/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0382
        - accuracy: 0.9937
Epoch 422/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0379
        - accuracy: 0.9934
Epoch 423/500
12612/12612 [==============================] - 1s 106us/sample - loss: 0.0379
        - accuracy: 0.9934
Epoch 424/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0377
        - accuracy: 0.9933
Epoch 425/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0378
        - accuracy: 0.9934
Epoch 426/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0379
        - accuracy: 0.9930
Epoch 427/500
```

12612/12612 [==============================] - 1s 105us/sample - loss: 0.0377 - accuracy: 0.9937
Epoch 428/500
12612/12612 [==============================] - 1s 109us/sample - loss: 0.0387 - accuracy: 0.9931
Epoch 429/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0379 - accuracy: 0.9938
Epoch 430/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0375 - accuracy: 0.9934
Epoch 431/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0384 - accuracy: 0.9933
Epoch 432/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0393 - accuracy: 0.9934
Epoch 433/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0378 - accuracy: 0.9934
Epoch 434/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0377 - accuracy: 0.9933
Epoch 435/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0379

```
- accuracy: 0.9934
Epoch 436/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0382
- accuracy: 0.9935
Epoch 437/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0374
- accuracy: 0.9932
Epoch 438/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0371
- accuracy: 0.9937
Epoch 439/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0372
- accuracy: 0.9933
Epoch 440/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0368
- accuracy: 0.9935
Epoch 441/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0381
- accuracy: 0.9931
Epoch 442/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0371
- accuracy: 0.9937
Epoch 443/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0369
- accuracy: 0.9937
```

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Epoch 444/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0377
- accuracy: 0.9933
Epoch 445/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0369
- accuracy: 0.9935
Epoch 446/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0372
- accuracy: 0.9934
Epoch 447/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0375
- accuracy: 0.9931
Epoch 448/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0373
- accuracy: 0.9934
Epoch 449/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0375
- accuracy: 0.9932
Epoch 450/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0377
- accuracy: 0.9935
Epoch 451/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0373
- accuracy: 0.9935
Epoch 452/500
```

```
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0382
- accuracy: 0.9935
Epoch 453/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0364
- accuracy: 0.9938
Epoch 454/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0373
- accuracy: 0.9936
Epoch 455/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0371
- accuracy: 0.9931
Epoch 456/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0370
- accuracy: 0.9938
Epoch 457/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0367
- accuracy: 0.9936
Epoch 458/500
12612/12612 [==============================] - 1s 94us/sample - loss: 0.0367
- accuracy: 0.9937
Epoch 459/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0366
- accuracy: 0.9933
Epoch 460/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0380
```

- accuracy: 0.9937
Epoch 461/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0370
- accuracy: 0.9935
Epoch 462/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0372
- accuracy: 0.9935
Epoch 463/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0362
- accuracy: 0.9933
Epoch 464/500
12612/12612 [==============================] - 1s 87us/sample - loss: 0.0369
- accuracy: 0.9937
Epoch 465/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0373
- accuracy: 0.9935
Epoch 466/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0365
- accuracy: 0.9933
Epoch 467/500
12613/12612 [==============================] - 1s 96us/sample - loss: 0.0363
- accuracy: 0.9937
Epoch 468/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0362
- accuracy: 0.9933

```
Epoch 469/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0365
        - accuracy: 0.9937
Epoch 470/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0377
        - accuracy: 0.9937
Epoch 471/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0364
        - accuracy: 0.9933
Epoch 472/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0364
        - accuracy: 0.9938
Epoch 473/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0359
        - accuracy: 0.9937
Epoch 474/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0363
        - accuracy: 0.9938
Epoch 475/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0370
        - accuracy: 0.9933
Epoch 476/500
12612/12612 [==============================] - 1s 100us/sample - loss: 0.0359
        - accuracy: 0.9937
Epoch 477/500
```

```
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0360
 - accuracy: 0.9937
Epoch 478/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0365
 - accuracy: 0.9934
Epoch 479/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0361
 - accuracy: 0.9938
Epoch 480/500
12612/12612 [==============================] - 1s 105us/sample - loss: 0.0362
 - accuracy: 0.9937
Epoch 481/500
12612/12612 [==============================] - 1s 99us/sample - loss: 0.0361
 - accuracy: 0.9937
Epoch 482/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0360
 - accuracy: 0.9938
Epoch 483/500
12612/12612 [==============================] - 1s 91us/sample - loss: 0.0361
 - accuracy: 0.9932
Epoch 484/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0360
 - accuracy: 0.9937
Epoch 485/500
12612/12612 [==============================] - 1s 106us/sample - loss: 0.0356
```

```
- accuracy: 0.9937
Epoch 486/500
12612/12612 [==============================] - 1s 101us/sample - loss: 0.0358
- accuracy: 0.9937
Epoch 487/500
12612/12612 [==============================] - 1s 90us/sample - loss: 0.0357
- accuracy: 0.9935
Epoch 488/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0358
- accuracy: 0.9938
Epoch 489/500
12612/12612 [==============================] - 1s 92us/sample - loss: 0.0366
- accuracy: 0.9939
Epoch 490/500
12612/12612 [==============================] - 1s 102us/sample - loss: 0.0358
- accuracy: 0.9937
Epoch 491/500
12612/12612 [==============================] - 1s 95us/sample - loss: 0.0353
- accuracy: 0.9937
Epoch 492/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0353
- accuracy: 0.9937
Epoch 493/500
12612/12612 [==============================] - 1s 88us/sample - loss: 0.0359
- accuracy: 0.9936
```

```
Epoch 494/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0354
    - accuracy: 0.9937
Epoch 495/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0356
    - accuracy: 0.9939
Epoch 496/500
12612/12612 [==============================] - 1s 93us/sample - loss: 0.0355
    - accuracy: 0.9941
Epoch 497/500
12612/12612 [==============================] - 1s 96us/sample - loss: 0.0352
    - accuracy: 0.9935
Epoch 498/500
12612/12612 [==============================] - 1s 89us/sample - loss: 0.0355
    - accuracy: 0.9938
Epoch 499/500
12612/12612 [==============================] - 1s 98us/sample - loss: 0.0355
    - accuracy: 0.9937
Epoch 500/500
12612/12612 [==============================] - 1s 97us/sample - loss: 0.0353
    - accuracy: 0.9941
2893/2893 [==============================] - 0s 62us/sample

class_weight_Fold_5: {0: 0.11008117308195861, 1: 9.8275324675324}
```

pos_weight: 0.9
thresholdNum: 0.5

Average of train loss Fold_5: 0.0698
Average of yPredProbability Fold_5: 0.0165

classification_report_Fold_5:

	precision	recall	f1-score	support
Normal 0	1.00	0.99	1.00	2883
Anomaly 1	0.06	0.10	0.07	10
accuracy			0.99	2893
macro avg	0.53	0.55	0.53	2893
weighted avg	0.99	0.99	0.99	2893

confusion_matrix_Fold_5:
True Negatives: 2866
False Positives: 17
False Negatives: 9
True Positives: 1

End running time Fold_5: 210504_232326 ,-----------------------.

$$$
$$:

Average's Results of All Folds is such as below:

Approach class_weight did not use

thresholdNum: 0.5

Average's train loss of All Folds : 0.0684
Average of yPredProbability fold_All: 0.2071

classification_report_AllFolds:

	precision	recall	f1-score	support
Normal 0	0.99	0.80	0.88	14337
Anomaly 1	0.01	0.17	0.01	86
accuracy			0.79	14423
macro avg	0.50	0.49	0.45	14423

weighted avg   0.99   0.79   0.88   14423

confusion_matrix_AllFolds:
True Negatives: 11422
False Positives: 2915
False Negatives: 71
True Positives: 15

Average threshold_rt AllFolds: 0.46
Average precision_rt AllFolds: 0.01
Average recall_rt AllFolds: 0.2

Main End running time: 210504_232332, *******************************.

Process finished with exit code 0