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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: 210608_221922, *****
```

Name of corresponding python code file: finalTest_CV

doScaleAfterSplit= True approach.

shiftNumber: 2, windowLength: 2
makeNoiseByJitter: False

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

baseFileName of output Folders and Plots name: finalTest_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: 210608_221924 , -----:

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: 210608_221924
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2021-06-08 22:19:24.655375: I tensorflow/core/platform/cpu_feature_guard.cc:142] Your CPU supports instructions that this TensorFlow binary was not compiled to use: AVX AVX2
2021-06-08 22:19:24.659207: 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: 0.00047, 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: 0.000794, 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 generated Augmented data Fold_1:	

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

End running time Data Augmentation_Fold_1: 210608_222014
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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: 210608_222014

Cross Validation Model.summary():

Model: "sequential"

Layer (type)	Output Shape	Param #
lstm (LSTM)	(None, 236)	335120
dense (Dense)	(None, 188)	44556
dense_1 (Dense)	(None, 36)	6804
dense_2 (Dense)	(None, 1)	37
Total params: 386,517		
Trainable params: 386,517		
Non-trainable params: 0		
None		

Cross Validation Model config:

{'name': 'sequential', 'layers': [{'class_name': 'LSTM', 'config': {'name': 'lstm', 'units': 236, 'activation': 'tanh', 'return_sequences': True}}, {'class_name': 'Dense', 'config': {'name': 'dense', 'units': 188, 'activation': 'relu'}}, {'class_name': 'Dense', 'config': {'name': 'dense_1', 'units': 36, 'activation': 'relu'}}, {'class_name': 'Dense', 'config': {'name': 'dense_2', 'units': 1, 'activation': 'sigmoid'}}]}

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lstm', 'trainable': True, 'batch_input_shape': (None, 1, 118), 'dtype': '
float32', 'return_sequences': False, 'return_state': False, 'go_backwards':
False, 'stateful': False, 'unroll': False, 'time_major': False, 'units': 236
, 'activation': 'tanh', 'recurrent_activation': 'sigmoid', 'use_bias': True, '
kernel_initializer': {'class_name': 'GlorotUniform', 'config': {'seed': None
}}, 'recurrent_initializer': {'class_name': 'Orthogonal', 'config': {'gain': 1
.0, 'seed': None}}, 'bias_initializer': {'class_name': 'Zeros', 'config
': {'}}, 'unit_forget_bias': True, 'kernel_regularizer': None, '
recurrent_regularizer': None, 'bias_regularizer': None, 'activity_regularizer
': None, 'kernel_constraint': None, 'recurrent_constraint': None, '
bias_constraint': None, 'dropout': 0.0, 'recurrent_dropout': 0.0, '
implementation': 2}}, {'class_name': 'Dense', 'config': {'name': 'dense', '
trainable': True, 'dtype': 'float32', 'units': 188, 'activation': 'tanh', '
use_bias': True, 'kernel_initializer': {'class_name': 'GlorotUniform', 'config
': {'seed': None}}, 'bias_initializer': {'class_name': 'Zeros', 'config
': {'}}, 'kernel_regularizer': {'class_name': 'L1L2', 'config': {'l1': 0.0, 'l2
': 0.01499999664723873}}, 'bias_regularizer': None, 'activity_regularizer':
None, 'kernel_constraint': None, 'bias_constraint': None}, {'class_name': '
Dense', 'config': {'name': 'dense_1', 'trainable': True, 'dtype': 'float32', '
units': 36, 'activation': 'tanh', 'use_bias': True, 'kernel_initializer': {'
class_name': 'GlorotUniform', 'config': {'seed': None}}, 'bias_initializer
': {'class_name': 'Zeros', 'config': {'}}, 'kernel_regularizer': {'class_name
': 'L1L2', 'config': {'l1': 0.0, 'l2': 0.01499999664723873}}, '
bias_regularizer': None, 'activity_regularizer': None, 'kernel_constraint':
None, 'bias_constraint': None}, {'class_name': 'Dense', 'config': {'name': '

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

Train on 12380 samples

Epoch 1/500

12380/12380 [=====] - 10s 780us/sample - loss: 3.0442
- accuracy: 0.9216

Epoch 2/500

12380/12380 [=====] - 4s 302us/sample - loss: 1.3487
- accuracy: 0.9285

Epoch 3/500

12380/12380 [=====] - 4s 316us/sample - loss: 0.6282
- accuracy: 0.9359

Epoch 4/500

12380/12380 [=====] - 3s 269us/sample - loss: 0.3366
- accuracy: 0.9492

Epoch 5/500

12380/12380 [=====] - 3s 282us/sample - loss: 0.2260
- accuracy: 0.9536

Epoch 6/500


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12380/12380 [=====] - 3s 253us/sample - loss: 0.1842
- accuracy: 0.9574
Epoch 7/500
12380/12380 [=====] - 4s 284us/sample - loss: 0.1667
- accuracy: 0.9602
Epoch 8/500
12380/12380 [=====] - 4s 289us/sample - loss: 0.1571
- accuracy: 0.9629
Epoch 9/500
12380/12380 [=====] - 3s 256us/sample - loss: 0.1510
- accuracy: 0.9632
Epoch 10/500
12380/12380 [=====] - 3s 282us/sample - loss: 0.1455
- accuracy: 0.9644
Epoch 11/500
12380/12380 [=====] - 3s 252us/sample - loss: 0.1409
- accuracy: 0.9666
Epoch 12/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.1372
- accuracy: 0.9676
Epoch 13/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.1338
- accuracy: 0.9679
Epoch 14/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.1302
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- accuracy: 0.9695
Epoch 15/500
12380/12380 [=====] - 3s 282us/sample - loss: 0.1270
- accuracy: 0.9704
Epoch 16/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.1239
- accuracy: 0.9702
Epoch 17/500
12380/12380 [=====] - 4s 283us/sample - loss: 0.1216
- accuracy: 0.9721
Epoch 18/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.1189
- accuracy: 0.9727
Epoch 19/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.1160
- accuracy: 0.9733
Epoch 20/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.1145
- accuracy: 0.9738
Epoch 21/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.1116
- accuracy: 0.9746
Epoch 22/500
12380/12380 [=====] - 3s 276us/sample - loss: 0.1102
- accuracy: 0.9737
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Epoch 23/500
12380/12380 [=====] - 3s 254us/sample - loss: 0.1082
- accuracy: 0.9754
Epoch 24/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.1066
- accuracy: 0.9760
Epoch 25/500
12380/12380 [=====] - 3s 252us/sample - loss: 0.1046
- accuracy: 0.9767
Epoch 26/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.1032
- accuracy: 0.9763
Epoch 27/500
12380/12380 [=====] - 3s 270us/sample - loss: 0.1012
- accuracy: 0.9773
Epoch 28/500
12380/12380 [=====] - 3s 256us/sample - loss: 0.0997
- accuracy: 0.9771
Epoch 29/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0986
- accuracy: 0.9781
Epoch 30/500
12380/12380 [=====] - 3s 261us/sample - loss: 0.0971
- accuracy: 0.9783
Epoch 31/500
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12380/12380 [=====] - 4s 284us/sample - loss: 0.0966
- accuracy: 0.9783
Epoch 32/500
12380/12380 [=====] - 3s 260us/sample - loss: 0.0951
- accuracy: 0.9792
Epoch 33/500
12380/12380 [=====] - 3s 282us/sample - loss: 0.0933
- accuracy: 0.9788
Epoch 34/500
12380/12380 [=====] - 4s 331us/sample - loss: 0.0922
- accuracy: 0.9796
Epoch 35/500
12380/12380 [=====] - 4s 301us/sample - loss: 0.0911
- accuracy: 0.9808
Epoch 36/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0902
- accuracy: 0.9798
Epoch 37/500
12380/12380 [=====] - 4s 296us/sample - loss: 0.0894
- accuracy: 0.9803
Epoch 38/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.0879
- accuracy: 0.9814
Epoch 39/500
12380/12380 [=====] - 4s 324us/sample - loss: 0.0873
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- accuracy: 0.9808
Epoch 40/500
12380/12380 [=====] - 4s 323us/sample - loss: 0.0868
- accuracy: 0.9815
Epoch 41/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0857
- accuracy: 0.9809
Epoch 42/500
12380/12380 [=====] - 4s 296us/sample - loss: 0.0845
- accuracy: 0.9819
Epoch 43/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0829
- accuracy: 0.9817
Epoch 44/500
12380/12380 [=====] - 4s 291us/sample - loss: 0.0829
- accuracy: 0.9819
Epoch 45/500
12380/12380 [=====] - 4s 288us/sample - loss: 0.0820
- accuracy: 0.9821
Epoch 46/500
12380/12380 [=====] - 3s 253us/sample - loss: 0.0816
- accuracy: 0.9829
Epoch 47/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0805
- accuracy: 0.9830
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Epoch 48/500
12380/12380 [=====] - 3s 255us/sample - loss: 0.0802
- accuracy: 0.9833
Epoch 49/500
12380/12380 [=====] - 3s 280us/sample - loss: 0.0791
- accuracy: 0.9830
Epoch 50/500
12380/12380 [=====] - 3s 255us/sample - loss: 0.0786
- accuracy: 0.9828
Epoch 51/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.0773
- accuracy: 0.9835
Epoch 52/500
12380/12380 [=====] - 4s 299us/sample - loss: 0.0773
- accuracy: 0.9836
Epoch 53/500
12380/12380 [=====] - 3s 282us/sample - loss: 0.0764
- accuracy: 0.9837
Epoch 54/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.0754
- accuracy: 0.9838
Epoch 55/500
12380/12380 [=====] - 3s 256us/sample - loss: 0.0751
- accuracy: 0.9840
Epoch 56/500
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12380/12380 [=====] - 3s 274us/sample - loss: 0.0744
- accuracy: 0.9848
Epoch 57/500
12380/12380 [=====] - 3s 281us/sample - loss: 0.0746
- accuracy: 0.9843
Epoch 58/500
12380/12380 [=====] - 4s 285us/sample - loss: 0.0733
- accuracy: 0.9847
Epoch 59/500
12380/12380 [=====] - 4s 303us/sample - loss: 0.0728
- accuracy: 0.9846
Epoch 60/500
12380/12380 [=====] - 4s 287us/sample - loss: 0.0729
- accuracy: 0.9855
Epoch 61/500
12380/12380 [=====] - 4s 334us/sample - loss: 0.0723
- accuracy: 0.9852
Epoch 62/500
12380/12380 [=====] - 4s 309us/sample - loss: 0.0714
- accuracy: 0.9852
Epoch 63/500
12380/12380 [=====] - 4s 291us/sample - loss: 0.0706
- accuracy: 0.9856
Epoch 64/500
12380/12380 [=====] - 5s 375us/sample - loss: 0.0702
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- accuracy: 0.9852
Epoch 65/500
12380/12380 [=====] - 4s 294us/sample - loss: 0.0699
- accuracy: 0.9857
Epoch 66/500
12380/12380 [=====] - 3s 259us/sample - loss: 0.0693
- accuracy: 0.9857
Epoch 67/500
12380/12380 [=====] - 4s 300us/sample - loss: 0.0687
- accuracy: 0.9859
Epoch 68/500
12380/12380 [=====] - 5s 402us/sample - loss: 0.0682
- accuracy: 0.9863
Epoch 69/500
12380/12380 [=====] - 5s 368us/sample - loss: 0.0677
- accuracy: 0.9865
Epoch 70/500
12380/12380 [=====] - 4s 312us/sample - loss: 0.0670
- accuracy: 0.9864
Epoch 71/500
12380/12380 [=====] - 4s 327us/sample - loss: 0.0672
- accuracy: 0.9857
Epoch 72/500
12380/12380 [=====] - 4s 361us/sample - loss: 0.0662
- accuracy: 0.9870
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Epoch 73/500
12380/12380 [=====] - 4s 310us/sample - loss: 0.0661
- accuracy: 0.9867
Epoch 74/500
12380/12380 [=====] - 4s 362us/sample - loss: 0.0661
- accuracy: 0.9860
Epoch 75/500
12380/12380 [=====] - 4s 357us/sample - loss: 0.0653
- accuracy: 0.9868
Epoch 76/500
12380/12380 [=====] - 4s 326us/sample - loss: 0.0651
- accuracy: 0.9868
Epoch 77/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0646
- accuracy: 0.9868
Epoch 78/500
12380/12380 [=====] - 4s 283us/sample - loss: 0.0642
- accuracy: 0.9872
Epoch 79/500
12380/12380 [=====] - 4s 300us/sample - loss: 0.0637
- accuracy: 0.9872
Epoch 80/500
12380/12380 [=====] - 4s 292us/sample - loss: 0.0636
- accuracy: 0.9868
Epoch 81/500
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12380/12380 [=====] - 4s 300us/sample - loss: 0.0630
- accuracy: 0.9876
Epoch 82/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0627
- accuracy: 0.9873
Epoch 83/500
12380/12380 [=====] - 4s 319us/sample - loss: 0.0624
- accuracy: 0.9873
Epoch 84/500
12380/12380 [=====] - 4s 319us/sample - loss: 0.0620
- accuracy: 0.9872
Epoch 85/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0610
- accuracy: 0.9874
Epoch 86/500
12380/12380 [=====] - 4s 284us/sample - loss: 0.0612
- accuracy: 0.9876
Epoch 87/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0607
- accuracy: 0.9878
Epoch 88/500
12380/12380 [=====] - 3s 260us/sample - loss: 0.0600
- accuracy: 0.9877
Epoch 89/500
12380/12380 [=====] - 3s 280us/sample - loss: 0.0601
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- accuracy: 0.9879
Epoch 90/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.0602
- accuracy: 0.9880
Epoch 91/500
12380/12380 [=====] - 3s 280us/sample - loss: 0.0594
- accuracy: 0.9884
Epoch 92/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0591
- accuracy: 0.9884
Epoch 93/500
12380/12380 [=====] - 4s 309us/sample - loss: 0.0589
- accuracy: 0.9881
Epoch 94/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0588
- accuracy: 0.9878
Epoch 95/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0585
- accuracy: 0.9884
Epoch 96/500
12380/12380 [=====] - 4s 292us/sample - loss: 0.0578
- accuracy: 0.9881
Epoch 97/500
12380/12380 [=====] - 4s 293us/sample - loss: 0.0574
- accuracy: 0.9880
```

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Epoch 98/500
12380/12380 [=====] - 4s 292us/sample - loss: 0.0583
- accuracy: 0.9884
Epoch 99/500
12380/12380 [=====] - 4s 305us/sample - loss: 0.0570
- accuracy: 0.9887
Epoch 100/500
12380/12380 [=====] - 4s 346us/sample - loss: 0.0563
- accuracy: 0.9884
Epoch 101/500
12380/12380 [=====] - 4s 283us/sample - loss: 0.0570
- accuracy: 0.9887
Epoch 102/500
12380/12380 [=====] - 4s 292us/sample - loss: 0.0556
- accuracy: 0.9888
Epoch 103/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0562
- accuracy: 0.9889
Epoch 104/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0562
- accuracy: 0.9885
Epoch 105/500
12380/12380 [=====] - 3s 276us/sample - loss: 0.0555
- accuracy: 0.9890
Epoch 106/500
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12380/12380 [=====] - 3s 261us/sample - loss: 0.0553
- accuracy: 0.9892
Epoch 107/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0552
- accuracy: 0.9888
Epoch 108/500
12380/12380 [=====] - 3s 256us/sample - loss: 0.0548
- accuracy: 0.9888
Epoch 109/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0544
- accuracy: 0.9893
Epoch 110/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0545
- accuracy: 0.9894
Epoch 111/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.0537
- accuracy: 0.9895
Epoch 112/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0541
- accuracy: 0.9891
Epoch 113/500
12380/12380 [=====] - 3s 260us/sample - loss: 0.0531
- accuracy: 0.9887
Epoch 114/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0527
```

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- accuracy: 0.9901
Epoch 115/500
12380/12380 [=====] - 3s 260us/sample - loss: 0.0528
- accuracy: 0.9894
Epoch 116/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0528
- accuracy: 0.9895
Epoch 117/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0523
- accuracy: 0.9898
Epoch 118/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.0523
- accuracy: 0.9897
Epoch 119/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0518
- accuracy: 0.9897
Epoch 120/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0513
- accuracy: 0.9897
Epoch 121/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0512
- accuracy: 0.9899
Epoch 122/500
12380/12380 [=====] - 3s 259us/sample - loss: 0.0513
- accuracy: 0.9905
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Epoch 123/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0508
- accuracy: 0.9905
Epoch 124/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0509
- accuracy: 0.9901
Epoch 125/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0501
- accuracy: 0.9907
Epoch 126/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0502
- accuracy: 0.9903
Epoch 127/500
12380/12380 [=====] - 3s 259us/sample - loss: 0.0500
- accuracy: 0.9901
Epoch 128/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0496
- accuracy: 0.9902
Epoch 129/500
12380/12380 [=====] - 3s 252us/sample - loss: 0.0496
- accuracy: 0.9904
Epoch 130/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0488
- accuracy: 0.9905
Epoch 131/500
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```
12380/12380 [=====] - 3s 269us/sample - loss: 0.0496
- accuracy: 0.9902
Epoch 132/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0494
- accuracy: 0.9903
Epoch 133/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0485
- accuracy: 0.9906
Epoch 134/500
12380/12380 [=====] - 3s 255us/sample - loss: 0.0481
- accuracy: 0.9902
Epoch 135/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0481
- accuracy: 0.9906
Epoch 136/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0484
- accuracy: 0.9907
Epoch 137/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0484
- accuracy: 0.9905
Epoch 138/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.0482
- accuracy: 0.9909
Epoch 139/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0474
```



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- accuracy: 0.9909
Epoch 140/500
12380/12380 [=====] - 3s 276us/sample - loss: 0.0478
- accuracy: 0.9901
Epoch 141/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0471
- accuracy: 0.9907
Epoch 142/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.0470
- accuracy: 0.9912
Epoch 143/500
12380/12380 [=====] - 3s 276us/sample - loss: 0.0469
- accuracy: 0.9915
Epoch 144/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0466
- accuracy: 0.9913
Epoch 145/500
12380/12380 [=====] - 3s 281us/sample - loss: 0.0464
- accuracy: 0.9912
Epoch 146/500
12380/12380 [=====] - 3s 258us/sample - loss: 0.0464
- accuracy: 0.9912
Epoch 147/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0461
- accuracy: 0.9914
```

```
Epoch 148/500
12380/12380 [=====] - 3s 266us/sample - loss: 0.0458
- accuracy: 0.9914
Epoch 149/500
12380/12380 [=====] - 4s 291us/sample - loss: 0.0459
- accuracy: 0.9914
Epoch 150/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0456
- accuracy: 0.9915
Epoch 151/500
12380/12380 [=====] - 3s 256us/sample - loss: 0.0459
- accuracy: 0.9918
Epoch 152/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0457
- accuracy: 0.9912
Epoch 153/500
12380/12380 [=====] - 3s 256us/sample - loss: 0.0452
- accuracy: 0.9914
Epoch 154/500
12380/12380 [=====] - 3s 270us/sample - loss: 0.0444
- accuracy: 0.9920
Epoch 155/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0447
- accuracy: 0.9914
Epoch 156/500
```

```
12380/12380 [=====] - 3s 261us/sample - loss: 0.0443
- accuracy: 0.9920
Epoch 157/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0446
- accuracy: 0.9919
Epoch 158/500
12380/12380 [=====] - 3s 255us/sample - loss: 0.0449
- accuracy: 0.9917
Epoch 159/500
12380/12380 [=====] - 3s 276us/sample - loss: 0.0442
- accuracy: 0.9916
Epoch 160/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0434
- accuracy: 0.9919
Epoch 161/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0440
- accuracy: 0.9914
Epoch 162/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0437
- accuracy: 0.9921
Epoch 163/500
12380/12380 [=====] - 3s 254us/sample - loss: 0.0434
- accuracy: 0.9917
Epoch 164/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0435
```

```
- accuracy: 0.9918
Epoch 165/500
12380/12380 [=====] - 3s 258us/sample - loss: 0.0432
- accuracy: 0.9922
Epoch 166/500
12380/12380 [=====] - 3s 270us/sample - loss: 0.0427
- accuracy: 0.9918
Epoch 167/500
12380/12380 [=====] - 3s 256us/sample - loss: 0.0429
- accuracy: 0.9922
Epoch 168/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.0425
- accuracy: 0.9921
Epoch 169/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0425
- accuracy: 0.9923
Epoch 170/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0420
- accuracy: 0.9922
Epoch 171/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0422
- accuracy: 0.9918
Epoch 172/500
12380/12380 [=====] - 3s 270us/sample - loss: 0.0422
- accuracy: 0.9919
```

```
Epoch 173/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0417
- accuracy: 0.9924
Epoch 174/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0422
- accuracy: 0.9918
Epoch 175/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0412
- accuracy: 0.9922
Epoch 176/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0412
- accuracy: 0.9922
Epoch 177/500
12380/12380 [=====] - 3s 260us/sample - loss: 0.0413
- accuracy: 0.9922
Epoch 178/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0412
- accuracy: 0.9920
Epoch 179/500
12380/12380 [=====] - 3s 260us/sample - loss: 0.0410
- accuracy: 0.9926
Epoch 180/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0412
- accuracy: 0.9926
Epoch 181/500
```

```
12380/12380 [=====] - 3s 260us/sample - loss: 0.0408
- accuracy: 0.9926
Epoch 182/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0408
- accuracy: 0.9922
Epoch 183/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0404
- accuracy: 0.9929
Epoch 184/500
12380/12380 [=====] - 3s 258us/sample - loss: 0.0405
- accuracy: 0.9924
Epoch 185/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0404
- accuracy: 0.9922
Epoch 186/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0396
- accuracy: 0.9926
Epoch 187/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0400
- accuracy: 0.9929
Epoch 188/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0401
- accuracy: 0.9926
Epoch 189/500
12380/12380 [=====] - 3s 266us/sample - loss: 0.0394
```

```
- accuracy: 0.9927
Epoch 190/500
12380/12380 [=====] - 3s 264us/sample - loss: 0.0394
- accuracy: 0.9928
Epoch 191/500
12380/12380 [=====] - 3s 254us/sample - loss: 0.0397
- accuracy: 0.9927
Epoch 192/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0395
- accuracy: 0.9927
Epoch 193/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0391
- accuracy: 0.9926
Epoch 194/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0391
- accuracy: 0.9929
Epoch 195/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.0389
- accuracy: 0.9926
Epoch 196/500
12380/12380 [=====] - 3s 266us/sample - loss: 0.0391
- accuracy: 0.9924
Epoch 197/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0391
- accuracy: 0.9928
```

```
Epoch 198/500
12380/12380 [=====] - 3s 258us/sample - loss: 0.0389
- accuracy: 0.9925
Epoch 199/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0385
- accuracy: 0.9929
Epoch 200/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0381
- accuracy: 0.9933
Epoch 201/500
12380/12380 [=====] - 4s 301us/sample - loss: 0.0383
- accuracy: 0.9931
Epoch 202/500
12380/12380 [=====] - 4s 323us/sample - loss: 0.0380
- accuracy: 0.9931
Epoch 203/500
12380/12380 [=====] - 4s 322us/sample - loss: 0.0382
- accuracy: 0.9932
Epoch 204/500
12380/12380 [=====] - 4s 308us/sample - loss: 0.0381
- accuracy: 0.9931
Epoch 205/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0377
- accuracy: 0.9931
Epoch 206/500
```



```
12380/12380 [=====] - 3s 273us/sample - loss: 0.0377
- accuracy: 0.9929
Epoch 207/500
12380/12380 [=====] - 4s 314us/sample - loss: 0.0371
- accuracy: 0.9935
Epoch 208/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0374
- accuracy: 0.9932
Epoch 209/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0371
- accuracy: 0.9934
Epoch 210/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0373
- accuracy: 0.9932
Epoch 211/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.0372
- accuracy: 0.9933
Epoch 212/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0373
- accuracy: 0.9931
Epoch 213/500
12380/12380 [=====] - 3s 282us/sample - loss: 0.0362
- accuracy: 0.9931
Epoch 214/500
12380/12380 [=====] - 4s 301us/sample - loss: 0.0363
```

```
- accuracy: 0.9935
Epoch 215/500
12380/12380 [=====] - 5s 417us/sample - loss: 0.0365
- accuracy: 0.9934
Epoch 216/500
12380/12380 [=====] - 5s 367us/sample - loss: 0.0363
- accuracy: 0.9934
Epoch 217/500
12380/12380 [=====] - 5s 368us/sample - loss: 0.0365
- accuracy: 0.9935
Epoch 218/500
12380/12380 [=====] - 4s 356us/sample - loss: 0.0367
- accuracy: 0.9932
Epoch 219/500
12380/12380 [=====] - 4s 317us/sample - loss: 0.0358
- accuracy: 0.9935
Epoch 220/500
12380/12380 [=====] - 4s 356us/sample - loss: 0.0361
- accuracy: 0.9935
Epoch 221/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0363
- accuracy: 0.9931
Epoch 222/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.0357
- accuracy: 0.9935
```

```
Epoch 223/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0358
- accuracy: 0.9936
Epoch 224/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0357
- accuracy: 0.9935
Epoch 225/500
12380/12380 [=====] - 4s 301us/sample - loss: 0.0354
- accuracy: 0.9935
Epoch 226/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0353
- accuracy: 0.9935
Epoch 227/500
12380/12380 [=====] - 4s 304us/sample - loss: 0.0354
- accuracy: 0.9935
Epoch 228/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0354
- accuracy: 0.9931
Epoch 229/500
12380/12380 [=====] - 4s 324us/sample - loss: 0.0350
- accuracy: 0.9932
Epoch 230/500
12380/12380 [=====] - 4s 294us/sample - loss: 0.0349
- accuracy: 0.9935
Epoch 231/500
```

```
12380/12380 [=====] - 4s 302us/sample - loss: 0.0346
- accuracy: 0.9936
Epoch 232/500
12380/12380 [=====] - 4s 287us/sample - loss: 0.0347
- accuracy: 0.9932
Epoch 233/500
12380/12380 [=====] - 4s 313us/sample - loss: 0.0348
- accuracy: 0.9941
Epoch 234/500
12380/12380 [=====] - 3s 264us/sample - loss: 0.0346
- accuracy: 0.9938
Epoch 235/500
12380/12380 [=====] - 4s 296us/sample - loss: 0.0344
- accuracy: 0.9939
Epoch 236/500
12380/12380 [=====] - 4s 293us/sample - loss: 0.0343
- accuracy: 0.9936
Epoch 237/500
12380/12380 [=====] - 4s 295us/sample - loss: 0.0340
- accuracy: 0.9939
Epoch 238/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0342
- accuracy: 0.9938
Epoch 239/500
12380/12380 [=====] - 4s 353us/sample - loss: 0.0346
```

```
- accuracy: 0.9935
Epoch 240/500
12380/12380 [=====] - 4s 290us/sample - loss: 0.0342
- accuracy: 0.9941
Epoch 241/500
12380/12380 [=====] - 4s 313us/sample - loss: 0.0340
- accuracy: 0.9936
Epoch 242/500
12380/12380 [=====] - 4s 294us/sample - loss: 0.0342
- accuracy: 0.9939
Epoch 243/500
12380/12380 [=====] - 4s 300us/sample - loss: 0.0338
- accuracy: 0.9939
Epoch 244/500
12380/12380 [=====] - 4s 348us/sample - loss: 0.0340
- accuracy: 0.9936
Epoch 245/500
12380/12380 [=====] - 4s 295us/sample - loss: 0.0337
- accuracy: 0.9942
Epoch 246/500
12380/12380 [=====] - 4s 305us/sample - loss: 0.0332
- accuracy: 0.9939
Epoch 247/500
12380/12380 [=====] - 4s 295us/sample - loss: 0.0334
- accuracy: 0.9942
```

```
Epoch 248/500
12380/12380 [=====] - 4s 284us/sample - loss: 0.0335
- accuracy: 0.9940
Epoch 249/500
12380/12380 [=====] - 4s 310us/sample - loss: 0.0332
- accuracy: 0.9941
Epoch 250/500
12380/12380 [=====] - 4s 292us/sample - loss: 0.0333
- accuracy: 0.9940
Epoch 251/500
12380/12380 [=====] - 3s 282us/sample - loss: 0.0332
- accuracy: 0.9940
Epoch 252/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0331
- accuracy: 0.9941
Epoch 253/500
12380/12380 [=====] - 4s 285us/sample - loss: 0.0332
- accuracy: 0.9941
Epoch 254/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0327
- accuracy: 0.9943
Epoch 255/500
12380/12380 [=====] - 4s 287us/sample - loss: 0.0331
- accuracy: 0.9942
Epoch 256/500
```

```
12380/12380 [=====] - 3s 280us/sample - loss: 0.0325
- accuracy: 0.9945
Epoch 257/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0328
- accuracy: 0.9942
Epoch 258/500
12380/12380 [=====] - 4s 285us/sample - loss: 0.0322
- accuracy: 0.9942
Epoch 259/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0323
- accuracy: 0.9943
Epoch 260/500
12380/12380 [=====] - 4s 301us/sample - loss: 0.0324
- accuracy: 0.9936
Epoch 261/500
12380/12380 [=====] - 4s 305us/sample - loss: 0.0322
- accuracy: 0.9947
Epoch 262/500
12380/12380 [=====] - 4s 323us/sample - loss: 0.0321
- accuracy: 0.9943
Epoch 263/500
12380/12380 [=====] - 4s 355us/sample - loss: 0.0324
- accuracy: 0.9943
Epoch 264/500
12380/12380 [=====] - 4s 288us/sample - loss: 0.0318
```

```
- accuracy: 0.9941
Epoch 265/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0320
- accuracy: 0.9944
Epoch 266/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0322
- accuracy: 0.9939
Epoch 267/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0320
- accuracy: 0.9943
Epoch 268/500
12380/12380 [=====] - 4s 290us/sample - loss: 0.0316
- accuracy: 0.9946
Epoch 269/500
12380/12380 [=====] - 4s 295us/sample - loss: 0.0316
- accuracy: 0.9947
Epoch 270/500
12380/12380 [=====] - 4s 295us/sample - loss: 0.0317
- accuracy: 0.9944
Epoch 271/500
12380/12380 [=====] - 3s 280us/sample - loss: 0.0321
- accuracy: 0.9944
Epoch 272/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0315
- accuracy: 0.9949
```



```
Epoch 273/500
12380/12380 [=====] - 3s 266us/sample - loss: 0.0314
- accuracy: 0.9948
Epoch 274/500
12380/12380 [=====] - 3s 264us/sample - loss: 0.0305
- accuracy: 0.9943
Epoch 275/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.0311
- accuracy: 0.9945
Epoch 276/500
12380/12380 [=====] - 3s 281us/sample - loss: 0.0311
- accuracy: 0.9942
Epoch 277/500
12380/12380 [=====] - 4s 294us/sample - loss: 0.0306
- accuracy: 0.9948
Epoch 278/500
12380/12380 [=====] - 3s 280us/sample - loss: 0.0308
- accuracy: 0.9944
Epoch 279/500
12380/12380 [=====] - 4s 321us/sample - loss: 0.0305
- accuracy: 0.9947
Epoch 280/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0306
- accuracy: 0.9945
Epoch 281/500
```

```
12380/12380 [=====] - 3s 268us/sample - loss: 0.0308
- accuracy: 0.9944
Epoch 282/500
12380/12380 [=====] - 3s 276us/sample - loss: 0.0306
- accuracy: 0.9945
Epoch 283/500
12380/12380 [=====] - 4s 291us/sample - loss: 0.0305
- accuracy: 0.9945
Epoch 284/500
12380/12380 [=====] - 4s 289us/sample - loss: 0.0305
- accuracy: 0.9952
Epoch 285/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0306
- accuracy: 0.9945
Epoch 286/500
12380/12380 [=====] - 3s 280us/sample - loss: 0.0299
- accuracy: 0.9946
Epoch 287/500
12380/12380 [=====] - 4s 300us/sample - loss: 0.0308
- accuracy: 0.9947
Epoch 288/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0302
- accuracy: 0.9949
Epoch 289/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0299
```

```
- accuracy: 0.9948
Epoch 290/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.0293
- accuracy: 0.9951
Epoch 291/500
12380/12380 [=====] - 3s 270us/sample - loss: 0.0300
- accuracy: 0.9949
Epoch 292/500
12380/12380 [=====] - 3s 259us/sample - loss: 0.0297
- accuracy: 0.9945
Epoch 293/500
12380/12380 [=====] - 3s 259us/sample - loss: 0.0306
- accuracy: 0.9943
Epoch 294/500
12380/12380 [=====] - 3s 259us/sample - loss: 0.0297
- accuracy: 0.9947
Epoch 295/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0294
- accuracy: 0.9945
Epoch 296/500
12380/12380 [=====] - 3s 266us/sample - loss: 0.0296
- accuracy: 0.9951
Epoch 297/500
12380/12380 [=====] - 3s 258us/sample - loss: 0.0295
- accuracy: 0.9947
```

```
Epoch 298/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0294
- accuracy: 0.9949
Epoch 299/500
12380/12380 [=====] - 3s 259us/sample - loss: 0.0292
- accuracy: 0.9952
Epoch 300/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0292
- accuracy: 0.9949
Epoch 301/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0295
- accuracy: 0.9947
Epoch 302/500
12380/12380 [=====] - 3s 270us/sample - loss: 0.0293
- accuracy: 0.9949
Epoch 303/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0290
- accuracy: 0.9950
Epoch 304/500
12380/12380 [=====] - 3s 266us/sample - loss: 0.0290
- accuracy: 0.9948
Epoch 305/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0290
- accuracy: 0.9950
Epoch 306/500
```

```
12380/12380 [=====] - 3s 275us/sample - loss: 0.0289
- accuracy: 0.9950
Epoch 307/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0289
- accuracy: 0.9949
Epoch 308/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0285
- accuracy: 0.9951
Epoch 309/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0286
- accuracy: 0.9952
Epoch 310/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0286
- accuracy: 0.9949
Epoch 311/500
12380/12380 [=====] - 3s 258us/sample - loss: 0.0286
- accuracy: 0.9951
Epoch 312/500
12380/12380 [=====] - 3s 261us/sample - loss: 0.0283
- accuracy: 0.9951
Epoch 313/500
12380/12380 [=====] - 3s 259us/sample - loss: 0.0282
- accuracy: 0.9950
Epoch 314/500
12380/12380 [=====] - 3s 261us/sample - loss: 0.0282
```

```
- accuracy: 0.9951
Epoch 315/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0286
- accuracy: 0.9951
Epoch 316/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0283
- accuracy: 0.9951
Epoch 317/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0278
- accuracy: 0.9952
Epoch 318/500
12380/12380 [=====] - 3s 261us/sample - loss: 0.0278
- accuracy: 0.9950
Epoch 319/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0282
- accuracy: 0.9950
Epoch 320/500
12380/12380 [=====] - 4s 284us/sample - loss: 0.0281
- accuracy: 0.9949
Epoch 321/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0281
- accuracy: 0.9950
Epoch 322/500
12380/12380 [=====] - 4s 283us/sample - loss: 0.0279
- accuracy: 0.9952
```

```
Epoch 323/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0277
- accuracy: 0.9952
Epoch 324/500
12380/12380 [=====] - 4s 303us/sample - loss: 0.0279
- accuracy: 0.9952
Epoch 325/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0279
- accuracy: 0.9947
Epoch 326/500
12380/12380 [=====] - 4s 290us/sample - loss: 0.0277
- accuracy: 0.9952
Epoch 327/500
12380/12380 [=====] - 4s 308us/sample - loss: 0.0280
- accuracy: 0.9949
Epoch 328/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0278
- accuracy: 0.9947
Epoch 329/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0275
- accuracy: 0.9951
Epoch 330/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0270
- accuracy: 0.9952
Epoch 331/500
```

```
12380/12380 [=====] - 3s 271us/sample - loss: 0.0270
- accuracy: 0.9950
Epoch 332/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0275
- accuracy: 0.9952
Epoch 333/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0273
- accuracy: 0.9951
Epoch 334/500
12380/12380 [=====] - 4s 305us/sample - loss: 0.0271
- accuracy: 0.9951
Epoch 335/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0270
- accuracy: 0.9951
Epoch 336/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0274
- accuracy: 0.9953
Epoch 337/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0266
- accuracy: 0.9954
Epoch 338/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0268
- accuracy: 0.9953
Epoch 339/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0268
```



```
- accuracy: 0.9954
Epoch 340/500
12380/12380 [=====] - 3s 264us/sample - loss: 0.0263
- accuracy: 0.9952
Epoch 341/500
12380/12380 [=====] - 3s 276us/sample - loss: 0.0268
- accuracy: 0.9953
Epoch 342/500
12380/12380 [=====] - 3s 276us/sample - loss: 0.0272
- accuracy: 0.9956
Epoch 343/500
12380/12380 [=====] - 3s 270us/sample - loss: 0.0261
- accuracy: 0.9955
Epoch 344/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0263
- accuracy: 0.9956
Epoch 345/500
12380/12380 [=====] - 4s 298us/sample - loss: 0.0263
- accuracy: 0.9950
Epoch 346/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0259
- accuracy: 0.9953
Epoch 347/500
12380/12380 [=====] - 4s 295us/sample - loss: 0.0263
- accuracy: 0.9955
```

```
Epoch 348/500
12380/12380 [=====] - 4s 297us/sample - loss: 0.0262
- accuracy: 0.9954
Epoch 349/500
12380/12380 [=====] - 3s 275us/sample - loss: 0.0265
- accuracy: 0.9952
Epoch 350/500
12380/12380 [=====] - 3s 265us/sample - loss: 0.0258
- accuracy: 0.9953
Epoch 351/500
12380/12380 [=====] - 4s 285us/sample - loss: 0.0257
- accuracy: 0.9954
Epoch 352/500
12380/12380 [=====] - 3s 281us/sample - loss: 0.0265
- accuracy: 0.9953
Epoch 353/500
12380/12380 [=====] - 4s 299us/sample - loss: 0.0262
- accuracy: 0.9956
Epoch 354/500
12380/12380 [=====] - 4s 322us/sample - loss: 0.0257
- accuracy: 0.9955
Epoch 355/500
12380/12380 [=====] - 4s 287us/sample - loss: 0.0260
- accuracy: 0.9955
Epoch 356/500
```

```
12380/12380 [=====] - 3s 273us/sample - loss: 0.0257
- accuracy: 0.9955
Epoch 357/500
12380/12380 [=====] - 4s 284us/sample - loss: 0.0259
- accuracy: 0.9959
Epoch 358/500
12380/12380 [=====] - 4s 288us/sample - loss: 0.0259
- accuracy: 0.9953
Epoch 359/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0256
- accuracy: 0.9950
Epoch 360/500
12380/12380 [=====] - 4s 284us/sample - loss: 0.0258
- accuracy: 0.9953
Epoch 361/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0254
- accuracy: 0.9954
Epoch 362/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0258
- accuracy: 0.9955
Epoch 363/500
12380/12380 [=====] - 3s 282us/sample - loss: 0.0254
- accuracy: 0.9952
Epoch 364/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0253
```

```
- accuracy: 0.9956
Epoch 365/500
12380/12380 [=====] - 4s 289us/sample - loss: 0.0252
- accuracy: 0.9955
Epoch 366/500
12380/12380 [=====] - 4s 283us/sample - loss: 0.0248
- accuracy: 0.9957
Epoch 367/500
12380/12380 [=====] - 4s 287us/sample - loss: 0.0256
- accuracy: 0.9952
Epoch 368/500
12380/12380 [=====] - 4s 328us/sample - loss: 0.0251
- accuracy: 0.9959
Epoch 369/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0253
- accuracy: 0.9956
Epoch 370/500
12380/12380 [=====] - 4s 291us/sample - loss: 0.0250
- accuracy: 0.9954
Epoch 371/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0247
- accuracy: 0.9954
Epoch 372/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0251
- accuracy: 0.9956
```

```
Epoch 373/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0244
- accuracy: 0.9956
Epoch 374/500
12380/12380 [=====] - 4s 296us/sample - loss: 0.0247
- accuracy: 0.9957
Epoch 375/500
12380/12380 [=====] - 4s 287us/sample - loss: 0.0250
- accuracy: 0.9957
Epoch 376/500
12380/12380 [=====] - 4s 301us/sample - loss: 0.0246
- accuracy: 0.9952
Epoch 377/500
12380/12380 [=====] - 4s 285us/sample - loss: 0.0253
- accuracy: 0.9954
Epoch 378/500
12380/12380 [=====] - 4s 284us/sample - loss: 0.0247
- accuracy: 0.9954
Epoch 379/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0247
- accuracy: 0.9958
Epoch 380/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0245
- accuracy: 0.9957
Epoch 381/500
```

```
12380/12380 [=====] - 3s 279us/sample - loss: 0.0247
- accuracy: 0.9957
Epoch 382/500
12380/12380 [=====] - 4s 297us/sample - loss: 0.0245
- accuracy: 0.9958
Epoch 383/500
12380/12380 [=====] - 4s 305us/sample - loss: 0.0242
- accuracy: 0.9956
Epoch 384/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0251
- accuracy: 0.9957
Epoch 385/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0241
- accuracy: 0.9958
Epoch 386/500
12380/12380 [=====] - 4s 288us/sample - loss: 0.0239
- accuracy: 0.9957
Epoch 387/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0241
- accuracy: 0.9958
Epoch 388/500
12380/12380 [=====] - 4s 289us/sample - loss: 0.0245
- accuracy: 0.9956
Epoch 389/500
12380/12380 [=====] - 4s 291us/sample - loss: 0.0241
```

```
- accuracy: 0.9954
Epoch 390/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0239
- accuracy: 0.9956
Epoch 391/500
12380/12380 [=====] - 4s 294us/sample - loss: 0.0237
- accuracy: 0.9956
Epoch 392/500
12380/12380 [=====] - 4s 326us/sample - loss: 0.0241
- accuracy: 0.9958
Epoch 393/500
12380/12380 [=====] - 4s 346us/sample - loss: 0.0242
- accuracy: 0.9955
Epoch 394/500
12380/12380 [=====] - 4s 291us/sample - loss: 0.0235
- accuracy: 0.9959
Epoch 395/500
12380/12380 [=====] - 3s 264us/sample - loss: 0.0235
- accuracy: 0.9958
Epoch 396/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0235
- accuracy: 0.9955
Epoch 397/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0237
- accuracy: 0.9956
```

```
Epoch 398/500
12380/12380 [=====] - 3s 264us/sample - loss: 0.0237
- accuracy: 0.9959
Epoch 399/500
12380/12380 [=====] - 3s 273us/sample - loss: 0.0236
- accuracy: 0.9962
Epoch 400/500
12380/12380 [=====] - 3s 267us/sample - loss: 0.0235
- accuracy: 0.9957
Epoch 401/500
12380/12380 [=====] - 3s 281us/sample - loss: 0.0234
- accuracy: 0.9959
Epoch 402/500
12380/12380 [=====] - 4s 306us/sample - loss: 0.0236
- accuracy: 0.9953
Epoch 403/500
12380/12380 [=====] - 4s 297us/sample - loss: 0.0235
- accuracy: 0.9958
Epoch 404/500
12380/12380 [=====] - 4s 285us/sample - loss: 0.0238
- accuracy: 0.9957
Epoch 405/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0233
- accuracy: 0.9959
Epoch 406/500
```



```
12380/12380 [=====] - 3s 268us/sample - loss: 0.0231
- accuracy: 0.9961
Epoch 407/500
12380/12380 [=====] - 3s 277us/sample - loss: 0.0230
- accuracy: 0.9960
Epoch 408/500
12380/12380 [=====] - 4s 285us/sample - loss: 0.0233
- accuracy: 0.9960
Epoch 409/500
12380/12380 [=====] - 4s 310us/sample - loss: 0.0232
- accuracy: 0.9957
Epoch 410/500
12380/12380 [=====] - 4s 285us/sample - loss: 0.0231
- accuracy: 0.9958
Epoch 411/500
12380/12380 [=====] - 4s 309us/sample - loss: 0.0230
- accuracy: 0.9952
Epoch 412/500
12380/12380 [=====] - 4s 312us/sample - loss: 0.0231
- accuracy: 0.9961
Epoch 413/500
12380/12380 [=====] - 3s 266us/sample - loss: 0.0238
- accuracy: 0.9956
Epoch 414/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0227
```

```
- accuracy: 0.9956
Epoch 415/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0225
- accuracy: 0.9961
Epoch 416/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0226
- accuracy: 0.9957
Epoch 417/500
12380/12380 [=====] - 4s 295us/sample - loss: 0.0226
- accuracy: 0.9962
Epoch 418/500
12380/12380 [=====] - 4s 290us/sample - loss: 0.0222
- accuracy: 0.9961
Epoch 419/500
12380/12380 [=====] - 4s 287us/sample - loss: 0.0234
- accuracy: 0.9960
Epoch 420/500
12380/12380 [=====] - 3s 266us/sample - loss: 0.0227
- accuracy: 0.9959
Epoch 421/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0221
- accuracy: 0.9959
Epoch 422/500
12380/12380 [=====] - 3s 278us/sample - loss: 0.0233
- accuracy: 0.9960
```

```
Epoch 423/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0225
- accuracy: 0.9960
Epoch 424/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0219
- accuracy: 0.9960
Epoch 425/500
12380/12380 [=====] - 4s 303us/sample - loss: 0.0221
- accuracy: 0.9962
Epoch 426/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0226
- accuracy: 0.9959
Epoch 427/500
12380/12380 [=====] - 4s 290us/sample - loss: 0.0226
- accuracy: 0.9959
Epoch 428/500
12380/12380 [=====] - 4s 289us/sample - loss: 0.0222
- accuracy: 0.9959
Epoch 429/500
12380/12380 [=====] - 4s 298us/sample - loss: 0.0217
- accuracy: 0.9958
Epoch 430/500
12380/12380 [=====] - 4s 305us/sample - loss: 0.0222
- accuracy: 0.9961
Epoch 431/500
```

```
12380/12380 [=====] - 4s 300us/sample - loss: 0.0223
- accuracy: 0.9962
Epoch 432/500
12380/12380 [=====] - 4s 284us/sample - loss: 0.0220
- accuracy: 0.9957
Epoch 433/500
12380/12380 [=====] - 4s 287us/sample - loss: 0.0220
- accuracy: 0.9962
Epoch 434/500
12380/12380 [=====] - 3s 280us/sample - loss: 0.0224
- accuracy: 0.9958
Epoch 435/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0224
- accuracy: 0.9960
Epoch 436/500
12380/12380 [=====] - 4s 292us/sample - loss: 0.0218
- accuracy: 0.9960
Epoch 437/500
12380/12380 [=====] - 3s 280us/sample - loss: 0.0222
- accuracy: 0.9962
Epoch 438/500
12380/12380 [=====] - 3s 268us/sample - loss: 0.0217
- accuracy: 0.9959
Epoch 439/500
12380/12380 [=====] - 4s 307us/sample - loss: 0.0215
```

```
- accuracy: 0.9960
Epoch 440/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0218
- accuracy: 0.9959
Epoch 441/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0219
- accuracy: 0.9962
Epoch 442/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0218
- accuracy: 0.9960
Epoch 443/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0225
- accuracy: 0.9960
Epoch 444/500
12380/12380 [=====] - 4s 297us/sample - loss: 0.0222
- accuracy: 0.9959
Epoch 445/500
12380/12380 [=====] - 4s 303us/sample - loss: 0.0216
- accuracy: 0.9958
Epoch 446/500
12380/12380 [=====] - 3s 280us/sample - loss: 0.0216
- accuracy: 0.9962
Epoch 447/500
12380/12380 [=====] - 4s 288us/sample - loss: 0.0210
- accuracy: 0.9959
```

```
Epoch 448/500
12380/12380 [=====] - 4s 297us/sample - loss: 0.0213
- accuracy: 0.9960
Epoch 449/500
12380/12380 [=====] - 3s 260us/sample - loss: 0.0215
- accuracy: 0.9963
Epoch 450/500
12380/12380 [=====] - 3s 266us/sample - loss: 0.0220
- accuracy: 0.9960
Epoch 451/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0206
- accuracy: 0.9964
Epoch 452/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0212
- accuracy: 0.9960
Epoch 453/500
12380/12380 [=====] - 3s 256us/sample - loss: 0.0216
- accuracy: 0.9961
Epoch 454/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0216
- accuracy: 0.9961
Epoch 455/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0217
- accuracy: 0.9964
Epoch 456/500
```

```
12380/12380 [=====] - 3s 270us/sample - loss: 0.0214
- accuracy: 0.9960
Epoch 457/500
12380/12380 [=====] - 3s 279us/sample - loss: 0.0210
- accuracy: 0.9960
Epoch 458/500
12380/12380 [=====] - 4s 290us/sample - loss: 0.0215
- accuracy: 0.9960
Epoch 459/500
12380/12380 [=====] - 4s 308us/sample - loss: 0.0211
- accuracy: 0.9962
Epoch 460/500
12380/12380 [=====] - 4s 298us/sample - loss: 0.0209
- accuracy: 0.9965
Epoch 461/500
12380/12380 [=====] - 4s 299us/sample - loss: 0.0211
- accuracy: 0.9962
Epoch 462/500
12380/12380 [=====] - 4s 312us/sample - loss: 0.0209
- accuracy: 0.9957
Epoch 463/500
12380/12380 [=====] - 4s 284us/sample - loss: 0.0205
- accuracy: 0.9964
Epoch 464/500
12380/12380 [=====] - 4s 285us/sample - loss: 0.0213
```

```
- accuracy: 0.9961
Epoch 465/500
12380/12380 [=====] - 4s 294us/sample - loss: 0.0208
- accuracy: 0.9962
Epoch 466/500
12380/12380 [=====] - 4s 288us/sample - loss: 0.0209
- accuracy: 0.9967
Epoch 467/500
12380/12380 [=====] - 4s 347us/sample - loss: 0.0206
- accuracy: 0.9956
Epoch 468/500
12380/12380 [=====] - 5s 395us/sample - loss: 0.0207
- accuracy: 0.9964
Epoch 469/500
12380/12380 [=====] - 4s 341us/sample - loss: 0.0203
- accuracy: 0.9964
Epoch 470/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0203
- accuracy: 0.9964
Epoch 471/500
12380/12380 [=====] - 4s 297us/sample - loss: 0.0205
- accuracy: 0.9966
Epoch 472/500
12380/12380 [=====] - 3s 276us/sample - loss: 0.0206
- accuracy: 0.9961
```



```
Epoch 473/500
12380/12380 [=====] - 3s 272us/sample - loss: 0.0204
- accuracy: 0.9963
Epoch 474/500
12380/12380 [=====] - 3s 263us/sample - loss: 0.0203
- accuracy: 0.9962
Epoch 475/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0206
- accuracy: 0.9964
Epoch 476/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0203
- accuracy: 0.9962
Epoch 477/500
12380/12380 [=====] - 3s 262us/sample - loss: 0.0197
- accuracy: 0.9967
Epoch 478/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0203
- accuracy: 0.9960
Epoch 479/500
12380/12380 [=====] - 3s 271us/sample - loss: 0.0201
- accuracy: 0.9960
Epoch 480/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0201
- accuracy: 0.9960
Epoch 481/500
```

```
12380/12380 [=====] - 3s 282us/sample - loss: 0.0195
- accuracy: 0.9964
Epoch 482/500
12380/12380 [=====] - 4s 303us/sample - loss: 0.0197
- accuracy: 0.9965
Epoch 483/500
12380/12380 [=====] - 3s 274us/sample - loss: 0.0199
- accuracy: 0.9960
Epoch 484/500
12380/12380 [=====] - 3s 248us/sample - loss: 0.0203
- accuracy: 0.9963
Epoch 485/500
12380/12380 [=====] - 3s 222us/sample - loss: 0.0205
- accuracy: 0.9962
Epoch 486/500
12380/12380 [=====] - 3s 254us/sample - loss: 0.0198
- accuracy: 0.9967
Epoch 487/500
12380/12380 [=====] - 3s 256us/sample - loss: 0.0196
- accuracy: 0.9966
Epoch 488/500
12380/12380 [=====] - 3s 258us/sample - loss: 0.0201
- accuracy: 0.9963
Epoch 489/500
12380/12380 [=====] - 3s 257us/sample - loss: 0.0193
```

```
- accuracy: 0.9962
Epoch 490/500
12380/12380 [=====] - 4s 291us/sample - loss: 0.0196
- accuracy: 0.9965
Epoch 491/500
12380/12380 [=====] - 3s 252us/sample - loss: 0.0197
- accuracy: 0.9964
Epoch 492/500
12380/12380 [=====] - 3s 269us/sample - loss: 0.0195
- accuracy: 0.9960
Epoch 493/500
12380/12380 [=====] - 3s 253us/sample - loss: 0.0195
- accuracy: 0.9965
Epoch 494/500
12380/12380 [=====] - 3s 243us/sample - loss: 0.0194
- accuracy: 0.9963
Epoch 495/500
12380/12380 [=====] - 3s 258us/sample - loss: 0.0196
- accuracy: 0.9962
Epoch 496/500
12380/12380 [=====] - 3s 258us/sample - loss: 0.0198
- accuracy: 0.9964
Epoch 497/500
12380/12380 [=====] - 4s 286us/sample - loss: 0.0197
- accuracy: 0.9963
```

```
Epoch 498/500
12380/12380 [=====] - 3s 255us/sample - loss: 0.0194
- accuracy: 0.9967
Epoch 499/500
12380/12380 [=====] - 3s 247us/sample - loss: 0.0193
- accuracy: 0.9964
Epoch 500/500
12380/12380 [=====] - 3s 247us/sample - loss: 0.0192
- accuracy: 0.9962
2872/2872 [=====] - 1s 451us/sample

class_weight_Fold_1: {0: 0.10769899956502825, 1: 12.589830508474575}
```

```
pos_weight: 0.9
thresholdNum: 0.5
```

```
Average of train loss Fold_1: 0.0528
Average of yPredProbability Fold_1: 0.2781
```

```
classification_report_Fold_1:
precision    recall  f1-score   support
```

Normal 0	0.99	0.73	0.84	2845
Anomaly 1	0.00	0.11	0.01	27

accuracy			0.72	2872
macro avg	0.50	0.42	0.42	2872
weighted avg	0.98	0.72	0.83	2872

confusion_matrix_Fold_1:

True Negatives: 2077
False Positives: 768
False Negatives: 24
True Positives: 3

End running time Fold_1: 210608_224927 ,-----.

Start running time Fold_2: 210608_224927 ,-----:

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: 210608_224928

,+++++

Data Augmentation MSE Label 1==> mean: 0.000723, min: 0.000274, max: 0.002556

Data Augmentation MSE Label 1==> mean: 0.000313, min: 2.9e-05, max: 0.001448

Data Augmentation MSE Label 1==> mean: 0.000287, min: 5e-06, max: 0.001166

Data Augmentation MSE Label 1==> mean: 0.000319, min: 1e-06, max: 0.001258

Data Augmentation MSE Label 1==> mean: 0.000389, min: 0.0, max: 0.001546

Data Augmentation MSE Label 1==> mean: 0.000501, min: 0.0, max: 0.002219

Data Augmentation MSE Label 1==> mean: 0.000651, min: 0.0, max: 0.003605

Data Augmentation MSE Label 1==> mean: 0.000771, min: 0.0, max: 0.003601

Data Augmentation MSE Label 1==> mean: 0.000878, min: 0.0, max: 0.005686

Data Augmentation MSE Label 1==> mean: 0.001017, min: 0.0, max: 0.009183

Data Augmentation MSE Label 1==> mean: 0.00116, min: 0.0, max: 0.008231

Data Augmentation MSE Label 1==> mean: 0.001413, min: 0.0, max: 0.009671

Data Augmentation MSE Label 1==> mean: 0.001736, min: 0.0, max: 0.011623

Data Augmentation MSE Label 1==> mean: 0.001623, min: 0.0, max: 0.011723

MSE All generated Augmented data Fold_2:

mean: 0.000842

min: 2.2e-05

max: 0.005251

End running time Data Augmentation_Fold_2: 210608_225025
,+++++

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 [=====] - 8s 667us/sample - loss: 3.0544
- accuracy: 0.9002
Epoch 2/500
12599/12599 [=====] - 3s 267us/sample - loss: 1.3753
- accuracy: 0.9117
Epoch 3/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.6682
- accuracy: 0.9186
Epoch 4/500
12599/12599 [=====] - 4s 287us/sample - loss: 0.3885
- accuracy: 0.9267
Epoch 5/500
12599/12599 [=====] - 5s 361us/sample - loss: 0.2838
- accuracy: 0.9326
Epoch 6/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.2436
- accuracy: 0.9365
Epoch 7/500
12599/12599 [=====] - 4s 287us/sample - loss: 0.2266
- accuracy: 0.9393
Epoch 8/500
12599/12599 [=====] - 4s 337us/sample - loss: 0.2174
- accuracy: 0.9408
```



```
Epoch 9/500
12599/12599 [=====] - 4s 321us/sample - loss: 0.2115
- accuracy: 0.9429
Epoch 10/500
12599/12599 [=====] - 4s 333us/sample - loss: 0.2049
- accuracy: 0.9456
Epoch 11/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.1992
- accuracy: 0.9471
Epoch 12/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.1945
- accuracy: 0.9501
Epoch 13/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.1888
- accuracy: 0.9521
Epoch 14/500
12599/12599 [=====] - 4s 286us/sample - loss: 0.1850
- accuracy: 0.9532
Epoch 15/500
12599/12599 [=====] - 4s 307us/sample - loss: 0.1798
- accuracy: 0.9563
Epoch 16/500
12599/12599 [=====] - 4s 286us/sample - loss: 0.1756
- accuracy: 0.9569
Epoch 17/500
```

```
12599/12599 [=====] - 4s 291us/sample - loss: 0.1715
- accuracy: 0.9587
Epoch 18/500
12599/12599 [=====] - 4s 302us/sample - loss: 0.1672
- accuracy: 0.9603
Epoch 19/500
12599/12599 [=====] - 4s 305us/sample - loss: 0.1644
- accuracy: 0.9606
Epoch 20/500
12599/12599 [=====] - 4s 289us/sample - loss: 0.1599
- accuracy: 0.9619
Epoch 21/500
12599/12599 [=====] - 4s 327us/sample - loss: 0.1566
- accuracy: 0.9647
Epoch 22/500
12599/12599 [=====] - 6s 450us/sample - loss: 0.1529
- accuracy: 0.9645
Epoch 23/500
12599/12599 [=====] - 5s 399us/sample - loss: 0.1494
- accuracy: 0.9661
Epoch 24/500
12599/12599 [=====] - 4s 317us/sample - loss: 0.1471
- accuracy: 0.9671
Epoch 25/500
12599/12599 [=====] - 4s 316us/sample - loss: 0.1436
```

```
- accuracy: 0.9675
Epoch 26/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.1403
- accuracy: 0.9691
Epoch 27/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.1381
- accuracy: 0.9696
Epoch 28/500
12599/12599 [=====] - 4s 327us/sample - loss: 0.1359
- accuracy: 0.9694
Epoch 29/500
12599/12599 [=====] - 5s 362us/sample - loss: 0.1332
- accuracy: 0.9700
Epoch 30/500
12599/12599 [=====] - 5s 357us/sample - loss: 0.1306
- accuracy: 0.9707
Epoch 31/500
12599/12599 [=====] - 4s 285us/sample - loss: 0.1291
- accuracy: 0.9713
Epoch 32/500
12599/12599 [=====] - 4s 332us/sample - loss: 0.1263
- accuracy: 0.9725
Epoch 33/500
12599/12599 [=====] - 4s 314us/sample - loss: 0.1239
- accuracy: 0.9732
```

```
Epoch 34/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.1223
- accuracy: 0.9738
Epoch 35/500
12599/12599 [=====] - 4s 285us/sample - loss: 0.1199
- accuracy: 0.9742
Epoch 36/500
12599/12599 [=====] - 3s 277us/sample - loss: 0.1175
- accuracy: 0.9740
Epoch 37/500
12599/12599 [=====] - 4s 305us/sample - loss: 0.1166
- accuracy: 0.9745
Epoch 38/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.1143
- accuracy: 0.9757
Epoch 39/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.1123
- accuracy: 0.9757
Epoch 40/500
12599/12599 [=====] - 4s 321us/sample - loss: 0.1111
- accuracy: 0.9767
Epoch 41/500
12599/12599 [=====] - 4s 297us/sample - loss: 0.1094
- accuracy: 0.9768
Epoch 42/500
```

```
12599/12599 [=====] - 4s 298us/sample - loss: 0.1081
- accuracy: 0.9775
Epoch 43/500
12599/12599 [=====] - 4s 311us/sample - loss: 0.1063
- accuracy: 0.9774
Epoch 44/500
12599/12599 [=====] - 4s 332us/sample - loss: 0.1051
- accuracy: 0.9778
Epoch 45/500
12599/12599 [=====] - 4s 294us/sample - loss: 0.1028
- accuracy: 0.9786
Epoch 46/500
12599/12599 [=====] - 4s 301us/sample - loss: 0.1019
- accuracy: 0.9793
Epoch 47/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.1006
- accuracy: 0.9802
Epoch 48/500
12599/12599 [=====] - 3s 277us/sample - loss: 0.0999
- accuracy: 0.9806
Epoch 49/500
12599/12599 [=====] - 4s 322us/sample - loss: 0.0984
- accuracy: 0.9803
Epoch 50/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0975
```

```
- accuracy: 0.9804
Epoch 51/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0951
- accuracy: 0.9818
Epoch 52/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0947
- accuracy: 0.9814
Epoch 53/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0933
- accuracy: 0.9816
Epoch 54/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0924
- accuracy: 0.9825
Epoch 55/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0911
- accuracy: 0.9826
Epoch 56/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0906
- accuracy: 0.9823
Epoch 57/500
12599/12599 [=====] - 3s 270us/sample - loss: 0.0896
- accuracy: 0.9836
Epoch 58/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0886
- accuracy: 0.9837
```

```
Epoch 59/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0873
- accuracy: 0.9840
Epoch 60/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0869
- accuracy: 0.9835
Epoch 61/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0852
- accuracy: 0.9845
Epoch 62/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0845
- accuracy: 0.9848
Epoch 63/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0845
- accuracy: 0.9833
Epoch 64/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0830
- accuracy: 0.9850
Epoch 65/500
12599/12599 [=====] - 3s 268us/sample - loss: 0.0826
- accuracy: 0.9846
Epoch 66/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0822
- accuracy: 0.9852
Epoch 67/500
```

```
12599/12599 [=====] - 4s 278us/sample - loss: 0.0813
- accuracy: 0.9858
Epoch 68/500
12599/12599 [=====] - 3s 278us/sample - loss: 0.0809
- accuracy: 0.9855
Epoch 69/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0798
- accuracy: 0.9857
Epoch 70/500
12599/12599 [=====] - 4s 291us/sample - loss: 0.0784
- accuracy: 0.9858
Epoch 71/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0783
- accuracy: 0.9865
Epoch 72/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0775
- accuracy: 0.9867
Epoch 73/500
12599/12599 [=====] - 4s 304us/sample - loss: 0.0775
- accuracy: 0.9860
Epoch 74/500
12599/12599 [=====] - 4s 308us/sample - loss: 0.0764
- accuracy: 0.9863
Epoch 75/500
12599/12599 [=====] - 4s 312us/sample - loss: 0.0758
```



```
- accuracy: 0.9870
Epoch 76/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0752
- accuracy: 0.9866
Epoch 77/500
12599/12599 [=====] - 4s 305us/sample - loss: 0.0746
- accuracy: 0.9865
Epoch 78/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0737
- accuracy: 0.9871
Epoch 79/500
12599/12599 [=====] - 4s 300us/sample - loss: 0.0734
- accuracy: 0.9876
Epoch 80/500
12599/12599 [=====] - 5s 385us/sample - loss: 0.0729
- accuracy: 0.9876
Epoch 81/500
12599/12599 [=====] - 6s 470us/sample - loss: 0.0722
- accuracy: 0.9879
Epoch 82/500
12599/12599 [=====] - 6s 489us/sample - loss: 0.0723
- accuracy: 0.9869
Epoch 83/500
12599/12599 [=====] - 7s 557us/sample - loss: 0.0727
- accuracy: 0.9875
```

```
Epoch 84/500
12599/12599 [=====] - 7s 565us/sample - loss: 0.0710
- accuracy: 0.9876
Epoch 85/500
12599/12599 [=====] - 5s 434us/sample - loss: 0.0697
- accuracy: 0.9883
Epoch 86/500
12599/12599 [=====] - 6s 461us/sample - loss: 0.0709
- accuracy: 0.9875
Epoch 87/500
12599/12599 [=====] - 6s 490us/sample - loss: 0.0700
- accuracy: 0.9882
Epoch 88/500
12599/12599 [=====] - 7s 557us/sample - loss: 0.0689
- accuracy: 0.9885
Epoch 89/500
12599/12599 [=====] - 7s 535us/sample - loss: 0.0685
- accuracy: 0.9883
Epoch 90/500
12599/12599 [=====] - 4s 308us/sample - loss: 0.0681
- accuracy: 0.9886
Epoch 91/500
12599/12599 [=====] - 5s 368us/sample - loss: 0.0676
- accuracy: 0.9886
Epoch 92/500
```

```
12599/12599 [=====] - 4s 297us/sample - loss: 0.0672
- accuracy: 0.9886
Epoch 93/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0680
- accuracy: 0.9885
Epoch 94/500
12599/12599 [=====] - 4s 288us/sample - loss: 0.0668
- accuracy: 0.9888
Epoch 95/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0667
- accuracy: 0.9883
Epoch 96/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0657
- accuracy: 0.9892
Epoch 97/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0655
- accuracy: 0.9894
Epoch 98/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0648
- accuracy: 0.9886
Epoch 99/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0655
- accuracy: 0.9889
Epoch 100/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0644
```

```
- accuracy: 0.9897
Epoch 101/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0643
- accuracy: 0.9892
Epoch 102/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0631
- accuracy: 0.9896
Epoch 103/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0637
- accuracy: 0.9897
Epoch 104/500
12599/12599 [=====] - 4s 286us/sample - loss: 0.0627
- accuracy: 0.9890
Epoch 105/500
12599/12599 [=====] - 3s 263us/sample - loss: 0.0627
- accuracy: 0.9890
Epoch 106/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0630
- accuracy: 0.9892
Epoch 107/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0622
- accuracy: 0.9902
Epoch 108/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0614
- accuracy: 0.9896
```

```
Epoch 109/500
12599/12599 [=====] - 4s 289us/sample - loss: 0.0612
- accuracy: 0.9897
Epoch 110/500
12599/12599 [=====] - 3s 259us/sample - loss: 0.0617
- accuracy: 0.9894
Epoch 111/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0615
- accuracy: 0.9894
Epoch 112/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0612
- accuracy: 0.9898
Epoch 113/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0611
- accuracy: 0.9895
Epoch 114/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0598
- accuracy: 0.9902
Epoch 115/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0600
- accuracy: 0.9898
Epoch 116/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0604
- accuracy: 0.9897
Epoch 117/500
```

```
12599/12599 [=====] - 3s 271us/sample - loss: 0.0589
- accuracy: 0.9902
Epoch 118/500
12599/12599 [=====] - 3s 268us/sample - loss: 0.0591
- accuracy: 0.9898
Epoch 119/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0586
- accuracy: 0.9906
Epoch 120/500
12599/12599 [=====] - 3s 256us/sample - loss: 0.0582
- accuracy: 0.9899
Epoch 121/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0585
- accuracy: 0.9905
Epoch 122/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0582
- accuracy: 0.9910
Epoch 123/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0581
- accuracy: 0.9906
Epoch 124/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0573
- accuracy: 0.9907
Epoch 125/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0567
```

```
- accuracy: 0.9906
Epoch 126/500
12599/12599 [=====] - 4s 278us/sample - loss: 0.0572
- accuracy: 0.9905
Epoch 127/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0579
- accuracy: 0.9903
Epoch 128/500
12599/12599 [=====] - 3s 268us/sample - loss: 0.0566
- accuracy: 0.9907
Epoch 129/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0560
- accuracy: 0.9906
Epoch 130/500
12599/12599 [=====] - 3s 258us/sample - loss: 0.0559
- accuracy: 0.9902
Epoch 131/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0561
- accuracy: 0.9906
Epoch 132/500
12599/12599 [=====] - 3s 265us/sample - loss: 0.0566
- accuracy: 0.9905
Epoch 133/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0553
- accuracy: 0.9906
```

```
Epoch 134/500
12599/12599 [=====] - 3s 270us/sample - loss: 0.0552
- accuracy: 0.9914
Epoch 135/500
12599/12599 [=====] - 3s 266us/sample - loss: 0.0553
- accuracy: 0.9907
Epoch 136/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0553
- accuracy: 0.9905
Epoch 137/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0554
- accuracy: 0.9906
Epoch 138/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0541
- accuracy: 0.9912
Epoch 139/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0550
- accuracy: 0.9907
Epoch 140/500
12599/12599 [=====] - 3s 265us/sample - loss: 0.0551
- accuracy: 0.9899
Epoch 141/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0540
- accuracy: 0.9906
Epoch 142/500
```



```
12599/12599 [=====] - 3s 259us/sample - loss: 0.0538
- accuracy: 0.9913
Epoch 143/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0538
- accuracy: 0.9912
Epoch 144/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0540
- accuracy: 0.9912
Epoch 145/500
12599/12599 [=====] - 3s 265us/sample - loss: 0.0539
- accuracy: 0.9910
Epoch 146/500
12599/12599 [=====] - 4s 289us/sample - loss: 0.0530
- accuracy: 0.9914
Epoch 147/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0525
- accuracy: 0.9909
Epoch 148/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0519
- accuracy: 0.9910
Epoch 149/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0531
- accuracy: 0.9913
Epoch 150/500
12599/12599 [=====] - 3s 263us/sample - loss: 0.0528
```

```
- accuracy: 0.9910
Epoch 151/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0521
- accuracy: 0.9910
Epoch 152/500
12599/12599 [=====] - 3s 257us/sample - loss: 0.0524
- accuracy: 0.9914
Epoch 153/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0518
- accuracy: 0.9913
Epoch 154/500
12599/12599 [=====] - 3s 268us/sample - loss: 0.0516
- accuracy: 0.9914
Epoch 155/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0519
- accuracy: 0.9913
Epoch 156/500
12599/12599 [=====] - 3s 277us/sample - loss: 0.0514
- accuracy: 0.9911
Epoch 157/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0514
- accuracy: 0.9911
Epoch 158/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0510
- accuracy: 0.9913
```

```
Epoch 159/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0507
- accuracy: 0.9916
Epoch 160/500
12599/12599 [=====] - 3s 266us/sample - loss: 0.0503
- accuracy: 0.9918
Epoch 161/500
12599/12599 [=====] - 4s 308us/sample - loss: 0.0508
- accuracy: 0.9913
Epoch 162/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0507
- accuracy: 0.9917
Epoch 163/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0498
- accuracy: 0.9915
Epoch 164/500
12599/12599 [=====] - 4s 278us/sample - loss: 0.0500
- accuracy: 0.9916
Epoch 165/500
12599/12599 [=====] - 3s 263us/sample - loss: 0.0504
- accuracy: 0.9918
Epoch 166/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0498
- accuracy: 0.9918
Epoch 167/500
```

```
12599/12599 [=====] - 3s 259us/sample - loss: 0.0498
- accuracy: 0.9918
Epoch 168/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0498
- accuracy: 0.9919
Epoch 169/500
12599/12599 [=====] - 4s 285us/sample - loss: 0.0495
- accuracy: 0.9914
Epoch 170/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0499
- accuracy: 0.9917
Epoch 171/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0485
- accuracy: 0.9919
Epoch 172/500
12599/12599 [=====] - 3s 260us/sample - loss: 0.0500
- accuracy: 0.9913
Epoch 173/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0488
- accuracy: 0.9915
Epoch 174/500
12599/12599 [=====] - 4s 347us/sample - loss: 0.0482
- accuracy: 0.9921
Epoch 175/500
12599/12599 [=====] - 4s 303us/sample - loss: 0.0494
```

```
- accuracy: 0.9921
Epoch 176/500
12599/12599 [=====] - 4s 285us/sample - loss: 0.0479
- accuracy: 0.9916
Epoch 177/500
12599/12599 [=====] - 4s 288us/sample - loss: 0.0491
- accuracy: 0.9915
Epoch 178/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0481
- accuracy: 0.9922
Epoch 179/500
12599/12599 [=====] - 4s 287us/sample - loss: 0.0482
- accuracy: 0.9925
Epoch 180/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.0488
- accuracy: 0.9919
Epoch 181/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0475
- accuracy: 0.9919
Epoch 182/500
12599/12599 [=====] - 4s 288us/sample - loss: 0.0474
- accuracy: 0.9923
Epoch 183/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0475
- accuracy: 0.9919
```

```
Epoch 184/500
12599/12599 [=====] - 4s 294us/sample - loss: 0.0470
- accuracy: 0.9924
Epoch 185/500
12599/12599 [=====] - 4s 303us/sample - loss: 0.0481
- accuracy: 0.9919
Epoch 186/500
12599/12599 [=====] - 4s 307us/sample - loss: 0.0471
- accuracy: 0.9929
Epoch 187/500
12599/12599 [=====] - 4s 305us/sample - loss: 0.0466
- accuracy: 0.9921
Epoch 188/500
12599/12599 [=====] - 4s 330us/sample - loss: 0.0472
- accuracy: 0.9921
Epoch 189/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0468
- accuracy: 0.9923
Epoch 190/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0475
- accuracy: 0.9926
Epoch 191/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0469
- accuracy: 0.9923
Epoch 192/500
```

```
12599/12599 [=====] - 3s 267us/sample - loss: 0.0468
- accuracy: 0.9921
Epoch 193/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0466
- accuracy: 0.9926
Epoch 194/500
12599/12599 [=====] - 4s 293us/sample - loss: 0.0476
- accuracy: 0.9921
Epoch 195/500
12599/12599 [=====] - 4s 320us/sample - loss: 0.0461
- accuracy: 0.9926
Epoch 196/500
12599/12599 [=====] - 4s 345us/sample - loss: 0.0457
- accuracy: 0.9922
Epoch 197/500
12599/12599 [=====] - 4s 299us/sample - loss: 0.0459
- accuracy: 0.9927
Epoch 198/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0462
- accuracy: 0.9921
Epoch 199/500
12599/12599 [=====] - 4s 278us/sample - loss: 0.0457
- accuracy: 0.9925
Epoch 200/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0459
```

```
- accuracy: 0.9921
Epoch 201/500
12599/12599 [=====] - 4s 304us/sample - loss: 0.0465
- accuracy: 0.9924
Epoch 202/500
12599/12599 [=====] - 4s 344us/sample - loss: 0.0455
- accuracy: 0.9921
Epoch 203/500
12599/12599 [=====] - 4s 289us/sample - loss: 0.0455
- accuracy: 0.9922
Epoch 204/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.0449
- accuracy: 0.9926
Epoch 205/500
12599/12599 [=====] - 4s 317us/sample - loss: 0.0459
- accuracy: 0.9928
Epoch 206/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0451
- accuracy: 0.9919
Epoch 207/500
12599/12599 [=====] - 4s 293us/sample - loss: 0.0447
- accuracy: 0.9921
Epoch 208/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0448
- accuracy: 0.9927
```



```
Epoch 209/500
12599/12599 [=====] - 4s 315us/sample - loss: 0.0457
- accuracy: 0.9926
Epoch 210/500
12599/12599 [=====] - 5s 422us/sample - loss: 0.0445
- accuracy: 0.9925
Epoch 211/500
12599/12599 [=====] - 4s 320us/sample - loss: 0.0442
- accuracy: 0.9928
Epoch 212/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0446
- accuracy: 0.9927
Epoch 213/500
12599/12599 [=====] - 4s 293us/sample - loss: 0.0453
- accuracy: 0.9925
Epoch 214/500
12599/12599 [=====] - 4s 301us/sample - loss: 0.0443
- accuracy: 0.9925
Epoch 215/500
12599/12599 [=====] - 4s 291us/sample - loss: 0.0444
- accuracy: 0.9924
Epoch 216/500
12599/12599 [=====] - 5s 365us/sample - loss: 0.0439
- accuracy: 0.9929
Epoch 217/500
```

```
12599/12599 [=====] - 4s 350us/sample - loss: 0.0441
- accuracy: 0.9929
Epoch 218/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0439
- accuracy: 0.9928
Epoch 219/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0439
- accuracy: 0.9924
Epoch 220/500
12599/12599 [=====] - 4s 297us/sample - loss: 0.0444
- accuracy: 0.9927
Epoch 221/500
12599/12599 [=====] - 4s 309us/sample - loss: 0.0436
- accuracy: 0.9928
Epoch 222/500
12599/12599 [=====] - 4s 296us/sample - loss: 0.0438
- accuracy: 0.9926
Epoch 223/500
12599/12599 [=====] - 4s 321us/sample - loss: 0.0438
- accuracy: 0.9925
Epoch 224/500
12599/12599 [=====] - 4s 328us/sample - loss: 0.0437
- accuracy: 0.9925
Epoch 225/500
12599/12599 [=====] - 4s 300us/sample - loss: 0.0439
```

```
- accuracy: 0.9925
Epoch 226/500
12599/12599 [=====] - 4s 289us/sample - loss: 0.0431
- accuracy: 0.9931
Epoch 227/500
12599/12599 [=====] - 3s 266us/sample - loss: 0.0430
- accuracy: 0.9932
Epoch 228/500
12599/12599 [=====] - 4s 299us/sample - loss: 0.0429
- accuracy: 0.9927
Epoch 229/500
12599/12599 [=====] - 4s 302us/sample - loss: 0.0424
- accuracy: 0.9929
Epoch 230/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.0429
- accuracy: 0.9925
Epoch 231/500
12599/12599 [=====] - 4s 300us/sample - loss: 0.0429
- accuracy: 0.9926
Epoch 232/500
12599/12599 [=====] - 4s 305us/sample - loss: 0.0428
- accuracy: 0.9925
Epoch 233/500
12599/12599 [=====] - 5s 382us/sample - loss: 0.0426
- accuracy: 0.9929
```

```
Epoch 234/500
12599/12599 [=====] - 4s 336us/sample - loss: 0.0425
- accuracy: 0.9925
Epoch 235/500
12599/12599 [=====] - 5s 378us/sample - loss: 0.0423
- accuracy: 0.9926
Epoch 236/500
12599/12599 [=====] - 4s 309us/sample - loss: 0.0421
- accuracy: 0.9929
Epoch 237/500
12599/12599 [=====] - 4s 302us/sample - loss: 0.0417
- accuracy: 0.9928
Epoch 238/500
12599/12599 [=====] - 4s 321us/sample - loss: 0.0433
- accuracy: 0.9925
Epoch 239/500
12599/12599 [=====] - 4s 288us/sample - loss: 0.0421
- accuracy: 0.9931
Epoch 240/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0413
- accuracy: 0.9932
Epoch 241/500
12599/12599 [=====] - 4s 291us/sample - loss: 0.0421
- accuracy: 0.9929
Epoch 242/500
```

```
12599/12599 [=====] - 3s 265us/sample - loss: 0.0415
- accuracy: 0.9927
Epoch 243/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0417
- accuracy: 0.9931
Epoch 244/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0412
- accuracy: 0.9932
Epoch 245/500
12599/12599 [=====] - 3s 263us/sample - loss: 0.0410
- accuracy: 0.9930
Epoch 246/500
12599/12599 [=====] - 3s 277us/sample - loss: 0.0412
- accuracy: 0.9925
Epoch 247/500
12599/12599 [=====] - 3s 258us/sample - loss: 0.0418
- accuracy: 0.9928
Epoch 248/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0411
- accuracy: 0.9932
Epoch 249/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0418
- accuracy: 0.9933
Epoch 250/500
12599/12599 [=====] - 3s 268us/sample - loss: 0.0408
```

```
- accuracy: 0.9933
Epoch 251/500
12599/12599 [=====] - 4s 287us/sample - loss: 0.0411
- accuracy: 0.9931
Epoch 252/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0407
- accuracy: 0.9931
Epoch 253/500
12599/12599 [=====] - 4s 328us/sample - loss: 0.0411
- accuracy: 0.9929
Epoch 254/500
12599/12599 [=====] - 4s 351us/sample - loss: 0.0412
- accuracy: 0.9927
Epoch 255/500
12599/12599 [=====] - 5s 397us/sample - loss: 0.0402
- accuracy: 0.9931
Epoch 256/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0419
- accuracy: 0.9931
Epoch 257/500
12599/12599 [=====] - 4s 344us/sample - loss: 0.0409
- accuracy: 0.9934
Epoch 258/500
12599/12599 [=====] - 4s 336us/sample - loss: 0.0409
- accuracy: 0.9929
```

```
Epoch 259/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0413
- accuracy: 0.9931
Epoch 260/500
12599/12599 [=====] - 4s 312us/sample - loss: 0.0407
- accuracy: 0.9928
Epoch 261/500
12599/12599 [=====] - 4s 301us/sample - loss: 0.0399
- accuracy: 0.9934
Epoch 262/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0397
- accuracy: 0.9933
Epoch 263/500
12599/12599 [=====] - 4s 286us/sample - loss: 0.0408
- accuracy: 0.9934
Epoch 264/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0395
- accuracy: 0.9934
Epoch 265/500
12599/12599 [=====] - 3s 270us/sample - loss: 0.0404
- accuracy: 0.9928
Epoch 266/500
12599/12599 [=====] - 4s 299us/sample - loss: 0.0391
- accuracy: 0.9926
Epoch 267/500
```

```
12599/12599 [=====] - 4s 279us/sample - loss: 0.0399
- accuracy: 0.9930
Epoch 268/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0408
- accuracy: 0.9937
Epoch 269/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0394
- accuracy: 0.9929
Epoch 270/500
12599/12599 [=====] - 3s 266us/sample - loss: 0.0394
- accuracy: 0.9935
Epoch 271/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.0391
- accuracy: 0.9931
Epoch 272/500
12599/12599 [=====] - 3s 270us/sample - loss: 0.0394
- accuracy: 0.9933
Epoch 273/500
12599/12599 [=====] - 4s 314us/sample - loss: 0.0389
- accuracy: 0.9934
Epoch 274/500
12599/12599 [=====] - 4s 306us/sample - loss: 0.0390
- accuracy: 0.9931
Epoch 275/500
12599/12599 [=====] - 4s 299us/sample - loss: 0.0394
```



```
- accuracy: 0.9934
Epoch 276/500
12599/12599 [=====] - 4s 348us/sample - loss: 0.0391
- accuracy: 0.9930
Epoch 277/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0385
- accuracy: 0.9934
Epoch 278/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0399
- accuracy: 0.9931
Epoch 279/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0390
- accuracy: 0.9933
Epoch 280/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.0388
- accuracy: 0.9937
Epoch 281/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0391
- accuracy: 0.9931
Epoch 282/500
12599/12599 [=====] - 5s 367us/sample - loss: 0.0386
- accuracy: 0.9939
Epoch 283/500
12599/12599 [=====] - 5s 406us/sample - loss: 0.0388
- accuracy: 0.9932
```

```
Epoch 284/500
12599/12599 [=====] - 4s 356us/sample - loss: 0.0381
- accuracy: 0.9935
Epoch 285/500
12599/12599 [=====] - 5s 417us/sample - loss: 0.0389
- accuracy: 0.9933
Epoch 286/500
12599/12599 [=====] - 4s 328us/sample - loss: 0.0378
- accuracy: 0.9933
Epoch 287/500
12599/12599 [=====] - 4s 343us/sample - loss: 0.0396
- accuracy: 0.9930
Epoch 288/500
12599/12599 [=====] - 4s 315us/sample - loss: 0.0384
- accuracy: 0.9937
Epoch 289/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0383
- accuracy: 0.9934
Epoch 290/500
12599/12599 [=====] - 4s 303us/sample - loss: 0.0377
- accuracy: 0.9935
Epoch 291/500
12599/12599 [=====] - 4s 308us/sample - loss: 0.0377
- accuracy: 0.9933
Epoch 292/500
```

```
12599/12599 [=====] - 4s 283us/sample - loss: 0.0382
- accuracy: 0.9936
Epoch 293/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0385
- accuracy: 0.9938
Epoch 294/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.0383
- accuracy: 0.9932
Epoch 295/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0373
- accuracy: 0.9933
Epoch 296/500
12599/12599 [=====] - 4s 298us/sample - loss: 0.0380
- accuracy: 0.9931
Epoch 297/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0389
- accuracy: 0.9929
Epoch 298/500
12599/12599 [=====] - 4s 291us/sample - loss: 0.0377
- accuracy: 0.9935
Epoch 299/500
12599/12599 [=====] - 4s 333us/sample - loss: 0.0379
- accuracy: 0.9932
Epoch 300/500
12599/12599 [=====] - 4s 339us/sample - loss: 0.0373
```

```
- accuracy: 0.9937
Epoch 301/500
12599/12599 [=====] - 5s 367us/sample - loss: 0.0376
- accuracy: 0.9933
Epoch 302/500
12599/12599 [=====] - 4s 322us/sample - loss: 0.0374
- accuracy: 0.9937
Epoch 303/500
12599/12599 [=====] - 4s 333us/sample - loss: 0.0379
- accuracy: 0.9937
Epoch 304/500
12599/12599 [=====] - 4s 314us/sample - loss: 0.0370
- accuracy: 0.9935
Epoch 305/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0370
- accuracy: 0.9935
Epoch 306/500
12599/12599 [=====] - 4s 297us/sample - loss: 0.0368
- accuracy: 0.9936
Epoch 307/500
12599/12599 [=====] - 4s 289us/sample - loss: 0.0372
- accuracy: 0.9937
Epoch 308/500
12599/12599 [=====] - 4s 298us/sample - loss: 0.0371
- accuracy: 0.9939
```

```
Epoch 309/500
12599/12599 [=====] - 4s 299us/sample - loss: 0.0373
- accuracy: 0.9937
Epoch 310/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0377
- accuracy: 0.9935
Epoch 311/500
12599/12599 [=====] - 4s 286us/sample - loss: 0.0376
- accuracy: 0.9939
Epoch 312/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0365
- accuracy: 0.9939
Epoch 313/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0373
- accuracy: 0.9938
Epoch 314/500
12599/12599 [=====] - 4s 297us/sample - loss: 0.0375
- accuracy: 0.9933
Epoch 315/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0369
- accuracy: 0.9937
Epoch 316/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0360
- accuracy: 0.9940
Epoch 317/500
```

```
12599/12599 [=====] - 4s 288us/sample - loss: 0.0367
- accuracy: 0.9941
Epoch 318/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0365
- accuracy: 0.9936
Epoch 319/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0363
- accuracy: 0.9938
Epoch 320/500
12599/12599 [=====] - 3s 265us/sample - loss: 0.0365
- accuracy: 0.9932
Epoch 321/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0366
- accuracy: 0.9934
Epoch 322/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0365
- accuracy: 0.9940
Epoch 323/500
12599/12599 [=====] - 3s 260us/sample - loss: 0.0367
- accuracy: 0.9936
Epoch 324/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.0360
- accuracy: 0.9934
Epoch 325/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0362
```

```
- accuracy: 0.9937
Epoch 326/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0357
- accuracy: 0.9940
Epoch 327/500
12599/12599 [=====] - 4s 286us/sample - loss: 0.0365
- accuracy: 0.9936
Epoch 328/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0362
- accuracy: 0.9934
Epoch 329/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0360
- accuracy: 0.9937
Epoch 330/500
12599/12599 [=====] - 3s 270us/sample - loss: 0.0354
- accuracy: 0.9934
Epoch 331/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0355
- accuracy: 0.9936
Epoch 332/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.0376
- accuracy: 0.9933
Epoch 333/500
12599/12599 [=====] - 3s 263us/sample - loss: 0.0349
- accuracy: 0.9934
```

```
Epoch 334/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0359
- accuracy: 0.9933
Epoch 335/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0351
- accuracy: 0.9933
Epoch 336/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0350
- accuracy: 0.9938
Epoch 337/500
12599/12599 [=====] - 4s 288us/sample - loss: 0.0358
- accuracy: 0.9936
Epoch 338/500
12599/12599 [=====] - 3s 264us/sample - loss: 0.0359
- accuracy: 0.9934
Epoch 339/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.0352
- accuracy: 0.9938
Epoch 340/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0352
- accuracy: 0.9937
Epoch 341/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0350
- accuracy: 0.9940
Epoch 342/500
```



```
12599/12599 [=====] - 4s 280us/sample - loss: 0.0347
- accuracy: 0.9939
Epoch 343/500
12599/12599 [=====] - 3s 264us/sample - loss: 0.0357
- accuracy: 0.9937
Epoch 344/500
12599/12599 [=====] - 4s 278us/sample - loss: 0.0355
- accuracy: 0.9929
Epoch 345/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0354
- accuracy: 0.9939
Epoch 346/500
12599/12599 [=====] - 3s 270us/sample - loss: 0.0349
- accuracy: 0.9937
Epoch 347/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0348
- accuracy: 0.9937
Epoch 348/500
12599/12599 [=====] - 3s 265us/sample - loss: 0.0354
- accuracy: 0.9935
Epoch 349/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0347
- accuracy: 0.9941
Epoch 350/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0350
```

```
- accuracy: 0.9937
Epoch 351/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0347
- accuracy: 0.9940
Epoch 352/500
12599/12599 [=====] - 4s 301us/sample - loss: 0.0345
- accuracy: 0.9937
Epoch 353/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0350
- accuracy: 0.9938
Epoch 354/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0342
- accuracy: 0.9940
Epoch 355/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.0346
- accuracy: 0.9940
Epoch 356/500
12599/12599 [=====] - 3s 266us/sample - loss: 0.0347
- accuracy: 0.9938
Epoch 357/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.0341
- accuracy: 0.9937
Epoch 358/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0340
- accuracy: 0.9937
```

```
Epoch 359/500
12599/12599 [=====] - 3s 277us/sample - loss: 0.0340
- accuracy: 0.9943
Epoch 360/500
12599/12599 [=====] - 4s 287us/sample - loss: 0.0344
- accuracy: 0.9940
Epoch 361/500
12599/12599 [=====] - 3s 260us/sample - loss: 0.0340
- accuracy: 0.9937
Epoch 362/500
12599/12599 [=====] - 4s 288us/sample - loss: 0.0342
- accuracy: 0.9940
Epoch 363/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0342
- accuracy: 0.9941
Epoch 364/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.0343
- accuracy: 0.9939
Epoch 365/500
12599/12599 [=====] - 4s 293us/sample - loss: 0.0342
- accuracy: 0.9939
Epoch 366/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0340
- accuracy: 0.9940
Epoch 367/500
```

```
12599/12599 [=====] - 4s 279us/sample - loss: 0.0344
- accuracy: 0.9940
Epoch 368/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0339
- accuracy: 0.9937
Epoch 369/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0336
- accuracy: 0.9941
Epoch 370/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0343
- accuracy: 0.9937
Epoch 371/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0338
- accuracy: 0.9937
Epoch 372/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0333
- accuracy: 0.9940
Epoch 373/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0338
- accuracy: 0.9940
Epoch 374/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0336
- accuracy: 0.9938
Epoch 375/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0331
```

```
- accuracy: 0.9944
Epoch 376/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0339
- accuracy: 0.9941
Epoch 377/500
12599/12599 [=====] - 3s 273us/sample - loss: 0.0330
- accuracy: 0.9940
Epoch 378/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0339
- accuracy: 0.9940
Epoch 379/500
12599/12599 [=====] - 3s 268us/sample - loss: 0.0330
- accuracy: 0.9940
Epoch 380/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0328
- accuracy: 0.9942
Epoch 381/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0331
- accuracy: 0.9938
Epoch 382/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0335
- accuracy: 0.9940
Epoch 383/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0332
- accuracy: 0.9940
```

```
Epoch 384/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0329
- accuracy: 0.9942
Epoch 385/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0335
- accuracy: 0.9937
Epoch 386/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0326
- accuracy: 0.9939
Epoch 387/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0329
- accuracy: 0.9938
Epoch 388/500
12599/12599 [=====] - 4s 278us/sample - loss: 0.0326
- accuracy: 0.9941
Epoch 389/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0317
- accuracy: 0.9942
Epoch 390/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0325
- accuracy: 0.9941
Epoch 391/500
12599/12599 [=====] - 3s 278us/sample - loss: 0.0327
- accuracy: 0.9938
Epoch 392/500
```

```
12599/12599 [=====] - 3s 277us/sample - loss: 0.0335
- accuracy: 0.9941
Epoch 393/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0325
- accuracy: 0.9944
Epoch 394/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0323
- accuracy: 0.9941
Epoch 395/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0320
- accuracy: 0.9938
Epoch 396/500
12599/12599 [=====] - 3s 270us/sample - loss: 0.0318
- accuracy: 0.9948
Epoch 397/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0324
- accuracy: 0.9940
Epoch 398/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0324
- accuracy: 0.9940
Epoch 399/500
12599/12599 [=====] - 3s 265us/sample - loss: 0.0325
- accuracy: 0.9940
Epoch 400/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0319
```

```
- accuracy: 0.9940
Epoch 401/500
12599/12599 [=====] - 3s 264us/sample - loss: 0.0320
- accuracy: 0.9947
Epoch 402/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0324
- accuracy: 0.9944
Epoch 403/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0321
- accuracy: 0.9940
Epoch 404/500
12599/12599 [=====] - 3s 260us/sample - loss: 0.0322
- accuracy: 0.9940
Epoch 405/500
12599/12599 [=====] - 4s 285us/sample - loss: 0.0315
- accuracy: 0.9939
Epoch 406/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0317
- accuracy: 0.9943
Epoch 407/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0327
- accuracy: 0.9939
Epoch 408/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0321
- accuracy: 0.9941
```



```
Epoch 409/500
12599/12599 [=====] - 3s 266us/sample - loss: 0.0318
- accuracy: 0.9942
Epoch 410/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0323
- accuracy: 0.9941
Epoch 411/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0316
- accuracy: 0.9943
Epoch 412/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0314
- accuracy: 0.9943
Epoch 413/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0317
- accuracy: 0.9940
Epoch 414/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.0318
- accuracy: 0.9943
Epoch 415/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0311
- accuracy: 0.9944
Epoch 416/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0317
- accuracy: 0.9941
Epoch 417/500
```

```
12599/12599 [=====] - 3s 275us/sample - loss: 0.0315
- accuracy: 0.9941
Epoch 418/500
12599/12599 [=====] - 4s 294us/sample - loss: 0.0312
- accuracy: 0.9937
Epoch 419/500
12599/12599 [=====] - 3s 270us/sample - loss: 0.0312
- accuracy: 0.9942
Epoch 420/500
12599/12599 [=====] - 3s 277us/sample - loss: 0.0315
- accuracy: 0.9944
Epoch 421/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0319
- accuracy: 0.9939
Epoch 422/500
12599/12599 [=====] - 3s 263us/sample - loss: 0.0309
- accuracy: 0.9944
Epoch 423/500
12599/12599 [=====] - 4s 287us/sample - loss: 0.0314
- accuracy: 0.9939
Epoch 424/500
12599/12599 [=====] - 3s 268us/sample - loss: 0.0313
- accuracy: 0.9940
Epoch 425/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0313
```

```
- accuracy: 0.9938
Epoch 426/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0311
- accuracy: 0.9945
Epoch 427/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0317
- accuracy: 0.9941
Epoch 428/500
12599/12599 [=====] - 4s 295us/sample - loss: 0.0310
- accuracy: 0.9947
Epoch 429/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0312
- accuracy: 0.9943
Epoch 430/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0304
- accuracy: 0.9946
Epoch 431/500
12599/12599 [=====] - 4s 293us/sample - loss: 0.0309
- accuracy: 0.9942
Epoch 432/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0305
- accuracy: 0.9943
Epoch 433/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0312
- accuracy: 0.9943
```

```
Epoch 434/500
12599/12599 [=====] - 3s 277us/sample - loss: 0.0311
- accuracy: 0.9941
Epoch 435/500
12599/12599 [=====] - 3s 261us/sample - loss: 0.0312
- accuracy: 0.9943
Epoch 436/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0305
- accuracy: 0.9940
Epoch 437/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0309
- accuracy: 0.9940
Epoch 438/500
12599/12599 [=====] - 4s 283us/sample - loss: 0.0305
- accuracy: 0.9941
Epoch 439/500
12599/12599 [=====] - 4s 311us/sample - loss: 0.0304
- accuracy: 0.9948
Epoch 440/500
12599/12599 [=====] - 3s 271us/sample - loss: 0.0307
- accuracy: 0.9944
Epoch 441/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0311
- accuracy: 0.9944
Epoch 442/500
```

```
12599/12599 [=====] - 4s 299us/sample - loss: 0.0303
- accuracy: 0.9947
Epoch 443/500
12599/12599 [=====] - 3s 275us/sample - loss: 0.0302
- accuracy: 0.9942
Epoch 444/500
12599/12599 [=====] - 4s 301us/sample - loss: 0.0303
- accuracy: 0.9944
Epoch 445/500
12599/12599 [=====] - 4s 312us/sample - loss: 0.0308
- accuracy: 0.9942
Epoch 446/500
12599/12599 [=====] - 4s 307us/sample - loss: 0.0306
- accuracy: 0.9942
Epoch 447/500
12599/12599 [=====] - 4s 337us/sample - loss: 0.0295
- accuracy: 0.9943
Epoch 448/500
12599/12599 [=====] - 4s 350us/sample - loss: 0.0310
- accuracy: 0.9941
Epoch 449/500
12599/12599 [=====] - 4s 287us/sample - loss: 0.0302
- accuracy: 0.9944
Epoch 450/500
12599/12599 [=====] - 4s 338us/sample - loss: 0.0303
```

```
- accuracy: 0.9940
Epoch 451/500
12599/12599 [=====] - 4s 299us/sample - loss: 0.0300
- accuracy: 0.9946
Epoch 452/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0298
- accuracy: 0.9948
Epoch 453/500
12599/12599 [=====] - 4s 281us/sample - loss: 0.0304
- accuracy: 0.9944
Epoch 454/500
12599/12599 [=====] - 3s 269us/sample - loss: 0.0307
- accuracy: 0.9941
Epoch 455/500
12599/12599 [=====] - 4s 282us/sample - loss: 0.0295
- accuracy: 0.9945
Epoch 456/500
12599/12599 [=====] - 4s 290us/sample - loss: 0.0298
- accuracy: 0.9946
Epoch 457/500
12599/12599 [=====] - 3s 272us/sample - loss: 0.0299
- accuracy: 0.9944
Epoch 458/500
12599/12599 [=====] - 4s 318us/sample - loss: 0.0301
- accuracy: 0.9950
```

```
Epoch 459/500
12599/12599 [=====] - 4s 323us/sample - loss: 0.0297
- accuracy: 0.9940
Epoch 460/500
12599/12599 [=====] - 4s 280us/sample - loss: 0.0297
- accuracy: 0.9946
Epoch 461/500
12599/12599 [=====] - 4s 317us/sample - loss: 0.0298
- accuracy: 0.9939
Epoch 462/500
12599/12599 [=====] - 4s 303us/sample - loss: 0.0307
- accuracy: 0.9943
Epoch 463/500
12599/12599 [=====] - 3s 277us/sample - loss: 0.0292
- accuracy: 0.9944
Epoch 464/500
12599/12599 [=====] - 4s 296us/sample - loss: 0.0296
- accuracy: 0.9944
Epoch 465/500
12599/12599 [=====] - 4s 344us/sample - loss: 0.0291
- accuracy: 0.9947
Epoch 466/500
12599/12599 [=====] - 4s 287us/sample - loss: 0.0300
- accuracy: 0.9940
Epoch 467/500
```

```
12599/12599 [=====] - 4s 284us/sample - loss: 0.0288
- accuracy: 0.9948
Epoch 468/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.0293
- accuracy: 0.9947
Epoch 469/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0290
- accuracy: 0.9949
Epoch 470/500
12599/12599 [=====] - 4s 309us/sample - loss: 0.0293
- accuracy: 0.9946
Epoch 471/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0296
- accuracy: 0.9947
Epoch 472/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0293
- accuracy: 0.9946
Epoch 473/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0299
- accuracy: 0.9946
Epoch 474/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0289
- accuracy: 0.9946
Epoch 475/500
12599/12599 [=====] - 4s 285us/sample - loss: 0.0295
```



```
- accuracy: 0.9945
Epoch 476/500
12599/12599 [=====] - 4s 301us/sample - loss: 0.0299
- accuracy: 0.9944
Epoch 477/500
12599/12599 [=====] - 4s 329us/sample - loss: 0.0290
- accuracy: 0.9946
Epoch 478/500
12599/12599 [=====] - 4s 301us/sample - loss: 0.0289
- accuracy: 0.9945
Epoch 479/500
12599/12599 [=====] - 4s 293us/sample - loss: 0.0291
- accuracy: 0.9946
Epoch 480/500
12599/12599 [=====] - 3s 266us/sample - loss: 0.0293
- accuracy: 0.9947
Epoch 481/500
12599/12599 [=====] - 4s 284us/sample - loss: 0.0293
- accuracy: 0.9947
Epoch 482/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0284
- accuracy: 0.9948
Epoch 483/500
12599/12599 [=====] - 3s 250us/sample - loss: 0.0289
- accuracy: 0.9942
```

```
Epoch 484/500
12599/12599 [=====] - 3s 255us/sample - loss: 0.0294
- accuracy: 0.9945
Epoch 485/500
12599/12599 [=====] - 4s 279us/sample - loss: 0.0285
- accuracy: 0.9945
Epoch 486/500
12599/12599 [=====] - 4s 289us/sample - loss: 0.0288
- accuracy: 0.9945
Epoch 487/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0286
- accuracy: 0.9948
Epoch 488/500
12599/12599 [=====] - 3s 262us/sample - loss: 0.0294
- accuracy: 0.9946
Epoch 489/500
12599/12599 [=====] - 3s 274us/sample - loss: 0.0292
- accuracy: 0.9943
Epoch 490/500
12599/12599 [=====] - 3s 277us/sample - loss: 0.0286
- accuracy: 0.9947
Epoch 491/500
12599/12599 [=====] - 3s 267us/sample - loss: 0.0287
- accuracy: 0.9948
Epoch 492/500
```

```
12599/12599 [=====] - 3s 246us/sample - loss: 0.0291
- accuracy: 0.9944
Epoch 493/500
12599/12599 [=====] - 3s 254us/sample - loss: 0.0288
- accuracy: 0.9945
Epoch 494/500
12599/12599 [=====] - 3s 244us/sample - loss: 0.0295
- accuracy: 0.9949
Epoch 495/500
12599/12599 [=====] - 3s 258us/sample - loss: 0.0283
- accuracy: 0.9945
Epoch 496/500
12599/12599 [=====] - 4s 278us/sample - loss: 0.0288
- accuracy: 0.9946
Epoch 497/500
12599/12599 [=====] - 3s 276us/sample - loss: 0.0290
- accuracy: 0.9943
Epoch 498/500
12599/12599 [=====] - 4s 292us/sample - loss: 0.0288
- accuracy: 0.9945
Epoch 499/500
12599/12599 [=====] - 4s 352us/sample - loss: 0.0282
- accuracy: 0.9946
Epoch 500/500
12599/12599 [=====] - 4s 294us/sample - loss: 0.0274
```

```
- accuracy: 0.9945
2891/2891 [=====] - 1s 435us/sample

class_weight_Fold_2: {0: 0.10994851208656947, 1: 9.94657894736842}
```

```
pos_weight: 0.9
thresholdNum: 0.5
```

```
Average of train loss Fold_2: 0.0642
Average of yPredProbability Fold_2: 0.0988
```

classification_report_Fold_2:		precision	recall	f1-score	support
Normal	0	1.00	0.92	0.95	2881
Anomaly	1	0.00	0.00	0.00	10
accuracy				0.91	2891
macro avg		0.50	0.46	0.48	2891
weighted avg		0.99	0.91	0.95	2891

```
confusion_matrix_Fold_2:
```

True Negatives: 2639
False Positives: 242
False Negatives: 10
True Positives: 0

End running time Fold_2: 210608_232116 ,-----.

Start running time Fold_3: 210608_232116 ,-----:

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: 210608_232116
,+++++

Data Augmentation MSE Label 1==> mean: 0.000552, min: 0.000142, max: 0.001573

Data Augmentation MSE Label 1==> mean: 0.000257, min: 2.3e-05, max: 0.000851

Data Augmentation MSE Label 1==> mean: 0.000252, min: 3e-06, max: 0.000946

Data Augmentation	MSE	Label 1==>	mean: 0.000307,	min: 0.0,	max: 0.001228
Data Augmentation	MSE	Label 1==>	mean: 0.00041,	min: 0.0,	max: 0.002452
Data Augmentation	MSE	Label 1==>	mean: 0.000547,	min: 0.0,	max: 0.004221
Data Augmentation	MSE	Label 1==>	mean: 0.000694,	min: 0.0,	max: 0.005413
Data Augmentation	MSE	Label 1==>	mean: 0.000837,	min: 0.0,	max: 0.005176
Data Augmentation	MSE	Label 1==>	mean: 0.001092,	min: 0.0,	max: 0.008865
Data Augmentation	MSE	Label 1==>	mean: 0.001511,	min: 0.0,	max: 0.014668
Data Augmentation	MSE	Label 1==>	mean: 0.001437,	min: 0.0,	max: 0.011985
Data Augmentation	MSE	Label 1==>	mean: 0.001194,	min: 0.0,	max: 0.006074
Data Augmentation	MSE	Label 1==>	mean: 0.001198,	min: 0.0,	max: 0.013762
Data Augmentation	MSE	Label 1==>	mean: 0.001162,	min: 0.0,	max: 0.008539

MSE All generated Augmented data Fold_3:

mean: 0.000818

min: 1.2e-05

max: 0.006125

End running time Data Augmentation_Fold_3: 210608_232213
,+++++

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 [=====] - 9s 689us/sample - loss: 3.0460

- accuracy: 0.9106

Epoch 2/500

12534/12534 [=====] - 4s 311us/sample - loss: 1.3492

- accuracy: 0.9231

Epoch 3/500

```
12534/12534 [=====] - 4s 322us/sample - loss: 0.6365
- accuracy: 0.9301
Epoch 4/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.3594
- accuracy: 0.9334
Epoch 5/500
12534/12534 [=====] - 4s 315us/sample - loss: 0.2589
- accuracy: 0.9363
Epoch 6/500
12534/12534 [=====] - 4s 315us/sample - loss: 0.2216
- accuracy: 0.9375
Epoch 7/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.2069
- accuracy: 0.9400
Epoch 8/500
12534/12534 [=====] - 4s 290us/sample - loss: 0.1989
- accuracy: 0.9418
Epoch 9/500
12534/12534 [=====] - 5s 395us/sample - loss: 0.1942
- accuracy: 0.9441
Epoch 10/500
12534/12534 [=====] - 5s 413us/sample - loss: 0.1893
- accuracy: 0.9454
Epoch 11/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.1862
```



```
- accuracy: 0.9463
Epoch 12/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.1823
- accuracy: 0.9481
Epoch 13/500
12534/12534 [=====] - 4s 337us/sample - loss: 0.1790
- accuracy: 0.9486
Epoch 14/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.1753
- accuracy: 0.9511
Epoch 15/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.1720
- accuracy: 0.9509
Epoch 16/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.1686
- accuracy: 0.9528
Epoch 17/500
12534/12534 [=====] - 3s 271us/sample - loss: 0.1652
- accuracy: 0.9540
Epoch 18/500
12534/12534 [=====] - 4s 300us/sample - loss: 0.1616
- accuracy: 0.9567
Epoch 19/500
12534/12534 [=====] - 3s 268us/sample - loss: 0.1588
- accuracy: 0.9558
```

```
Epoch 20/500
12534/12534 [=====] - 4s 285us/sample - loss: 0.1560
- accuracy: 0.9577
Epoch 21/500
12534/12534 [=====] - 4s 303us/sample - loss: 0.1526
- accuracy: 0.9592
Epoch 22/500
12534/12534 [=====] - 4s 293us/sample - loss: 0.1492
- accuracy: 0.9607
Epoch 23/500
12534/12534 [=====] - 4s 341us/sample - loss: 0.1468
- accuracy: 0.9615
Epoch 24/500
12534/12534 [=====] - 4s 290us/sample - loss: 0.1441
- accuracy: 0.9622
Epoch 25/500
12534/12534 [=====] - 3s 264us/sample - loss: 0.1405
- accuracy: 0.9638
Epoch 26/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.1383
- accuracy: 0.9646
Epoch 27/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.1358
- accuracy: 0.9652
Epoch 28/500
```

```
12534/12534 [=====] - 4s 283us/sample - loss: 0.1334
- accuracy: 0.9667
Epoch 29/500
12534/12534 [=====] - 4s 313us/sample - loss: 0.1306
- accuracy: 0.9673
Epoch 30/500
12534/12534 [=====] - 4s 319us/sample - loss: 0.1284
- accuracy: 0.9671
Epoch 31/500
12534/12534 [=====] - 4s 309us/sample - loss: 0.1262
- accuracy: 0.9680
Epoch 32/500
12534/12534 [=====] - 4s 340us/sample - loss: 0.1247
- accuracy: 0.9696
Epoch 33/500
12534/12534 [=====] - 4s 341us/sample - loss: 0.1223
- accuracy: 0.9693
Epoch 34/500
12534/12534 [=====] - 4s 294us/sample - loss: 0.1202
- accuracy: 0.9705
Epoch 35/500
12534/12534 [=====] - 4s 303us/sample - loss: 0.1189
- accuracy: 0.9710
Epoch 36/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.1167
```

```
- accuracy: 0.9722
Epoch 37/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.1148
- accuracy: 0.9734
Epoch 38/500
12534/12534 [=====] - 4s 291us/sample - loss: 0.1130
- accuracy: 0.9734
Epoch 39/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.1117
- accuracy: 0.9736
Epoch 40/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.1105
- accuracy: 0.9744
Epoch 41/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.1087
- accuracy: 0.9750
Epoch 42/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.1068
- accuracy: 0.9744
Epoch 43/500
12534/12534 [=====] - 4s 307us/sample - loss: 0.1058
- accuracy: 0.9761
Epoch 44/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.1047
- accuracy: 0.9773
```

```
Epoch 45/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.1032
- accuracy: 0.9777
Epoch 46/500
12534/12534 [=====] - 4s 313us/sample - loss: 0.1019
- accuracy: 0.9761
Epoch 47/500
12534/12534 [=====] - 4s 290us/sample - loss: 0.1006
- accuracy: 0.9776
Epoch 48/500
12534/12534 [=====] - 3s 276us/sample - loss: 0.1002
- accuracy: 0.9774
Epoch 49/500
12534/12534 [=====] - 4s 303us/sample - loss: 0.0986
- accuracy: 0.9777
Epoch 50/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0975
- accuracy: 0.9787
Epoch 51/500
12534/12534 [=====] - 4s 320us/sample - loss: 0.0963
- accuracy: 0.9796
Epoch 52/500
12534/12534 [=====] - 4s 309us/sample - loss: 0.0952
- accuracy: 0.9793
Epoch 53/500
```

```
12534/12534 [=====] - 4s 304us/sample - loss: 0.0947
- accuracy: 0.9788
Epoch 54/500
12534/12534 [=====] - 4s 292us/sample - loss: 0.0929
- accuracy: 0.9810
Epoch 55/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0924
- accuracy: 0.9804
Epoch 56/500
12534/12534 [=====] - 4s 279us/sample - loss: 0.0910
- accuracy: 0.9813
Epoch 57/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0905
- accuracy: 0.9809
Epoch 58/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0894
- accuracy: 0.9813
Epoch 59/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0889
- accuracy: 0.9807
Epoch 60/500
12534/12534 [=====] - 3s 268us/sample - loss: 0.0884
- accuracy: 0.9807
Epoch 61/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0870
```

```
- accuracy: 0.9819
Epoch 62/500
12534/12534 [=====] - 4s 306us/sample - loss: 0.0862
- accuracy: 0.9823
Epoch 63/500
12534/12534 [=====] - 4s 290us/sample - loss: 0.0849
- accuracy: 0.9821
Epoch 64/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0841
- accuracy: 0.9825
Epoch 65/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0830
- accuracy: 0.9831
Epoch 66/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0830
- accuracy: 0.9826
Epoch 67/500
12534/12534 [=====] - 3s 271us/sample - loss: 0.0818
- accuracy: 0.9825
Epoch 68/500
12534/12534 [=====] - 3s 260us/sample - loss: 0.0814
- accuracy: 0.9831
Epoch 69/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0808
- accuracy: 0.9835
```

```
Epoch 70/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0801
- accuracy: 0.9844
Epoch 71/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0791
- accuracy: 0.9840
Epoch 72/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0788
- accuracy: 0.9843
Epoch 73/500
12534/12534 [=====] - 3s 266us/sample - loss: 0.0780
- accuracy: 0.9845
Epoch 74/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0776
- accuracy: 0.9852
Epoch 75/500
12534/12534 [=====] - 4s 290us/sample - loss: 0.0760
- accuracy: 0.9850
Epoch 76/500
12534/12534 [=====] - 3s 271us/sample - loss: 0.0763
- accuracy: 0.9846
Epoch 77/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.0761
- accuracy: 0.9849
Epoch 78/500
```



```
12534/12534 [=====] - 4s 307us/sample - loss: 0.0750
- accuracy: 0.9846
Epoch 79/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0743
- accuracy: 0.9848
Epoch 80/500
12534/12534 [=====] - 4s 338us/sample - loss: 0.0730
- accuracy: 0.9850
Epoch 81/500
12534/12534 [=====] - 4s 340us/sample - loss: 0.0735
- accuracy: 0.9858
Epoch 82/500
12534/12534 [=====] - 4s 302us/sample - loss: 0.0723
- accuracy: 0.9858
Epoch 83/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0726
- accuracy: 0.9860
Epoch 84/500
12534/12534 [=====] - 5s 421us/sample - loss: 0.0716
- accuracy: 0.9860
Epoch 85/500
12534/12534 [=====] - 4s 292us/sample - loss: 0.0711
- accuracy: 0.9857
Epoch 86/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0701
```

```
- accuracy: 0.9859
Epoch 87/500
12534/12534 [=====] - 4s 300us/sample - loss: 0.0701
- accuracy: 0.9864
Epoch 88/500
12534/12534 [=====] - 4s 291us/sample - loss: 0.0700
- accuracy: 0.9864
Epoch 89/500
12534/12534 [=====] - 4s 314us/sample - loss: 0.0691
- accuracy: 0.9860
Epoch 90/500
12534/12534 [=====] - 4s 341us/sample - loss: 0.0687
- accuracy: 0.9868
Epoch 91/500
12534/12534 [=====] - 5s 369us/sample - loss: 0.0680
- accuracy: 0.9862
Epoch 92/500
12534/12534 [=====] - 4s 303us/sample - loss: 0.0669
- accuracy: 0.9865
Epoch 93/500
12534/12534 [=====] - 4s 301us/sample - loss: 0.0670
- accuracy: 0.9869
Epoch 94/500
12534/12534 [=====] - 3s 272us/sample - loss: 0.0672
- accuracy: 0.9865
```

```
Epoch 95/500
12534/12534 [=====] - 4s 302us/sample - loss: 0.0660
- accuracy: 0.9874
Epoch 96/500
12534/12534 [=====] - 4s 304us/sample - loss: 0.0668
- accuracy: 0.9873
Epoch 97/500
12534/12534 [=====] - 4s 295us/sample - loss: 0.0661
- accuracy: 0.9872
Epoch 98/500
12534/12534 [=====] - 4s 313us/sample - loss: 0.0649
- accuracy: 0.9876
Epoch 99/500
12534/12534 [=====] - 4s 301us/sample - loss: 0.0647
- accuracy: 0.9876
Epoch 100/500
12534/12534 [=====] - 4s 300us/sample - loss: 0.0639
- accuracy: 0.9876
Epoch 101/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0639
- accuracy: 0.9874
Epoch 102/500
12534/12534 [=====] - 4s 302us/sample - loss: 0.0635
- accuracy: 0.9879
Epoch 103/500
```

```
12534/12534 [=====] - 3s 276us/sample - loss: 0.0631
- accuracy: 0.9881
Epoch 104/500
12534/12534 [=====] - 4s 279us/sample - loss: 0.0622
- accuracy: 0.9879
Epoch 105/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0628
- accuracy: 0.9878
Epoch 106/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0626
- accuracy: 0.9876
Epoch 107/500
12534/12534 [=====] - 4s 332us/sample - loss: 0.0619
- accuracy: 0.9879
Epoch 108/500
12534/12534 [=====] - 4s 294us/sample - loss: 0.0622
- accuracy: 0.9873
Epoch 109/500
12534/12534 [=====] - 4s 290us/sample - loss: 0.0614
- accuracy: 0.9884
Epoch 110/500
12534/12534 [=====] - 4s 306us/sample - loss: 0.0608
- accuracy: 0.9881
Epoch 111/500
12534/12534 [=====] - 4s 291us/sample - loss: 0.0602
```

```
- accuracy: 0.9885
Epoch 112/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0603
- accuracy: 0.9883
Epoch 113/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0595
- accuracy: 0.9888
Epoch 114/500
12534/12534 [=====] - 3s 272us/sample - loss: 0.0597
- accuracy: 0.9888
Epoch 115/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0593
- accuracy: 0.9889
Epoch 116/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0583
- accuracy: 0.9890
Epoch 117/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0576
- accuracy: 0.9897
Epoch 118/500
12534/12534 [=====] - 4s 322us/sample - loss: 0.0581
- accuracy: 0.9894
Epoch 119/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0586
- accuracy: 0.9890
```

```
Epoch 120/500
12534/12534 [=====] - 4s 322us/sample - loss: 0.0583
- accuracy: 0.9888
Epoch 121/500
12534/12534 [=====] - 4s 295us/sample - loss: 0.0573
- accuracy: 0.9891
Epoch 122/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0572
- accuracy: 0.9889
Epoch 123/500
12534/12534 [=====] - 4s 285us/sample - loss: 0.0562
- accuracy: 0.9888
Epoch 124/500
12534/12534 [=====] - 4s 333us/sample - loss: 0.0561
- accuracy: 0.9892
Epoch 125/500
12534/12534 [=====] - 4s 292us/sample - loss: 0.0559
- accuracy: 0.9894
Epoch 126/500
12534/12534 [=====] - 4s 332us/sample - loss: 0.0559
- accuracy: 0.9896
Epoch 127/500
12534/12534 [=====] - 4s 321us/sample - loss: 0.0556
- accuracy: 0.9894
Epoch 128/500
```

```
12534/12534 [=====] - 3s 275us/sample - loss: 0.0553
- accuracy: 0.9897
Epoch 129/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0553
- accuracy: 0.9899
Epoch 130/500
12534/12534 [=====] - 4s 303us/sample - loss: 0.0544
- accuracy: 0.9902
Epoch 131/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0546
- accuracy: 0.9899
Epoch 132/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0545
- accuracy: 0.9897
Epoch 133/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0546
- accuracy: 0.9899
Epoch 134/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0540
- accuracy: 0.9894
Epoch 135/500
12534/12534 [=====] - 4s 321us/sample - loss: 0.0535
- accuracy: 0.9904
Epoch 136/500
12534/12534 [=====] - 4s 293us/sample - loss: 0.0536
```

```
- accuracy: 0.9894
Epoch 137/500
12534/12534 [=====] - 4s 323us/sample - loss: 0.0531
- accuracy: 0.9900
Epoch 138/500
12534/12534 [=====] - 4s 291us/sample - loss: 0.0538
- accuracy: 0.9901
Epoch 139/500
12534/12534 [=====] - 4s 299us/sample - loss: 0.0530
- accuracy: 0.9904
Epoch 140/500
12534/12534 [=====] - 4s 302us/sample - loss: 0.0525
- accuracy: 0.9903
Epoch 141/500
12534/12534 [=====] - 4s 318us/sample - loss: 0.0519
- accuracy: 0.9897
Epoch 142/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0527
- accuracy: 0.9904
Epoch 143/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0520
- accuracy: 0.9899
Epoch 144/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.0520
- accuracy: 0.9900
```



```
Epoch 145/500
12534/12534 [=====] - 4s 300us/sample - loss: 0.0513
- accuracy: 0.9906
Epoch 146/500
12534/12534 [=====] - 4s 301us/sample - loss: 0.0507
- accuracy: 0.9909
Epoch 147/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0507
- accuracy: 0.9909
Epoch 148/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0511
- accuracy: 0.9907
Epoch 149/500
12534/12534 [=====] - 4s 341us/sample - loss: 0.0509
- accuracy: 0.9907
Epoch 150/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0507
- accuracy: 0.9911
Epoch 151/500
12534/12534 [=====] - 4s 291us/sample - loss: 0.0505
- accuracy: 0.9905
Epoch 152/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0503
- accuracy: 0.9908
Epoch 153/500
```

```
12534/12534 [=====] - 3s 277us/sample - loss: 0.0499
- accuracy: 0.9911
Epoch 154/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0499
- accuracy: 0.9910
Epoch 155/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0486
- accuracy: 0.9913
Epoch 156/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0504
- accuracy: 0.9907
Epoch 157/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0492
- accuracy: 0.9919
Epoch 158/500
12534/12534 [=====] - 3s 276us/sample - loss: 0.0488
- accuracy: 0.9911
Epoch 159/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0494
- accuracy: 0.9905
Epoch 160/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0488
- accuracy: 0.9913
Epoch 161/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0480
```

```
- accuracy: 0.9909
Epoch 162/500
12534/12534 [=====] - 4s 298us/sample - loss: 0.0475
- accuracy: 0.9919
Epoch 163/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0481
- accuracy: 0.9911
Epoch 164/500
12534/12534 [=====] - 3s 276us/sample - loss: 0.0476
- accuracy: 0.9915
Epoch 165/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0476
- accuracy: 0.9915
Epoch 166/500
12534/12534 [=====] - 4s 319us/sample - loss: 0.0473
- accuracy: 0.9916
Epoch 167/500
12534/12534 [=====] - 4s 297us/sample - loss: 0.0471
- accuracy: 0.9915
Epoch 168/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0469
- accuracy: 0.9915
Epoch 169/500
12534/12534 [=====] - 4s 292us/sample - loss: 0.0475
- accuracy: 0.9913
```

```
Epoch 170/500
12534/12534 [=====] - 4s 298us/sample - loss: 0.0468
- accuracy: 0.9920
Epoch 171/500
12534/12534 [=====] - 4s 298us/sample - loss: 0.0464
- accuracy: 0.9915
Epoch 172/500
12534/12534 [=====] - 4s 319us/sample - loss: 0.0458
- accuracy: 0.9919
Epoch 173/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.0465
- accuracy: 0.9917
Epoch 174/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0464
- accuracy: 0.9917
Epoch 175/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0462
- accuracy: 0.9912
Epoch 176/500
12534/12534 [=====] - 4s 312us/sample - loss: 0.0460
- accuracy: 0.9915
Epoch 177/500
12534/12534 [=====] - 4s 306us/sample - loss: 0.0446
- accuracy: 0.9919
Epoch 178/500
```

```
12534/12534 [=====] - 4s 292us/sample - loss: 0.0458
- accuracy: 0.9918
Epoch 179/500
12534/12534 [=====] - 4s 307us/sample - loss: 0.0453
- accuracy: 0.9915
Epoch 180/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0451
- accuracy: 0.9920
Epoch 181/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.0454
- accuracy: 0.9915
Epoch 182/500
12534/12534 [=====] - 3s 264us/sample - loss: 0.0448
- accuracy: 0.9916
Epoch 183/500
12534/12534 [=====] - 4s 293us/sample - loss: 0.0449
- accuracy: 0.9917
Epoch 184/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0447
- accuracy: 0.9917
Epoch 185/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0451
- accuracy: 0.9911
Epoch 186/500
12534/12534 [=====] - 3s 276us/sample - loss: 0.0442
```

```
- accuracy: 0.9916
Epoch 187/500
12534/12534 [=====] - 3s 266us/sample - loss: 0.0438
- accuracy: 0.9918
Epoch 188/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0442
- accuracy: 0.9921
Epoch 189/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.0446
- accuracy: 0.9916
Epoch 190/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0433
- accuracy: 0.9918
Epoch 191/500
12534/12534 [=====] - 4s 298us/sample - loss: 0.0444
- accuracy: 0.9922
Epoch 192/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0424
- accuracy: 0.9924
Epoch 193/500
12534/12534 [=====] - 4s 302us/sample - loss: 0.0438
- accuracy: 0.9922
Epoch 194/500
12534/12534 [=====] - 4s 301us/sample - loss: 0.0436
- accuracy: 0.9920
```

```
Epoch 195/500
12534/12534 [=====] - 5s 363us/sample - loss: 0.0430
- accuracy: 0.9917
Epoch 196/500
12534/12534 [=====] - 4s 326us/sample - loss: 0.0426
- accuracy: 0.9927
Epoch 197/500
12534/12534 [=====] - 4s 313us/sample - loss: 0.0428
- accuracy: 0.9928
Epoch 198/500
12534/12534 [=====] - 4s 333us/sample - loss: 0.0427
- accuracy: 0.9919
Epoch 199/500
12534/12534 [=====] - 4s 298us/sample - loss: 0.0427
- accuracy: 0.9920
Epoch 200/500
12534/12534 [=====] - 4s 301us/sample - loss: 0.0417
- accuracy: 0.9923
Epoch 201/500
12534/12534 [=====] - 4s 316us/sample - loss: 0.0427
- accuracy: 0.9923
Epoch 202/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0422
- accuracy: 0.9919
Epoch 203/500
```

```
12534/12534 [=====] - 4s 328us/sample - loss: 0.0417
- accuracy: 0.9930
Epoch 204/500
12534/12534 [=====] - 4s 309us/sample - loss: 0.0424
- accuracy: 0.9922
Epoch 205/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0415
- accuracy: 0.9926
Epoch 206/500
12534/12534 [=====] - 4s 305us/sample - loss: 0.0414
- accuracy: 0.9927
Epoch 207/500
12534/12534 [=====] - 4s 324us/sample - loss: 0.0414
- accuracy: 0.9919
Epoch 208/500
12534/12534 [=====] - 4s 312us/sample - loss: 0.0415
- accuracy: 0.9926
Epoch 209/500
12534/12534 [=====] - 4s 303us/sample - loss: 0.0412
- accuracy: 0.9919
Epoch 210/500
12534/12534 [=====] - 4s 327us/sample - loss: 0.0417
- accuracy: 0.9924
Epoch 211/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0414
```



```
- accuracy: 0.9927
Epoch 212/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0410
- accuracy: 0.9927
Epoch 213/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0396
- accuracy: 0.9924
Epoch 214/500
12534/12534 [=====] - 4s 295us/sample - loss: 0.0407
- accuracy: 0.9925
Epoch 215/500
12534/12534 [=====] - 4s 359us/sample - loss: 0.0417
- accuracy: 0.9927
Epoch 216/500
12534/12534 [=====] - 4s 325us/sample - loss: 0.0409
- accuracy: 0.9927
Epoch 217/500
12534/12534 [=====] - 4s 347us/sample - loss: 0.0403
- accuracy: 0.9923
Epoch 218/500
12534/12534 [=====] - 5s 390us/sample - loss: 0.0408
- accuracy: 0.9927
Epoch 219/500
12534/12534 [=====] - 5s 360us/sample - loss: 0.0408
- accuracy: 0.9921
```

```
Epoch 220/500
12534/12534 [=====] - 3s 271us/sample - loss: 0.0403
- accuracy: 0.9925
Epoch 221/500
12534/12534 [=====] - 4s 315us/sample - loss: 0.0400
- accuracy: 0.9923
Epoch 222/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0395
- accuracy: 0.9931
Epoch 223/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0395
- accuracy: 0.9929
Epoch 224/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0399
- accuracy: 0.9926
Epoch 225/500
12534/12534 [=====] - 4s 293us/sample - loss: 0.0395
- accuracy: 0.9927
Epoch 226/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0395
- accuracy: 0.9923
Epoch 227/500
12534/12534 [=====] - 4s 289us/sample - loss: 0.0396
- accuracy: 0.9923
Epoch 228/500
```

```
12534/12534 [=====] - 4s 322us/sample - loss: 0.0390
- accuracy: 0.9927
Epoch 229/500
12534/12534 [=====] - 4s 315us/sample - loss: 0.0395
- accuracy: 0.9927
Epoch 230/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0388
- accuracy: 0.9931
Epoch 231/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0387
- accuracy: 0.9932
Epoch 232/500
12534/12534 [=====] - 4s 298us/sample - loss: 0.0394
- accuracy: 0.9927
Epoch 233/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0387
- accuracy: 0.9927
Epoch 234/500
12534/12534 [=====] - 4s 320us/sample - loss: 0.0384
- accuracy: 0.9922
Epoch 235/500
12534/12534 [=====] - 5s 423us/sample - loss: 0.0382
- accuracy: 0.9934
Epoch 236/500
12534/12534 [=====] - 4s 310us/sample - loss: 0.0389
```

```
- accuracy: 0.9923
Epoch 237/500
12534/12534 [=====] - 4s 303us/sample - loss: 0.0382
- accuracy: 0.9933
Epoch 238/500
12534/12534 [=====] - 5s 390us/sample - loss: 0.0388
- accuracy: 0.9930
Epoch 239/500
12534/12534 [=====] - 5s 427us/sample - loss: 0.0382
- accuracy: 0.9933
Epoch 240/500
12534/12534 [=====] - 5s 397us/sample - loss: 0.0375
- accuracy: 0.9936
Epoch 241/500
12534/12534 [=====] - 4s 311us/sample - loss: 0.0380
- accuracy: 0.9926
Epoch 242/500
12534/12534 [=====] - 4s 321us/sample - loss: 0.0384
- accuracy: 0.9931
Epoch 243/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0374
- accuracy: 0.9930
Epoch 244/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0382
- accuracy: 0.9930
```

```
Epoch 245/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0383
- accuracy: 0.9932
Epoch 246/500
12534/12534 [=====] - 4s 318us/sample - loss: 0.0375
- accuracy: 0.9930
Epoch 247/500
12534/12534 [=====] - 4s 312us/sample - loss: 0.0375
- accuracy: 0.9932
Epoch 248/500
12534/12534 [=====] - 4s 305us/sample - loss: 0.0376
- accuracy: 0.9932
Epoch 249/500
12534/12534 [=====] - 4s 300us/sample - loss: 0.0375
- accuracy: 0.9933
Epoch 250/500
12534/12534 [=====] - 4s 295us/sample - loss: 0.0364
- accuracy: 0.9931
Epoch 251/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0365
- accuracy: 0.9931
Epoch 252/500
12534/12534 [=====] - 4s 314us/sample - loss: 0.0367
- accuracy: 0.9930
Epoch 253/500
```

```
12534/12534 [=====] - 4s 283us/sample - loss: 0.0377
- accuracy: 0.9931
Epoch 254/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0365
- accuracy: 0.9934
Epoch 255/500
12534/12534 [=====] - 4s 302us/sample - loss: 0.0367
- accuracy: 0.9933
Epoch 256/500
12534/12534 [=====] - 4s 297us/sample - loss: 0.0366
- accuracy: 0.9927
Epoch 257/500
12534/12534 [=====] - 4s 333us/sample - loss: 0.0367
- accuracy: 0.9932
Epoch 258/500
12534/12534 [=====] - 4s 295us/sample - loss: 0.0365
- accuracy: 0.9931
Epoch 259/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0361
- accuracy: 0.9938
Epoch 260/500
12534/12534 [=====] - 3s 276us/sample - loss: 0.0369
- accuracy: 0.9935
Epoch 261/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0360
```

```
- accuracy: 0.9929
Epoch 262/500
12534/12534 [=====] - 4s 291us/sample - loss: 0.0362
- accuracy: 0.9935
Epoch 263/500
12534/12534 [=====] - 4s 312us/sample - loss: 0.0360
- accuracy: 0.9931
Epoch 264/500
12534/12534 [=====] - 4s 321us/sample - loss: 0.0357
- accuracy: 0.9931
Epoch 265/500
12534/12534 [=====] - 4s 299us/sample - loss: 0.0356
- accuracy: 0.9931
Epoch 266/500
12534/12534 [=====] - 4s 308us/sample - loss: 0.0363
- accuracy: 0.9927
Epoch 267/500
12534/12534 [=====] - 4s 323us/sample - loss: 0.0357
- accuracy: 0.9933
Epoch 268/500
12534/12534 [=====] - 4s 306us/sample - loss: 0.0356
- accuracy: 0.9933
Epoch 269/500
12534/12534 [=====] - 5s 361us/sample - loss: 0.0352
- accuracy: 0.9936
```

```
Epoch 270/500
12534/12534 [=====] - 5s 394us/sample - loss: 0.0355
- accuracy: 0.9939
Epoch 271/500
12534/12534 [=====] - 4s 315us/sample - loss: 0.0359
- accuracy: 0.9939
Epoch 272/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0350
- accuracy: 0.9936
Epoch 273/500
12534/12534 [=====] - 4s 306us/sample - loss: 0.0352
- accuracy: 0.9932
Epoch 274/500
12534/12534 [=====] - 5s 369us/sample - loss: 0.0348
- accuracy: 0.9939
Epoch 275/500
12534/12534 [=====] - 4s 301us/sample - loss: 0.0344
- accuracy: 0.9937
Epoch 276/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0353
- accuracy: 0.9932
Epoch 277/500
12534/12534 [=====] - 4s 292us/sample - loss: 0.0344
- accuracy: 0.9936
Epoch 278/500
```



```
12534/12534 [=====] - 4s 307us/sample - loss: 0.0348
- accuracy: 0.9935
Epoch 279/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0348
- accuracy: 0.9935
Epoch 280/500
12534/12534 [=====] - 4s 302us/sample - loss: 0.0352
- accuracy: 0.9934
Epoch 281/500
12534/12534 [=====] - 4s 307us/sample - loss: 0.0343
- accuracy: 0.9936
Epoch 282/500
12534/12534 [=====] - 4s 326us/sample - loss: 0.0343
- accuracy: 0.9935
Epoch 283/500
12534/12534 [=====] - 4s 289us/sample - loss: 0.0344
- accuracy: 0.9935
Epoch 284/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0339
- accuracy: 0.9938
Epoch 285/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0339
- accuracy: 0.9939
Epoch 286/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0341
```

```
- accuracy: 0.9936
Epoch 287/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0344
- accuracy: 0.9935
Epoch 288/500
12534/12534 [=====] - 3s 272us/sample - loss: 0.0339
- accuracy: 0.9942
Epoch 289/500
12534/12534 [=====] - 3s 268us/sample - loss: 0.0343
- accuracy: 0.9935
Epoch 290/500
12534/12534 [=====] - 4s 292us/sample - loss: 0.0338
- accuracy: 0.9939
Epoch 291/500
12534/12534 [=====] - 3s 272us/sample - loss: 0.0332
- accuracy: 0.9935
Epoch 292/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0347
- accuracy: 0.9938
Epoch 293/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0332
- accuracy: 0.9939
Epoch 294/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0334
- accuracy: 0.9935
```

```
Epoch 295/500
12534/12534 [=====] - 4s 295us/sample - loss: 0.0336
- accuracy: 0.9937
Epoch 296/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0344
- accuracy: 0.9934
Epoch 297/500
12534/12534 [=====] - 4s 292us/sample - loss: 0.0335
- accuracy: 0.9937
Epoch 298/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0333
- accuracy: 0.9936
Epoch 299/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0335
- accuracy: 0.9938
Epoch 300/500
12534/12534 [=====] - 4s 318us/sample - loss: 0.0331
- accuracy: 0.9939
Epoch 301/500
12534/12534 [=====] - 4s 305us/sample - loss: 0.0335
- accuracy: 0.9935
Epoch 302/500
12534/12534 [=====] - 4s 320us/sample - loss: 0.0330
- accuracy: 0.9937
Epoch 303/500
```

```
12534/12534 [=====] - 4s 295us/sample - loss: 0.0330
- accuracy: 0.9936
Epoch 304/500
12534/12534 [=====] - 4s 316us/sample - loss: 0.0337
- accuracy: 0.9936
Epoch 305/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0330
- accuracy: 0.9937
Epoch 306/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0326
- accuracy: 0.9941
Epoch 307/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0327
- accuracy: 0.9936
Epoch 308/500
12534/12534 [=====] - 4s 299us/sample - loss: 0.0329
- accuracy: 0.9943
Epoch 309/500
12534/12534 [=====] - 4s 299us/sample - loss: 0.0327
- accuracy: 0.9936
Epoch 310/500
12534/12534 [=====] - 3s 279us/sample - loss: 0.0326
- accuracy: 0.9940
Epoch 311/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0329
```

```
- accuracy: 0.9937
Epoch 312/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.0321
- accuracy: 0.9942
Epoch 313/500
12534/12534 [=====] - 3s 267us/sample - loss: 0.0323
- accuracy: 0.9940
Epoch 314/500
12534/12534 [=====] - 4s 310us/sample - loss: 0.0317
- accuracy: 0.9941
Epoch 315/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0327
- accuracy: 0.9935
Epoch 316/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0330
- accuracy: 0.9939
Epoch 317/500
12534/12534 [=====] - 4s 315us/sample - loss: 0.0326
- accuracy: 0.9934
Epoch 318/500
12534/12534 [=====] - 4s 298us/sample - loss: 0.0321
- accuracy: 0.9939
Epoch 319/500
12534/12534 [=====] - 4s 301us/sample - loss: 0.0321
- accuracy: 0.9940
```

```
Epoch 320/500
12534/12534 [=====] - 3s 279us/sample - loss: 0.0318
- accuracy: 0.9937
Epoch 321/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0325
- accuracy: 0.9931
Epoch 322/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0323
- accuracy: 0.9941
Epoch 323/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0312
- accuracy: 0.9941
Epoch 324/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0313
- accuracy: 0.9942
Epoch 325/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0313
- accuracy: 0.9938
Epoch 326/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0315
- accuracy: 0.9943
Epoch 327/500
12534/12534 [=====] - 3s 271us/sample - loss: 0.0314
- accuracy: 0.9938
Epoch 328/500
```

```
12534/12534 [=====] - 4s 285us/sample - loss: 0.0313
- accuracy: 0.9943
Epoch 329/500
12534/12534 [=====] - 3s 276us/sample - loss: 0.0310
- accuracy: 0.9947
Epoch 330/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0315
- accuracy: 0.9939
Epoch 331/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0320
- accuracy: 0.9938
Epoch 332/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0310
- accuracy: 0.9942
Epoch 333/500
12534/12534 [=====] - 4s 303us/sample - loss: 0.0311
- accuracy: 0.9946
Epoch 334/500
12534/12534 [=====] - 4s 337us/sample - loss: 0.0315
- accuracy: 0.9943
Epoch 335/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0306
- accuracy: 0.9942
Epoch 336/500
12534/12534 [=====] - 4s 290us/sample - loss: 0.0306
```

```
- accuracy: 0.9938
Epoch 337/500
12534/12534 [=====] - 4s 297us/sample - loss: 0.0307
- accuracy: 0.9942
Epoch 338/500
12534/12534 [=====] - 4s 294us/sample - loss: 0.0306
- accuracy: 0.9941
Epoch 339/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0303
- accuracy: 0.9943
Epoch 340/500
12534/12534 [=====] - 4s 322us/sample - loss: 0.0311
- accuracy: 0.9935
Epoch 341/500
12534/12534 [=====] - 4s 317us/sample - loss: 0.0305
- accuracy: 0.9942
Epoch 342/500
12534/12534 [=====] - 4s 293us/sample - loss: 0.0303
- accuracy: 0.9942
Epoch 343/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0317
- accuracy: 0.9943
Epoch 344/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0309
- accuracy: 0.9945
```



```
Epoch 345/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0301
- accuracy: 0.9941
Epoch 346/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0295
- accuracy: 0.9947
Epoch 347/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0306
- accuracy: 0.9943
Epoch 348/500
12534/12534 [=====] - 3s 271us/sample - loss: 0.0304
- accuracy: 0.9947
Epoch 349/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0301
- accuracy: 0.9943
Epoch 350/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0307
- accuracy: 0.9942
Epoch 351/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0295
- accuracy: 0.9947
Epoch 352/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0312
- accuracy: 0.9943
Epoch 353/500
```

```
12534/12534 [=====] - 4s 283us/sample - loss: 0.0295
- accuracy: 0.9944
Epoch 354/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0302
- accuracy: 0.9943
Epoch 355/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0298
- accuracy: 0.9946
Epoch 356/500
12534/12534 [=====] - 4s 292us/sample - loss: 0.0296
- accuracy: 0.9946
Epoch 357/500
12534/12534 [=====] - 4s 299us/sample - loss: 0.0298
- accuracy: 0.9944
Epoch 358/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0293
- accuracy: 0.9943
Epoch 359/500
12534/12534 [=====] - 3s 266us/sample - loss: 0.0296
- accuracy: 0.9947
Epoch 360/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0293
- accuracy: 0.9946
Epoch 361/500
12534/12534 [=====] - 4s 311us/sample - loss: 0.0295
```

```
- accuracy: 0.9944
Epoch 362/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0297
- accuracy: 0.9944
Epoch 363/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0295
- accuracy: 0.9945
Epoch 364/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0300
- accuracy: 0.9946
Epoch 365/500
12534/12534 [=====] - 3s 279us/sample - loss: 0.0301
- accuracy: 0.9942
Epoch 366/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0289
- accuracy: 0.9949
Epoch 367/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0295
- accuracy: 0.9944
Epoch 368/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0293
- accuracy: 0.9945
Epoch 369/500
12534/12534 [=====] - 3s 279us/sample - loss: 0.0293
- accuracy: 0.9947
```

```
Epoch 370/500
12534/12534 [=====] - 4s 302us/sample - loss: 0.0287
- accuracy: 0.9947
Epoch 371/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0294
- accuracy: 0.9942
Epoch 372/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0287
- accuracy: 0.9943
Epoch 373/500
12534/12534 [=====] - 4s 289us/sample - loss: 0.0284
- accuracy: 0.9947
Epoch 374/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0295
- accuracy: 0.9940
Epoch 375/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0282
- accuracy: 0.9943
Epoch 376/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0291
- accuracy: 0.9940
Epoch 377/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0289
- accuracy: 0.9943
Epoch 378/500
```

```
12534/12534 [=====] - 4s 288us/sample - loss: 0.0280
- accuracy: 0.9943
Epoch 379/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0286
- accuracy: 0.9950
Epoch 380/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0283
- accuracy: 0.9945
Epoch 381/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0285
- accuracy: 0.9945
Epoch 382/500
12534/12534 [=====] - 3s 262us/sample - loss: 0.0285
- accuracy: 0.9949
Epoch 383/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0290
- accuracy: 0.9944
Epoch 384/500
12534/12534 [=====] - 3s 271us/sample - loss: 0.0290
- accuracy: 0.9939
Epoch 385/500
12534/12534 [=====] - 3s 266us/sample - loss: 0.0288
- accuracy: 0.9947
Epoch 386/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0281
```

```
- accuracy: 0.9947
Epoch 387/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0277
- accuracy: 0.9948
Epoch 388/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0282
- accuracy: 0.9950
Epoch 389/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0282
- accuracy: 0.9947
Epoch 390/500
12534/12534 [=====] - 3s 272us/sample - loss: 0.0280
- accuracy: 0.9949
Epoch 391/500
12534/12534 [=====] - 4s 291us/sample - loss: 0.0284
- accuracy: 0.9944
Epoch 392/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0282
- accuracy: 0.9948
Epoch 393/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0286
- accuracy: 0.9943
Epoch 394/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0275
- accuracy: 0.9942
```

```
Epoch 395/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0285
- accuracy: 0.9943
Epoch 396/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0285
- accuracy: 0.9948
Epoch 397/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0277
- accuracy: 0.9947
Epoch 398/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0283
- accuracy: 0.9946
Epoch 399/500
12534/12534 [=====] - 4s 291us/sample - loss: 0.0275
- accuracy: 0.9948
Epoch 400/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0278
- accuracy: 0.9943
Epoch 401/500
12534/12534 [=====] - 4s 309us/sample - loss: 0.0280
- accuracy: 0.9947
Epoch 402/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0274
- accuracy: 0.9943
Epoch 403/500
```

```
12534/12534 [=====] - 3s 268us/sample - loss: 0.0278
- accuracy: 0.9946
Epoch 404/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.0275
- accuracy: 0.9948
Epoch 405/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0273
- accuracy: 0.9951
Epoch 406/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0270
- accuracy: 0.9951
Epoch 407/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0275
- accuracy: 0.9951
Epoch 408/500
12534/12534 [=====] - 3s 276us/sample - loss: 0.0270
- accuracy: 0.9947
Epoch 409/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0273
- accuracy: 0.9946
Epoch 410/500
12534/12534 [=====] - 4s 283us/sample - loss: 0.0269
- accuracy: 0.9953
Epoch 411/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0273
```



```
- accuracy: 0.9950
Epoch 412/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0273
- accuracy: 0.9946
Epoch 413/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0271
- accuracy: 0.9946
Epoch 414/500
12534/12534 [=====] - 4s 286us/sample - loss: 0.0272
- accuracy: 0.9949
Epoch 415/500
12534/12534 [=====] - 4s 279us/sample - loss: 0.0266
- accuracy: 0.9947
Epoch 416/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0274
- accuracy: 0.9947
Epoch 417/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0269
- accuracy: 0.9951
Epoch 418/500
12534/12534 [=====] - 3s 276us/sample - loss: 0.0266
- accuracy: 0.9950
Epoch 419/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0263
- accuracy: 0.9942
```

```
Epoch 420/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0263
- accuracy: 0.9953
Epoch 421/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0264
- accuracy: 0.9951
Epoch 422/500
12534/12534 [=====] - 3s 271us/sample - loss: 0.0265
- accuracy: 0.9947
Epoch 423/500
12534/12534 [=====] - 3s 267us/sample - loss: 0.0265
- accuracy: 0.9948
Epoch 424/500
12534/12534 [=====] - 4s 291us/sample - loss: 0.0268
- accuracy: 0.9951
Epoch 425/500
12534/12534 [=====] - 4s 310us/sample - loss: 0.0273
- accuracy: 0.9947
Epoch 426/500
12534/12534 [=====] - 4s 301us/sample - loss: 0.0265
- accuracy: 0.9948
Epoch 427/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0267
- accuracy: 0.9948
Epoch 428/500
```

```
12534/12534 [=====] - 3s 274us/sample - loss: 0.0257
- accuracy: 0.9952
Epoch 429/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0266
- accuracy: 0.9948
Epoch 430/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0263
- accuracy: 0.9951
Epoch 431/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0258
- accuracy: 0.9959
Epoch 432/500
12534/12534 [=====] - 4s 289us/sample - loss: 0.0263
- accuracy: 0.9952
Epoch 433/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0258
- accuracy: 0.9951
Epoch 434/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0265
- accuracy: 0.9948
Epoch 435/500
12534/12534 [=====] - 4s 298us/sample - loss: 0.0257
- accuracy: 0.9947
Epoch 436/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0260
```

```
- accuracy: 0.9947
Epoch 437/500
12534/12534 [=====] - 3s 273us/sample - loss: 0.0262
- accuracy: 0.9950
Epoch 438/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0259
- accuracy: 0.9955
Epoch 439/500
12534/12534 [=====] - 3s 262us/sample - loss: 0.0257
- accuracy: 0.9951
Epoch 440/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0259
- accuracy: 0.9949
Epoch 441/500
12534/12534 [=====] - 3s 268us/sample - loss: 0.0256
- accuracy: 0.9951
Epoch 442/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0266
- accuracy: 0.9952
Epoch 443/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0266
- accuracy: 0.9947
Epoch 444/500
12534/12534 [=====] - 3s 272us/sample - loss: 0.0255
- accuracy: 0.9949
```

```
Epoch 445/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0256
- accuracy: 0.9953
Epoch 446/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0256
- accuracy: 0.9951
Epoch 447/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0266
- accuracy: 0.9954
Epoch 448/500
12534/12534 [=====] - 4s 285us/sample - loss: 0.0255
- accuracy: 0.9946
Epoch 449/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0254
- accuracy: 0.9953
Epoch 450/500
12534/12534 [=====] - 4s 311us/sample - loss: 0.0260
- accuracy: 0.9950
Epoch 451/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0255
- accuracy: 0.9949
Epoch 452/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0257
- accuracy: 0.9947
Epoch 453/500
```

```
12534/12534 [=====] - 4s 317us/sample - loss: 0.0262
- accuracy: 0.9947
Epoch 454/500
12534/12534 [=====] - 4s 300us/sample - loss: 0.0250
- accuracy: 0.9954
Epoch 455/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0252
- accuracy: 0.9953
Epoch 456/500
12534/12534 [=====] - 4s 284us/sample - loss: 0.0255
- accuracy: 0.9953
Epoch 457/500
12534/12534 [=====] - 3s 266us/sample - loss: 0.0255
- accuracy: 0.9947
Epoch 458/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0252
- accuracy: 0.9954
Epoch 459/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0249
- accuracy: 0.9953
Epoch 460/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0251
- accuracy: 0.9947
Epoch 461/500
12534/12534 [=====] - 3s 279us/sample - loss: 0.0262
```

```
- accuracy: 0.9947
Epoch 462/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0251
- accuracy: 0.9950
Epoch 463/500
12534/12534 [=====] - 3s 274us/sample - loss: 0.0249
- accuracy: 0.9951
Epoch 464/500
12534/12534 [=====] - 3s 277us/sample - loss: 0.0248
- accuracy: 0.9951
Epoch 465/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0248
- accuracy: 0.9951
Epoch 466/500
12534/12534 [=====] - 4s 303us/sample - loss: 0.0254
- accuracy: 0.9954
Epoch 467/500
12534/12534 [=====] - 4s 285us/sample - loss: 0.0248
- accuracy: 0.9956
Epoch 468/500
12534/12534 [=====] - 3s 278us/sample - loss: 0.0250
- accuracy: 0.9952
Epoch 469/500
12534/12534 [=====] - 4s 282us/sample - loss: 0.0246
- accuracy: 0.9949
```

```
Epoch 470/500
12534/12534 [=====] - 3s 262us/sample - loss: 0.0254
- accuracy: 0.9952
Epoch 471/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0251
- accuracy: 0.9951
Epoch 472/500
12534/12534 [=====] - 4s 281us/sample - loss: 0.0252
- accuracy: 0.9950
Epoch 473/500
12534/12534 [=====] - 3s 269us/sample - loss: 0.0252
- accuracy: 0.9950
Epoch 474/500
12534/12534 [=====] - 3s 270us/sample - loss: 0.0241
- accuracy: 0.9956
Epoch 475/500
12534/12534 [=====] - 3s 260us/sample - loss: 0.0248
- accuracy: 0.9955
Epoch 476/500
12534/12534 [=====] - 4s 280us/sample - loss: 0.0240
- accuracy: 0.9957
Epoch 477/500
12534/12534 [=====] - 3s 272us/sample - loss: 0.0243
- accuracy: 0.9949
Epoch 478/500
```



```
12534/12534 [=====] - 3s 271us/sample - loss: 0.0242
- accuracy: 0.9956
Epoch 479/500
12534/12534 [=====] - 3s 249us/sample - loss: 0.0244
- accuracy: 0.9952
Epoch 480/500
12534/12534 [=====] - 3s 225us/sample - loss: 0.0248
- accuracy: 0.9951
Epoch 481/500
12534/12534 [=====] - 3s 249us/sample - loss: 0.0242
- accuracy: 0.9949
Epoch 482/500
12534/12534 [=====] - 3s 263us/sample - loss: 0.0247
- accuracy: 0.9950
Epoch 483/500
12534/12534 [=====] - 3s 275us/sample - loss: 0.0245
- accuracy: 0.9953
Epoch 484/500
12534/12534 [=====] - 3s 260us/sample - loss: 0.0241
- accuracy: 0.9956
Epoch 485/500
12534/12534 [=====] - 3s 253us/sample - loss: 0.0240
- accuracy: 0.9952
Epoch 486/500
12534/12534 [=====] - 3s 263us/sample - loss: 0.0241
```

```
- accuracy: 0.9954
Epoch 487/500
12534/12534 [=====] - 3s 246us/sample - loss: 0.0244
- accuracy: 0.9950
Epoch 488/500
12534/12534 [=====] - 3s 252us/sample - loss: 0.0238
- accuracy: 0.9954
Epoch 489/500
12534/12534 [=====] - 3s 246us/sample - loss: 0.0236
- accuracy: 0.9957
Epoch 490/500
12534/12534 [=====] - 3s 262us/sample - loss: 0.0248
- accuracy: 0.9954
Epoch 491/500
12534/12534 [=====] - 3s 260us/sample - loss: 0.0245
- accuracy: 0.9954
Epoch 492/500
12534/12534 [=====] - 4s 296us/sample - loss: 0.0236
- accuracy: 0.9954
Epoch 493/500
12534/12534 [=====] - 3s 255us/sample - loss: 0.0239
- accuracy: 0.9954
Epoch 494/500
12534/12534 [=====] - 3s 264us/sample - loss: 0.0238
- accuracy: 0.9954
```

```
Epoch 495/500
12534/12534 [=====] - 3s 248us/sample - loss: 0.0231
- accuracy: 0.9957
Epoch 496/500
12534/12534 [=====] - 3s 237us/sample - loss: 0.0235
- accuracy: 0.9954
Epoch 497/500
12534/12534 [=====] - 4s 287us/sample - loss: 0.0241
- accuracy: 0.9957
Epoch 498/500
12534/12534 [=====] - 4s 288us/sample - loss: 0.0233
- accuracy: 0.9958
Epoch 499/500
12534/12534 [=====] - 4s 345us/sample - loss: 0.0241
- accuracy: 0.9955
Epoch 500/500
12534/12534 [=====] - 4s 316us/sample - loss: 0.0240
- accuracy: 0.9951
2887/2887 [=====] - 1s 438us/sample

class_weight_Fold_3: {0: 0.10928590112477109, 1: 10.592112676056338}
```

```
pos_weight: 0.9
thresholdNum: 0.5
```

Average of train loss Fold_3: 0.0606
Average of yPredProbability Fold_3: 0.0183

classification_report_Fold_3:				
	precision	recall	f1-score	support
Normal 0	0.99	0.98	0.99	2871
Anomaly 1	0.00	0.00	0.00	16
accuracy				
macro avg	0.50	0.49	0.49	2887
weighted avg	0.99	0.98	0.98	2887

confusion_matrix_Fold_3:
True Negatives: 2824
False Positives: 47
False Negatives: 16
True Positives: 0

End running time Fold_3: 210608_235252 ,-----.

Start running time Fold_4: 210608_235252 ,-----::

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: 210608_235252

,+++++

Data Augmentation MSE Label 1==> mean: 0.000626, min: 0.000257, max: 0.00148

Data Augmentation MSE Label 1==> mean: 0.000295, min: 6.6e-05, max: 0.000974

Data Augmentation MSE Label 1==> mean: 0.000263, min: 2e-05, max: 0.001062

Data Augmentation MSE Label 1==> mean: 0.000286, min: 7e-06, max: 0.001495

Data Augmentation MSE Label 1==> mean: 0.000336, min: 3e-06, max: 0.002238

Data Augmentation MSE Label 1==> mean: 0.000388, min: 1e-06, max: 0.002453

Data Augmentation MSE Label 1==> mean: 0.000435, min: 1e-06, max: 0.00316

Data Augmentation MSE Label 1==> mean: 0.000484, min: 0.0, max: 0.003696

Data Augmentation MSE Label 1==> mean: 0.00054, min: 0.0, max: 0.005927

Data Augmentation MSE Label 1==> mean: 0.000601, min: 0.0, max: 0.007275

Data Augmentation MSE Label 1==> mean: 0.000667, min: 0.0, max: 0.00642

Data Augmentation MSE Label 1==> mean: 0.000814, min: 0.0, max: 0.010366

Data Augmentation MSE Label 1==> mean: 0.000882, min: 0.0, max: 0.008245

Data Augmentation MSE Label 1==> mean: 0.000916, min: 0.0, max: 0.00762

MSE All generated Augmented data Fold_4:

mean: 0.000538

min: 2.5e-05

max: 0.004458

End running time Data Augmentation_Fold_4: 210608_235341

,+++++++.

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 [=====] - 8s 652us/sample - loss: 3.0552
- accuracy: 0.9149

Epoch 2/500

12443/12443 [=====] - 4s 296us/sample - loss: 1.3609
- accuracy: 0.9253

Epoch 3/500

12443/12443 [=====] - 4s 292us/sample - loss: 0.6415
- accuracy: 0.9318

Epoch 4/500

12443/12443 [=====] - 4s 288us/sample - loss: 0.3587
- accuracy: 0.9389

Epoch 5/500

12443/12443 [=====] - 3s 276us/sample - loss: 0.2551
- accuracy: 0.9445

```
Epoch 6/500
12443/12443 [=====] - 4s 320us/sample - loss: 0.2167
- accuracy: 0.9489
Epoch 7/500
12443/12443 [=====] - 4s 289us/sample - loss: 0.2001
- accuracy: 0.9512
Epoch 8/500
12443/12443 [=====] - 4s 297us/sample - loss: 0.1911
- accuracy: 0.9535
Epoch 9/500
12443/12443 [=====] - 4s 349us/sample - loss: 0.1846
- accuracy: 0.9554
Epoch 10/500
12443/12443 [=====] - 4s 281us/sample - loss: 0.1796
- accuracy: 0.9577
Epoch 11/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.1749
- accuracy: 0.9580
Epoch 12/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.1706
- accuracy: 0.9586
Epoch 13/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.1661
- accuracy: 0.9593
Epoch 14/500
```



```
12443/12443 [=====] - 4s 287us/sample - loss: 0.1624
- accuracy: 0.9601
Epoch 15/500
12443/12443 [=====] - 4s 293us/sample - loss: 0.1593
- accuracy: 0.9602
Epoch 16/500
12443/12443 [=====] - 3s 281us/sample - loss: 0.1550
- accuracy: 0.9617
Epoch 17/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.1522
- accuracy: 0.9620
Epoch 18/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.1489
- accuracy: 0.9623
Epoch 19/500
12443/12443 [=====] - 4s 282us/sample - loss: 0.1465
- accuracy: 0.9631
Epoch 20/500
12443/12443 [=====] - 4s 310us/sample - loss: 0.1433
- accuracy: 0.9649
Epoch 21/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.1406
- accuracy: 0.9654
Epoch 22/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.1376
```

```
- accuracy: 0.9663
Epoch 23/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.1352
- accuracy: 0.9675
Epoch 24/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.1327
- accuracy: 0.9699
Epoch 25/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.1299
- accuracy: 0.9698
Epoch 26/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.1274
- accuracy: 0.9718
Epoch 27/500
12443/12443 [=====] - 3s 281us/sample - loss: 0.1255
- accuracy: 0.9728
Epoch 28/500
12443/12443 [=====] - 4s 308us/sample - loss: 0.1233
- accuracy: 0.9728
Epoch 29/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.1206
- accuracy: 0.9740
Epoch 30/500
12443/12443 [=====] - 4s 330us/sample - loss: 0.1185
- accuracy: 0.9744
```

```
Epoch 31/500
12443/12443 [=====] - 4s 323us/sample - loss: 0.1162
- accuracy: 0.9755
Epoch 32/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.1141
- accuracy: 0.9753
Epoch 33/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.1121
- accuracy: 0.9755
Epoch 34/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.1101
- accuracy: 0.9769
Epoch 35/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.1075
- accuracy: 0.9778
Epoch 36/500
12443/12443 [=====] - 3s 272us/sample - loss: 0.1061
- accuracy: 0.9775
Epoch 37/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.1045
- accuracy: 0.9782
Epoch 38/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.1031
- accuracy: 0.9785
Epoch 39/500
```

```
12443/12443 [=====] - 3s 265us/sample - loss: 0.1019
- accuracy: 0.9784
Epoch 40/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0998
- accuracy: 0.9784
Epoch 41/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0980
- accuracy: 0.9796
Epoch 42/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0968
- accuracy: 0.9798
Epoch 43/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0954
- accuracy: 0.9802
Epoch 44/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0944
- accuracy: 0.9801
Epoch 45/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0926
- accuracy: 0.9810
Epoch 46/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0911
- accuracy: 0.9818
Epoch 47/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0900
```

```
- accuracy: 0.9814
Epoch 48/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0895
- accuracy: 0.9818
Epoch 49/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0879
- accuracy: 0.9823
Epoch 50/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0878
- accuracy: 0.9830
Epoch 51/500
12443/12443 [=====] - 3s 264us/sample - loss: 0.0860
- accuracy: 0.9827
Epoch 52/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0844
- accuracy: 0.9830
Epoch 53/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0835
- accuracy: 0.9844
Epoch 54/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0832
- accuracy: 0.9838
Epoch 55/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0823
- accuracy: 0.9839
```

```
Epoch 56/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0810
- accuracy: 0.9852
Epoch 57/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0798
- accuracy: 0.9851
Epoch 58/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0794
- accuracy: 0.9840
Epoch 59/500
12443/12443 [=====] - 3s 268us/sample - loss: 0.0796
- accuracy: 0.9844
Epoch 60/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0780
- accuracy: 0.9862
Epoch 61/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0770
- accuracy: 0.9862
Epoch 62/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0763
- accuracy: 0.9856
Epoch 63/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0760
- accuracy: 0.9859
Epoch 64/500
```

```
12443/12443 [=====] - 3s 265us/sample - loss: 0.0756
- accuracy: 0.9863
Epoch 65/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0748
- accuracy: 0.9863
Epoch 66/500
12443/12443 [=====] - 3s 262us/sample - loss: 0.0741
- accuracy: 0.9861
Epoch 67/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0729
- accuracy: 0.9873
Epoch 68/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0724
- accuracy: 0.9871
Epoch 69/500
12443/12443 [=====] - 3s 266us/sample - loss: 0.0724
- accuracy: 0.9865
Epoch 70/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0716
- accuracy: 0.9872
Epoch 71/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0704
- accuracy: 0.9884
Epoch 72/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0710
```

```
- accuracy: 0.9879
Epoch 73/500
12443/12443 [=====] - 3s 272us/sample - loss: 0.0699
- accuracy: 0.9876
Epoch 74/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.0689
- accuracy: 0.9884
Epoch 75/500
12443/12443 [=====] - 3s 268us/sample - loss: 0.0691
- accuracy: 0.9879
Epoch 76/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0680
- accuracy: 0.9875
Epoch 77/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0673
- accuracy: 0.9884
Epoch 78/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0673
- accuracy: 0.9875
Epoch 79/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0668
- accuracy: 0.9883
Epoch 80/500
12443/12443 [=====] - 3s 272us/sample - loss: 0.0662
- accuracy: 0.9885
```



```
Epoch 81/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0659
- accuracy: 0.9882
Epoch 82/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0653
- accuracy: 0.9888
Epoch 83/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0651
- accuracy: 0.9879
Epoch 84/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0645
- accuracy: 0.9891
Epoch 85/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0639
- accuracy: 0.9891
Epoch 86/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0631
- accuracy: 0.9893
Epoch 87/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0637
- accuracy: 0.9887
Epoch 88/500
12443/12443 [=====] - 3s 261us/sample - loss: 0.0625
- accuracy: 0.9896
Epoch 89/500
```

```
12443/12443 [=====] - 3s 275us/sample - loss: 0.0624
- accuracy: 0.9894
Epoch 90/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0628
- accuracy: 0.9896
Epoch 91/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0616
- accuracy: 0.9896
Epoch 92/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.0606
- accuracy: 0.9893
Epoch 93/500
12443/12443 [=====] - 3s 266us/sample - loss: 0.0607
- accuracy: 0.9893
Epoch 94/500
12443/12443 [=====] - 3s 281us/sample - loss: 0.0600
- accuracy: 0.9899
Epoch 95/500
12443/12443 [=====] - 3s 264us/sample - loss: 0.0604
- accuracy: 0.9896
Epoch 96/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0604
- accuracy: 0.9898
Epoch 97/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0589
```

```
- accuracy: 0.9901
Epoch 98/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0594
- accuracy: 0.9898
Epoch 99/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0588
- accuracy: 0.9899
Epoch 100/500
12443/12443 [=====] - 3s 260us/sample - loss: 0.0584
- accuracy: 0.9902
Epoch 101/500
12443/12443 [=====] - 4s 281us/sample - loss: 0.0586
- accuracy: 0.9899
Epoch 102/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0573
- accuracy: 0.9903
Epoch 103/500
12443/12443 [=====] - 3s 266us/sample - loss: 0.0581
- accuracy: 0.9905
Epoch 104/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0571
- accuracy: 0.9900
Epoch 105/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0574
- accuracy: 0.9900
```

```
Epoch 106/500
12443/12443 [=====] - 4s 311us/sample - loss: 0.0572
- accuracy: 0.9909
Epoch 107/500
12443/12443 [=====] - 4s 289us/sample - loss: 0.0566
- accuracy: 0.9900
Epoch 108/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0567
- accuracy: 0.9906
Epoch 109/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0560
- accuracy: 0.9906
Epoch 110/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0551
- accuracy: 0.9905
Epoch 111/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0553
- accuracy: 0.9904
Epoch 112/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0542
- accuracy: 0.9908
Epoch 113/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0547
- accuracy: 0.9904
Epoch 114/500
```

```
12443/12443 [=====] - 4s 284us/sample - loss: 0.0549
- accuracy: 0.9905
Epoch 115/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0546
- accuracy: 0.9914
Epoch 116/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0544
- accuracy: 0.9910
Epoch 117/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0538
- accuracy: 0.9914
Epoch 118/500
12443/12443 [=====] - 3s 264us/sample - loss: 0.0539
- accuracy: 0.9907
Epoch 119/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0531
- accuracy: 0.9911
Epoch 120/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0529
- accuracy: 0.9905
Epoch 121/500
12443/12443 [=====] - 4s 289us/sample - loss: 0.0528
- accuracy: 0.9910
Epoch 122/500
12443/12443 [=====] - 5s 364us/sample - loss: 0.0530
```

```
- accuracy: 0.9910
Epoch 123/500
12443/12443 [=====] - 6s 498us/sample - loss: 0.0520
- accuracy: 0.9908
Epoch 124/500
12443/12443 [=====] - 5s 382us/sample - loss: 0.0523
- accuracy: 0.9914
Epoch 125/500
12443/12443 [=====] - 5s 369us/sample - loss: 0.0518
- accuracy: 0.9913
Epoch 126/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0518
- accuracy: 0.9909
Epoch 127/500
12443/12443 [=====] - 3s 281us/sample - loss: 0.0510
- accuracy: 0.9912
Epoch 128/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0515
- accuracy: 0.9916
Epoch 129/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0509
- accuracy: 0.9914
Epoch 130/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0510
- accuracy: 0.9914
```

```
Epoch 131/500
12443/12443 [=====] - 3s 260us/sample - loss: 0.0501
- accuracy: 0.9919
Epoch 132/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.0506
- accuracy: 0.9915
Epoch 133/500
12443/12443 [=====] - 4s 326us/sample - loss: 0.0503
- accuracy: 0.9917
Epoch 134/500
12443/12443 [=====] - 4s 319us/sample - loss: 0.0498
- accuracy: 0.9914
Epoch 135/500
12443/12443 [=====] - 4s 302us/sample - loss: 0.0500
- accuracy: 0.9908
Epoch 136/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0492
- accuracy: 0.9911
Epoch 137/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0492
- accuracy: 0.9916
Epoch 138/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.0494
- accuracy: 0.9912
Epoch 139/500
```

```
12443/12443 [=====] - 3s 264us/sample - loss: 0.0487
- accuracy: 0.9920
Epoch 140/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0490
- accuracy: 0.9916
Epoch 141/500
12443/12443 [=====] - 3s 268us/sample - loss: 0.0482
- accuracy: 0.9919
Epoch 142/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0487
- accuracy: 0.9920
Epoch 143/500
12443/12443 [=====] - 4s 281us/sample - loss: 0.0485
- accuracy: 0.9916
Epoch 144/500
12443/12443 [=====] - 3s 272us/sample - loss: 0.0479
- accuracy: 0.9920
Epoch 145/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0488
- accuracy: 0.9920
Epoch 146/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0479
- accuracy: 0.9924
Epoch 147/500
12443/12443 [=====] - 4s 290us/sample - loss: 0.0477
```



```
- accuracy: 0.9920
Epoch 148/500
12443/12443 [=====] - 4s 288us/sample - loss: 0.0472
- accuracy: 0.9921
Epoch 149/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0470
- accuracy: 0.9919
Epoch 150/500
12443/12443 [=====] - 4s 291us/sample - loss: 0.0465
- accuracy: 0.9921
Epoch 151/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.0472
- accuracy: 0.9923
Epoch 152/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0467
- accuracy: 0.9924
Epoch 153/500
12443/12443 [=====] - 4s 289us/sample - loss: 0.0466
- accuracy: 0.9920
Epoch 154/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.0463
- accuracy: 0.9921
Epoch 155/500
12443/12443 [=====] - 4s 287us/sample - loss: 0.0469
- accuracy: 0.9919
```

```
Epoch 156/500
12443/12443 [=====] - 4s 295us/sample - loss: 0.0457
- accuracy: 0.9920
Epoch 157/500
12443/12443 [=====] - 4s 349us/sample - loss: 0.0458
- accuracy: 0.9924
Epoch 158/500
12443/12443 [=====] - 4s 347us/sample - loss: 0.0458
- accuracy: 0.9916
Epoch 159/500
12443/12443 [=====] - 4s 326us/sample - loss: 0.0457
- accuracy: 0.9923
Epoch 160/500
12443/12443 [=====] - 4s 321us/sample - loss: 0.0449
- accuracy: 0.9924
Epoch 161/500
12443/12443 [=====] - 4s 340us/sample - loss: 0.0447
- accuracy: 0.9922
Epoch 162/500
12443/12443 [=====] - 6s 445us/sample - loss: 0.0448
- accuracy: 0.9926
Epoch 163/500
12443/12443 [=====] - 4s 311us/sample - loss: 0.0447
- accuracy: 0.9924
Epoch 164/500
```

```
12443/12443 [=====] - 4s 294us/sample - loss: 0.0450
- accuracy: 0.9928
Epoch 165/500
12443/12443 [=====] - 4s 313us/sample - loss: 0.0451
- accuracy: 0.9924
Epoch 166/500
12443/12443 [=====] - 4s 301us/sample - loss: 0.0444
- accuracy: 0.9917
Epoch 167/500
12443/12443 [=====] - 4s 301us/sample - loss: 0.0439
- accuracy: 0.9920
Epoch 168/500
12443/12443 [=====] - 4s 349us/sample - loss: 0.0439
- accuracy: 0.9926
Epoch 169/500
12443/12443 [=====] - 4s 314us/sample - loss: 0.0444
- accuracy: 0.9927
Epoch 170/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.0437
- accuracy: 0.9924
Epoch 171/500
12443/12443 [=====] - 4s 349us/sample - loss: 0.0439
- accuracy: 0.9929
Epoch 172/500
12443/12443 [=====] - 5s 380us/sample - loss: 0.0438
```

```
- accuracy: 0.9922
Epoch 173/500
12443/12443 [=====] - 4s 320us/sample - loss: 0.0432
- accuracy: 0.9930
Epoch 174/500
12443/12443 [=====] - 4s 333us/sample - loss: 0.0437
- accuracy: 0.9923
Epoch 175/500
12443/12443 [=====] - 4s 340us/sample - loss: 0.0430
- accuracy: 0.9929
Epoch 176/500
12443/12443 [=====] - 4s 329us/sample - loss: 0.0429
- accuracy: 0.9926
Epoch 177/500
12443/12443 [=====] - 5s 397us/sample - loss: 0.0426
- accuracy: 0.9930
Epoch 178/500
12443/12443 [=====] - 4s 315us/sample - loss: 0.0430
- accuracy: 0.9929
Epoch 179/500
12443/12443 [=====] - 4s 335us/sample - loss: 0.0418
- accuracy: 0.9928
Epoch 180/500
12443/12443 [=====] - 4s 351us/sample - loss: 0.0427
- accuracy: 0.9930
```

```
Epoch 181/500
12443/12443 [=====] - 4s 351us/sample - loss: 0.0432
- accuracy: 0.9923
Epoch 182/500
12443/12443 [=====] - 4s 296us/sample - loss: 0.0418
- accuracy: 0.9930
Epoch 183/500
12443/12443 [=====] - 4s 334us/sample - loss: 0.0425
- accuracy: 0.9934
Epoch 184/500
12443/12443 [=====] - 4s 318us/sample - loss: 0.0422
- accuracy: 0.9929
Epoch 185/500
12443/12443 [=====] - 4s 291us/sample - loss: 0.0419
- accuracy: 0.9932
Epoch 186/500
12443/12443 [=====] - 4s 325us/sample - loss: 0.0422
- accuracy: 0.9926
Epoch 187/500
12443/12443 [=====] - 4s 331us/sample - loss: 0.0415
- accuracy: 0.9927
Epoch 188/500
12443/12443 [=====] - 4s 304us/sample - loss: 0.0417
- accuracy: 0.9932
Epoch 189/500
```

```
12443/12443 [=====] - 4s 316us/sample - loss: 0.0411
- accuracy: 0.9933
Epoch 190/500
12443/12443 [=====] - 4s 293us/sample - loss: 0.0413
- accuracy: 0.9923
Epoch 191/500
12443/12443 [=====] - 4s 305us/sample - loss: 0.0429
- accuracy: 0.9926
Epoch 192/500
12443/12443 [=====] - 4s 317us/sample - loss: 0.0409
- accuracy: 0.9933
Epoch 193/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0408
- accuracy: 0.9932
Epoch 194/500
12443/12443 [=====] - 4s 290us/sample - loss: 0.0409
- accuracy: 0.9929
Epoch 195/500
12443/12443 [=====] - 4s 297us/sample - loss: 0.0405
- accuracy: 0.9938
Epoch 196/500
12443/12443 [=====] - 4s 310us/sample - loss: 0.0406
- accuracy: 0.9928
Epoch 197/500
12443/12443 [=====] - 4s 312us/sample - loss: 0.0406
```

```
- accuracy: 0.9930
Epoch 198/500
12443/12443 [=====] - 4s 282us/sample - loss: 0.0403
- accuracy: 0.9934
Epoch 199/500
12443/12443 [=====] - 3s 266us/sample - loss: 0.0399
- accuracy: 0.9932
Epoch 200/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0408
- accuracy: 0.9932
Epoch 201/500
12443/12443 [=====] - 3s 266us/sample - loss: 0.0400
- accuracy: 0.9937
Epoch 202/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0396
- accuracy: 0.9933
Epoch 203/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0400
- accuracy: 0.9940
Epoch 204/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.0401
- accuracy: 0.9933
Epoch 205/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0394
- accuracy: 0.9936
```

```
Epoch 206/500
12443/12443 [=====] - 3s 268us/sample - loss: 0.0393
- accuracy: 0.9937
Epoch 207/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0390
- accuracy: 0.9936
Epoch 208/500
12443/12443 [=====] - 4s 282us/sample - loss: 0.0390
- accuracy: 0.9934
Epoch 209/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0397
- accuracy: 0.9934
Epoch 210/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0392
- accuracy: 0.9938
Epoch 211/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0387
- accuracy: 0.9936
Epoch 212/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0393
- accuracy: 0.9937
Epoch 213/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0390
- accuracy: 0.9932
Epoch 214/500
```



```
12443/12443 [=====] - 3s 271us/sample - loss: 0.0388
- accuracy: 0.9935
Epoch 215/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0395
- accuracy: 0.9932
Epoch 216/500
12443/12443 [=====] - 3s 268us/sample - loss: 0.0383
- accuracy: 0.9938
Epoch 217/500
12443/12443 [=====] - 4s 282us/sample - loss: 0.0381
- accuracy: 0.9932
Epoch 218/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0382
- accuracy: 0.9935
Epoch 219/500
12443/12443 [=====] - 4s 293us/sample - loss: 0.0381
- accuracy: 0.9933
Epoch 220/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.0379
- accuracy: 0.9942
Epoch 221/500
12443/12443 [=====] - 4s 331us/sample - loss: 0.0377
- accuracy: 0.9932
Epoch 222/500
12443/12443 [=====] - 4s 292us/sample - loss: 0.0383
```

```
- accuracy: 0.9931
Epoch 223/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0375
- accuracy: 0.9938
Epoch 224/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.0378
- accuracy: 0.9934
Epoch 225/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0376
- accuracy: 0.9937
Epoch 226/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0382
- accuracy: 0.9932
Epoch 227/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0375
- accuracy: 0.9932
Epoch 228/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0377
- accuracy: 0.9936
Epoch 229/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0372
- accuracy: 0.9937
Epoch 230/500
12443/12443 [=====] - 4s 288us/sample - loss: 0.0367
- accuracy: 0.9935
```

```
Epoch 231/500
12443/12443 [=====] - 3s 264us/sample - loss: 0.0376
- accuracy: 0.9934
Epoch 232/500
12443/12443 [=====] - 3s 266us/sample - loss: 0.0366
- accuracy: 0.9937
Epoch 233/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0375
- accuracy: 0.9937
Epoch 234/500
12443/12443 [=====] - 3s 272us/sample - loss: 0.0370
- accuracy: 0.9937
Epoch 235/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0368
- accuracy: 0.9938
Epoch 236/500
12443/12443 [=====] - 4s 319us/sample - loss: 0.0365
- accuracy: 0.9937
Epoch 237/500
12443/12443 [=====] - 4s 318us/sample - loss: 0.0373
- accuracy: 0.9937
Epoch 238/500
12443/12443 [=====] - 4s 336us/sample - loss: 0.0365
- accuracy: 0.9936
Epoch 239/500
```

```
12443/12443 [=====] - 4s 329us/sample - loss: 0.0360
- accuracy: 0.9937
Epoch 240/500
12443/12443 [=====] - 4s 339us/sample - loss: 0.0360
- accuracy: 0.9937
Epoch 241/500
12443/12443 [=====] - 5s 368us/sample - loss: 0.0364
- accuracy: 0.9932
Epoch 242/500
12443/12443 [=====] - 4s 319us/sample - loss: 0.0363
- accuracy: 0.9941
Epoch 243/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0362
- accuracy: 0.9938
Epoch 244/500
12443/12443 [=====] - 4s 287us/sample - loss: 0.0362
- accuracy: 0.9941
Epoch 245/500
12443/12443 [=====] - 4s 287us/sample - loss: 0.0362
- accuracy: 0.9938
Epoch 246/500
12443/12443 [=====] - 4s 321us/sample - loss: 0.0353
- accuracy: 0.9937
Epoch 247/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0358
```

```
- accuracy: 0.9940
Epoch 248/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0357
- accuracy: 0.9942
Epoch 249/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0360
- accuracy: 0.9940
Epoch 250/500
12443/12443 [=====] - 4s 288us/sample - loss: 0.0355
- accuracy: 0.9938
Epoch 251/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0356
- accuracy: 0.9943
Epoch 252/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.0354
- accuracy: 0.9942
Epoch 253/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0357
- accuracy: 0.9940
Epoch 254/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0354
- accuracy: 0.9936
Epoch 255/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0351
- accuracy: 0.9937
```

```
Epoch 256/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0352
- accuracy: 0.9939
Epoch 257/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0351
- accuracy: 0.9937
Epoch 258/500
12443/12443 [=====] - 4s 298us/sample - loss: 0.0352
- accuracy: 0.9939
Epoch 259/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0351
- accuracy: 0.9941
Epoch 260/500
12443/12443 [=====] - 4s 302us/sample - loss: 0.0348
- accuracy: 0.9941
Epoch 261/500
12443/12443 [=====] - 4s 305us/sample - loss: 0.0349
- accuracy: 0.9941
Epoch 262/500
12443/12443 [=====] - 4s 302us/sample - loss: 0.0355
- accuracy: 0.9937
Epoch 263/500
12443/12443 [=====] - 4s 291us/sample - loss: 0.0344
- accuracy: 0.9940
Epoch 264/500
```

```
12443/12443 [=====] - 4s 296us/sample - loss: 0.0342
- accuracy: 0.9941
Epoch 265/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0346
- accuracy: 0.9941
Epoch 266/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0344
- accuracy: 0.9938
Epoch 267/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0345
- accuracy: 0.9941
Epoch 268/500
12443/12443 [=====] - 4s 298us/sample - loss: 0.0345
- accuracy: 0.9941
Epoch 269/500
12443/12443 [=====] - 4s 307us/sample - loss: 0.0342
- accuracy: 0.9941
Epoch 270/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0343
- accuracy: 0.9938
Epoch 271/500
12443/12443 [=====] - 4s 287us/sample - loss: 0.0336
- accuracy: 0.9940
Epoch 272/500
12443/12443 [=====] - 4s 302us/sample - loss: 0.0338
```

```
- accuracy: 0.9939
Epoch 273/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.0338
- accuracy: 0.9940
Epoch 274/500
12443/12443 [=====] - 4s 310us/sample - loss: 0.0340
- accuracy: 0.9938
Epoch 275/500
12443/12443 [=====] - 4s 281us/sample - loss: 0.0340
- accuracy: 0.9941
Epoch 276/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0334
- accuracy: 0.9947
Epoch 277/500
12443/12443 [=====] - 4s 291us/sample - loss: 0.0341
- accuracy: 0.9938
Epoch 278/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0338
- accuracy: 0.9941
Epoch 279/500
12443/12443 [=====] - 4s 318us/sample - loss: 0.0338
- accuracy: 0.9939
Epoch 280/500
12443/12443 [=====] - 4s 297us/sample - loss: 0.0339
- accuracy: 0.9942
```



```
Epoch 281/500
12443/12443 [=====] - 4s 292us/sample - loss: 0.0334
- accuracy: 0.9940
Epoch 282/500
12443/12443 [=====] - 4s 322us/sample - loss: 0.0329
- accuracy: 0.9940
Epoch 283/500
12443/12443 [=====] - 3s 281us/sample - loss: 0.0329
- accuracy: 0.9942
Epoch 284/500
12443/12443 [=====] - 3s 262us/sample - loss: 0.0330
- accuracy: 0.9943
Epoch 285/500
12443/12443 [=====] - 4s 301us/sample - loss: 0.0330
- accuracy: 0.9941
Epoch 286/500
12443/12443 [=====] - 4s 308us/sample - loss: 0.0333
- accuracy: 0.9944
Epoch 287/500
12443/12443 [=====] - 4s 328us/sample - loss: 0.0329
- accuracy: 0.9945
Epoch 288/500
12443/12443 [=====] - 4s 293us/sample - loss: 0.0330
- accuracy: 0.9943
Epoch 289/500
```

```
12443/12443 [=====] - 3s 277us/sample - loss: 0.0337
- accuracy: 0.9941
Epoch 290/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0328
- accuracy: 0.9940
Epoch 291/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0328
- accuracy: 0.9940
Epoch 292/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0334
- accuracy: 0.9938
Epoch 293/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0323
- accuracy: 0.9938
Epoch 294/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0332
- accuracy: 0.9937
Epoch 295/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0327
- accuracy: 0.9944
Epoch 296/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0329
- accuracy: 0.9944
Epoch 297/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0323
```

```
- accuracy: 0.9944
Epoch 298/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0323
- accuracy: 0.9942
Epoch 299/500
12443/12443 [=====] - 3s 268us/sample - loss: 0.0316
- accuracy: 0.9945
Epoch 300/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0322
- accuracy: 0.9946
Epoch 301/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0332
- accuracy: 0.9939
Epoch 302/500
12443/12443 [=====] - 3s 264us/sample - loss: 0.0319
- accuracy: 0.9944
Epoch 303/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0318
- accuracy: 0.9940
Epoch 304/500
12443/12443 [=====] - 3s 266us/sample - loss: 0.0324
- accuracy: 0.9940
Epoch 305/500
12443/12443 [=====] - 4s 291us/sample - loss: 0.0321
- accuracy: 0.9941
```

```
Epoch 306/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0324
- accuracy: 0.9946
Epoch 307/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0315
- accuracy: 0.9947
Epoch 308/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0317
- accuracy: 0.9946
Epoch 309/500
12443/12443 [=====] - 3s 272us/sample - loss: 0.0318
- accuracy: 0.9942
Epoch 310/500
12443/12443 [=====] - 4s 287us/sample - loss: 0.0320
- accuracy: 0.9942
Epoch 311/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0321
- accuracy: 0.9945
Epoch 312/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0309
- accuracy: 0.9946
Epoch 313/500
12443/12443 [=====] - 4s 298us/sample - loss: 0.0322
- accuracy: 0.9941
Epoch 314/500
```

```
12443/12443 [=====] - 4s 290us/sample - loss: 0.0316
- accuracy: 0.9942
Epoch 315/500
12443/12443 [=====] - 4s 300us/sample - loss: 0.0311
- accuracy: 0.9946
Epoch 316/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0310
- accuracy: 0.9947
Epoch 317/500
12443/12443 [=====] - 3s 272us/sample - loss: 0.0312
- accuracy: 0.9944
Epoch 318/500
12443/12443 [=====] - 4s 308us/sample - loss: 0.0307
- accuracy: 0.9946
Epoch 319/500
12443/12443 [=====] - 4s 298us/sample - loss: 0.0308
- accuracy: 0.9945
Epoch 320/500
12443/12443 [=====] - 4s 286us/sample - loss: 0.0313
- accuracy: 0.9948
Epoch 321/500
12443/12443 [=====] - 4s 309us/sample - loss: 0.0315
- accuracy: 0.9937
Epoch 322/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.0308
```

```
- accuracy: 0.9943
Epoch 323/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0310
- accuracy: 0.9949
Epoch 324/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0311
- accuracy: 0.9946
Epoch 325/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0308
- accuracy: 0.9945
Epoch 326/500
12443/12443 [=====] - 4s 303us/sample - loss: 0.0305
- accuracy: 0.9949
Epoch 327/500
12443/12443 [=====] - 4s 289us/sample - loss: 0.0308
- accuracy: 0.9947
Epoch 328/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0307
- accuracy: 0.9948
Epoch 329/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0305
- accuracy: 0.9943
Epoch 330/500
12443/12443 [=====] - 3s 272us/sample - loss: 0.0304
- accuracy: 0.9947
```

```
Epoch 331/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0300
- accuracy: 0.9944
Epoch 332/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0300
- accuracy: 0.9946
Epoch 333/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0308
- accuracy: 0.9943
Epoch 334/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0306
- accuracy: 0.9945
Epoch 335/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0305
- accuracy: 0.9946
Epoch 336/500
12443/12443 [=====] - 4s 307us/sample - loss: 0.0298
- accuracy: 0.9950
Epoch 337/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0300
- accuracy: 0.9943
Epoch 338/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0301
- accuracy: 0.9947
Epoch 339/500
```

```
12443/12443 [=====] - 4s 281us/sample - loss: 0.0301
- accuracy: 0.9945
Epoch 340/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0295
- accuracy: 0.9950
Epoch 341/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0300
- accuracy: 0.9946
Epoch 342/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0297
- accuracy: 0.9947
Epoch 343/500
12443/12443 [=====] - 4s 282us/sample - loss: 0.0305
- accuracy: 0.9945
Epoch 344/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0295
- accuracy: 0.9951
Epoch 345/500
12443/12443 [=====] - 3s 262us/sample - loss: 0.0305
- accuracy: 0.9942
Epoch 346/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0298
- accuracy: 0.9942
Epoch 347/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0298
```



```
- accuracy: 0.9949
Epoch 348/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0302
- accuracy: 0.9941
Epoch 349/500
12443/12443 [=====] - 3s 281us/sample - loss: 0.0300
- accuracy: 0.9951
Epoch 350/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0296
- accuracy: 0.9947
Epoch 351/500
12443/12443 [=====] - 4s 282us/sample - loss: 0.0291
- accuracy: 0.9949
Epoch 352/500
12443/12443 [=====] - 4s 287us/sample - loss: 0.0291
- accuracy: 0.9949
Epoch 353/500
12443/12443 [=====] - 3s 264us/sample - loss: 0.0295
- accuracy: 0.9946
Epoch 354/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0291
- accuracy: 0.9947
Epoch 355/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0298
- accuracy: 0.9947
```

```
Epoch 356/500
12443/12443 [=====] - 3s 281us/sample - loss: 0.0288
- accuracy: 0.9950
Epoch 357/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0301
- accuracy: 0.9944
Epoch 358/500
12443/12443 [=====] - 3s 272us/sample - loss: 0.0294
- accuracy: 0.9949
Epoch 359/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0299
- accuracy: 0.9946
Epoch 360/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.0284
- accuracy: 0.9952
Epoch 361/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0283
- accuracy: 0.9953
Epoch 362/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0285
- accuracy: 0.9949
Epoch 363/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0285
- accuracy: 0.9950
Epoch 364/500
```

```
12443/12443 [=====] - 3s 273us/sample - loss: 0.0293
- accuracy: 0.9948
Epoch 365/500
12443/12443 [=====] - 3s 281us/sample - loss: 0.0292
- accuracy: 0.9949
Epoch 366/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0287
- accuracy: 0.9951
Epoch 367/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0290
- accuracy: 0.9945
Epoch 368/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0291
- accuracy: 0.9946
Epoch 369/500
12443/12443 [=====] - 4s 305us/sample - loss: 0.0284
- accuracy: 0.9949
Epoch 370/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0286
- accuracy: 0.9948
Epoch 371/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0286
- accuracy: 0.9949
Epoch 372/500
12443/12443 [=====] - 3s 274us/sample - loss: 0.0294
```

```
- accuracy: 0.9947
Epoch 373/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0284
- accuracy: 0.9948
Epoch 374/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0285
- accuracy: 0.9949
Epoch 375/500
12443/12443 [=====] - 4s 327us/sample - loss: 0.0284
- accuracy: 0.9949
Epoch 376/500
12443/12443 [=====] - 4s 335us/sample - loss: 0.0290
- accuracy: 0.9948
Epoch 377/500
12443/12443 [=====] - 4s 324us/sample - loss: 0.0278
- accuracy: 0.9949
Epoch 378/500
12443/12443 [=====] - 4s 354us/sample - loss: 0.0285
- accuracy: 0.9946
Epoch 379/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0292
- accuracy: 0.9945
Epoch 380/500
12443/12443 [=====] - 4s 353us/sample - loss: 0.0281
- accuracy: 0.9945
```

```
Epoch 381/500
12443/12443 [=====] - 4s 290us/sample - loss: 0.0278
- accuracy: 0.9949
Epoch 382/500
12443/12443 [=====] - 4s 331us/sample - loss: 0.0277
- accuracy: 0.9948
Epoch 383/500
12443/12443 [=====] - 4s 326us/sample - loss: 0.0281
- accuracy: 0.9949
Epoch 384/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0282
- accuracy: 0.9948
Epoch 385/500
12443/12443 [=====] - 4s 292us/sample - loss: 0.0282
- accuracy: 0.9948
Epoch 386/500
12443/12443 [=====] - 4s 314us/sample - loss: 0.0277
- accuracy: 0.9956
Epoch 387/500
12443/12443 [=====] - 4s 319us/sample - loss: 0.0277
- accuracy: 0.9949
Epoch 388/500
12443/12443 [=====] - 5s 377us/sample - loss: 0.0283
- accuracy: 0.9947
Epoch 389/500
```

```
12443/12443 [=====] - 4s 282us/sample - loss: 0.0279
- accuracy: 0.9947
Epoch 390/500
12443/12443 [=====] - 4s 349us/sample - loss: 0.0274
- accuracy: 0.9953
Epoch 391/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0277
- accuracy: 0.9950
Epoch 392/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.0280
- accuracy: 0.9949
Epoch 393/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0275
- accuracy: 0.9949
Epoch 394/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0271
- accuracy: 0.9946
Epoch 395/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0276
- accuracy: 0.9946
Epoch 396/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0274
- accuracy: 0.9950
Epoch 397/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0279
```

```
- accuracy: 0.9947
Epoch 398/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0273
- accuracy: 0.9953
Epoch 399/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0275
- accuracy: 0.9952
Epoch 400/500
12443/12443 [=====] - 4s 288us/sample - loss: 0.0272
- accuracy: 0.9948
Epoch 401/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0268
- accuracy: 0.9951
Epoch 402/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0276
- accuracy: 0.9949
Epoch 403/500
12443/12443 [=====] - 4s 287us/sample - loss: 0.0272
- accuracy: 0.9950
Epoch 404/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0268
- accuracy: 0.9949
Epoch 405/500
12443/12443 [=====] - 4s 323us/sample - loss: 0.0277
- accuracy: 0.9947
```

```
Epoch 406/500
12443/12443 [=====] - 4s 327us/sample - loss: 0.0269
- accuracy: 0.9949
Epoch 407/500
12443/12443 [=====] - 3s 276us/sample - loss: 0.0269
- accuracy: 0.9949
Epoch 408/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0271
- accuracy: 0.9948
Epoch 409/500
12443/12443 [=====] - 4s 282us/sample - loss: 0.0277
- accuracy: 0.9954
Epoch 410/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.0271
- accuracy: 0.9950
Epoch 411/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0266
- accuracy: 0.9949
Epoch 412/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0268
- accuracy: 0.9954
Epoch 413/500
12443/12443 [=====] - 4s 282us/sample - loss: 0.0266
- accuracy: 0.9950
Epoch 414/500
```



```
12443/12443 [=====] - 4s 297us/sample - loss: 0.0272
- accuracy: 0.9950
Epoch 415/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0264
- accuracy: 0.9951
Epoch 416/500
12443/12443 [=====] - 4s 296us/sample - loss: 0.0266
- accuracy: 0.9951
Epoch 417/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0264
- accuracy: 0.9955
Epoch 418/500
12443/12443 [=====] - 4s 288us/sample - loss: 0.0272
- accuracy: 0.9952
Epoch 419/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0267
- accuracy: 0.9951
Epoch 420/500
12443/12443 [=====] - 3s 264us/sample - loss: 0.0264
- accuracy: 0.9953
Epoch 421/500
12443/12443 [=====] - 4s 283us/sample - loss: 0.0259
- accuracy: 0.9951
Epoch 422/500
12443/12443 [=====] - 3s 263us/sample - loss: 0.0265
```

```
- accuracy: 0.9951
Epoch 423/500
12443/12443 [=====] - 4s 287us/sample - loss: 0.0267
- accuracy: 0.9951
Epoch 424/500
12443/12443 [=====] - 4s 282us/sample - loss: 0.0261
- accuracy: 0.9954
Epoch 425/500
12443/12443 [=====] - 3s 278us/sample - loss: 0.0262
- accuracy: 0.9949
Epoch 426/500
12443/12443 [=====] - 4s 325us/sample - loss: 0.0262
- accuracy: 0.9951
Epoch 427/500
12443/12443 [=====] - 4s 286us/sample - loss: 0.0264
- accuracy: 0.9954
Epoch 428/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.0268
- accuracy: 0.9948
Epoch 429/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0255
- accuracy: 0.9954
Epoch 430/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0257
- accuracy: 0.9950
```

```
Epoch 431/500
12443/12443 [=====] - 3s 277us/sample - loss: 0.0256
- accuracy: 0.9954
Epoch 432/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0261
- accuracy: 0.9950
Epoch 433/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.0261
- accuracy: 0.9952
Epoch 434/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0258
- accuracy: 0.9952
Epoch 435/500
12443/12443 [=====] - 3s 264us/sample - loss: 0.0260
- accuracy: 0.9949
Epoch 436/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0260
- accuracy: 0.9949
Epoch 437/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0262
- accuracy: 0.9955
Epoch 438/500
12443/12443 [=====] - 3s 271us/sample - loss: 0.0258
- accuracy: 0.9953
Epoch 439/500
```

```
12443/12443 [=====] - 4s 291us/sample - loss: 0.0253
- accuracy: 0.9953
Epoch 440/500
12443/12443 [=====] - 3s 279us/sample - loss: 0.0257
- accuracy: 0.9953
Epoch 441/500
12443/12443 [=====] - 4s 307us/sample - loss: 0.0258
- accuracy: 0.9955
Epoch 442/500
12443/12443 [=====] - 3s 273us/sample - loss: 0.0259
- accuracy: 0.9949
Epoch 443/500
12443/12443 [=====] - 3s 270us/sample - loss: 0.0255
- accuracy: 0.9953
Epoch 444/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0251
- accuracy: 0.9959
Epoch 445/500
12443/12443 [=====] - 3s 264us/sample - loss: 0.0261
- accuracy: 0.9947
Epoch 446/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0250
- accuracy: 0.9953
Epoch 447/500
12443/12443 [=====] - 3s 280us/sample - loss: 0.0253
```

```
- accuracy: 0.9953
Epoch 448/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0250
- accuracy: 0.9956
Epoch 449/500
12443/12443 [=====] - 4s 295us/sample - loss: 0.0256
- accuracy: 0.9954
Epoch 450/500
12443/12443 [=====] - 4s 291us/sample - loss: 0.0259
- accuracy: 0.9954
Epoch 451/500
12443/12443 [=====] - 4s 301us/sample - loss: 0.0256
- accuracy: 0.9957
Epoch 452/500
12443/12443 [=====] - 4s 313us/sample - loss: 0.0246
- accuracy: 0.9958
Epoch 453/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0251
- accuracy: 0.9950
Epoch 454/500
12443/12443 [=====] - 4s 289us/sample - loss: 0.0253
- accuracy: 0.9956
Epoch 455/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0256
- accuracy: 0.9951
```

```
Epoch 456/500
12443/12443 [=====] - 4s 303us/sample - loss: 0.0251
- accuracy: 0.9952
Epoch 457/500
12443/12443 [=====] - 4s 285us/sample - loss: 0.0251
- accuracy: 0.9953
Epoch 458/500
12443/12443 [=====] - 4s 298us/sample - loss: 0.0246
- accuracy: 0.9951
Epoch 459/500
12443/12443 [=====] - 4s 290us/sample - loss: 0.0249
- accuracy: 0.9958
Epoch 460/500
12443/12443 [=====] - 4s 303us/sample - loss: 0.0248
- accuracy: 0.9955
Epoch 461/500
12443/12443 [=====] - 4s 311us/sample - loss: 0.0248
- accuracy: 0.9952
Epoch 462/500
12443/12443 [=====] - 4s 291us/sample - loss: 0.0248
- accuracy: 0.9957
Epoch 463/500
12443/12443 [=====] - 4s 286us/sample - loss: 0.0247
- accuracy: 0.9950
Epoch 464/500
```

```
12443/12443 [=====] - 3s 269us/sample - loss: 0.0249
- accuracy: 0.9954
Epoch 465/500
12443/12443 [=====] - 4s 294us/sample - loss: 0.0254
- accuracy: 0.9955
Epoch 466/500
12443/12443 [=====] - 4s 281us/sample - loss: 0.0249
- accuracy: 0.9953
Epoch 467/500
12443/12443 [=====] - 4s 293us/sample - loss: 0.0247
- accuracy: 0.9952
Epoch 468/500
12443/12443 [=====] - 4s 325us/sample - loss: 0.0245
- accuracy: 0.9955
Epoch 469/500
12443/12443 [=====] - 4s 291us/sample - loss: 0.0246
- accuracy: 0.9955
Epoch 470/500
12443/12443 [=====] - 3s 281us/sample - loss: 0.0247
- accuracy: 0.9959
Epoch 471/500
12443/12443 [=====] - 4s 297us/sample - loss: 0.0250
- accuracy: 0.9953
Epoch 472/500
12443/12443 [=====] - 4s 299us/sample - loss: 0.0245
```

```
- accuracy: 0.9953
Epoch 473/500
12443/12443 [=====] - 4s 329us/sample - loss: 0.0249
- accuracy: 0.9951
Epoch 474/500
12443/12443 [=====] - 4s 297us/sample - loss: 0.0247
- accuracy: 0.9957
Epoch 475/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0248
- accuracy: 0.9953
Epoch 476/500
12443/12443 [=====] - 4s 302us/sample - loss: 0.0243
- accuracy: 0.9957
Epoch 477/500
12443/12443 [=====] - 4s 284us/sample - loss: 0.0247
- accuracy: 0.9953
Epoch 478/500
12443/12443 [=====] - 4s 300us/sample - loss: 0.0244
- accuracy: 0.9956
Epoch 479/500
12443/12443 [=====] - 3s 266us/sample - loss: 0.0241
- accuracy: 0.9953
Epoch 480/500
12443/12443 [=====] - 3s 227us/sample - loss: 0.0245
- accuracy: 0.9953
```



```
Epoch 481/500
12443/12443 [=====] - 3s 266us/sample - loss: 0.0242
- accuracy: 0.9955
Epoch 482/500
12443/12443 [=====] - 3s 269us/sample - loss: 0.0246
- accuracy: 0.9952
Epoch 483/500
12443/12443 [=====] - 3s 265us/sample - loss: 0.0241
- accuracy: 0.9953
Epoch 484/500
12443/12443 [=====] - 3s 258us/sample - loss: 0.0238
- accuracy: 0.9953
Epoch 485/500
12443/12443 [=====] - 3s 256us/sample - loss: 0.0243
- accuracy: 0.9954
Epoch 486/500
12443/12443 [=====] - 3s 248us/sample - loss: 0.0246
- accuracy: 0.9955
Epoch 487/500
12443/12443 [=====] - 3s 244us/sample - loss: 0.0243
- accuracy: 0.9955
Epoch 488/500
12443/12443 [=====] - 3s 267us/sample - loss: 0.0238
- accuracy: 0.9950
Epoch 489/500
```

```
12443/12443 [=====] - 3s 253us/sample - loss: 0.0244
- accuracy: 0.9953
Epoch 490/500
12443/12443 [=====] - 3s 252us/sample - loss: 0.0242
- accuracy: 0.9961
Epoch 491/500
12443/12443 [=====] - 3s 246us/sample - loss: 0.0238
- accuracy: 0.9951
Epoch 492/500
12443/12443 [=====] - 3s 254us/sample - loss: 0.0237
- accuracy: 0.9951
Epoch 493/500
12443/12443 [=====] - 3s 260us/sample - loss: 0.0241
- accuracy: 0.9953
Epoch 494/500
12443/12443 [=====] - 3s 256us/sample - loss: 0.0237
- accuracy: 0.9961
Epoch 495/500
12443/12443 [=====] - 3s 251us/sample - loss: 0.0242
- accuracy: 0.9958
Epoch 496/500
12443/12443 [=====] - 3s 261us/sample - loss: 0.0237
- accuracy: 0.9953
Epoch 497/500
12443/12443 [=====] - 3s 275us/sample - loss: 0.0238
```

```
- accuracy: 0.9953
Epoch 498/500
12443/12443 [=====] - 3s 241us/sample - loss: 0.0239
- accuracy: 0.9957
Epoch 499/500
12443/12443 [=====] - 3s 238us/sample - loss: 0.0237
- accuracy: 0.9954
Epoch 500/500
12443/12443 [=====] - 4s 341us/sample - loss: 0.0238
- accuracy: 0.9956
2880/2880 [=====] - 2s 603us/sample

class_weight_Fold_4: {0: 0.10836018462074369, 1: 11.6653125}
```

```
pos_weight: 0.9
thresholdNum: 0.5
```

```
Average of train loss Fold_4: 0.0577
Average of yPredProbability Fold_4: 0.1546
```

```
classification_report_Fold_4:
precision    recall  f1-score   support
```

Normal 0	0.99	0.85	0.92	2857
Anomaly 1	0.00	0.09	0.01	23

accuracy			0.84	2880
macro avg	0.50	0.47	0.46	2880
weighted avg	0.98	0.84	0.91	2880

confusion_matrix_Fold_4:

True Negatives: 2428
False Positives: 429
False Negatives: 21
True Positives: 2

End running time Fold_4: 210609_002336 ,-----.

Start running time Fold_5: 210609_002336 ,-----:

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: 210609_002337

, ++++++

Data Augmentation MSE Label 1==> mean: 0.000487, min: 0.000193, max: 0.001406
Data Augmentation MSE Label 1==> mean: 0.000236, min: 1.9e-05, max: 0.000663
Data Augmentation MSE Label 1==> mean: 0.000263, min: 3e-06, max: 0.000933
Data Augmentation MSE Label 1==> mean: 0.000368, min: 1e-06, max: 0.002419
Data Augmentation MSE Label 1==> mean: 0.000607, min: 0.0, max: 0.008898
Data Augmentation MSE Label 1==> mean: 0.000957, min: 0.0, max: 0.015223
Data Augmentation MSE Label 1==> mean: 0.001227, min: 0.0, max: 0.0168
Data Augmentation MSE Label 1==> mean: 0.001328, min: 0.0, max: 0.008719
Data Augmentation MSE Label 1==> mean: 0.001477, min: 0.0, max: 0.008615
Data Augmentation MSE Label 1==> mean: 0.001829, min: 0.0, max: 0.015381
Data Augmentation MSE Label 1==> mean: 0.001935, min: 0.0, max: 0.010293

Data Augmentation MSE Label 1==> mean: 0.001968, min: 0.0, max: 0.010027

Data Augmentation MSE Label 1==> mean: 0.002085, min: 0.0, max: 0.015319

Data Augmentation MSE Label 1==> mean: 0.002559, min: 0.0, max: 0.027823

MSE All generated Augmented data Fold_5:

mean: 0.001238

min: 1.5e-05

max: 0.01018

End running time Data Augmentation_Fold_5: 210609_002437

,+++++++.

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 [=====] - 8s 622us/sample - loss: 3.0182
- accuracy: 0.9045

Epoch 2/500

12612/12612 [=====] - 3s 273us/sample - loss: 1.3337
- accuracy: 0.9162

Epoch 3/500

12612/12612 [=====] - 3s 275us/sample - loss: 0.6462
- accuracy: 0.9229

Epoch 4/500

12612/12612 [=====] - 3s 260us/sample - loss: 0.3809
- accuracy: 0.9278

Epoch 5/500

12612/12612 [=====] - 4s 282us/sample - loss: 0.2833
- accuracy: 0.9307

Epoch 6/500

12612/12612 [=====] - 4s 279us/sample - loss: 0.2464
- accuracy: 0.9332

Epoch 7/500

12612/12612 [=====] - 4s 286us/sample - loss: 0.2306
- accuracy: 0.9363

Epoch 8/500

12612/12612 [=====] - 4s 288us/sample - loss: 0.2210

```
- accuracy: 0.9375
Epoch 9/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.2143
- accuracy: 0.9400
Epoch 10/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.2093
- accuracy: 0.9420
Epoch 11/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.2045
- accuracy: 0.9426
Epoch 12/500
12612/12612 [=====] - 4s 278us/sample - loss: 0.1996
- accuracy: 0.9431
Epoch 13/500
12612/12612 [=====] - 4s 278us/sample - loss: 0.1953
- accuracy: 0.9471
Epoch 14/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.1909
- accuracy: 0.9475
Epoch 15/500
12612/12612 [=====] - 4s 289us/sample - loss: 0.1869
- accuracy: 0.9490
Epoch 16/500
12612/12612 [=====] - 4s 288us/sample - loss: 0.1839
- accuracy: 0.9492
```



```
Epoch 17/500
12612/12612 [=====] - 3s 270us/sample - loss: 0.1801
- accuracy: 0.9506
Epoch 18/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.1773
- accuracy: 0.9520
Epoch 19/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.1747
- accuracy: 0.9527
Epoch 20/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.1716
- accuracy: 0.9542
Epoch 21/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.1687
- accuracy: 0.9562
Epoch 22/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.1656
- accuracy: 0.9561
Epoch 23/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.1634
- accuracy: 0.9573
Epoch 24/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.1612
- accuracy: 0.9572
Epoch 25/500
```

```
12612/12612 [=====] - 3s 263us/sample - loss: 0.1581
- accuracy: 0.9582
Epoch 26/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.1563
- accuracy: 0.9595
Epoch 27/500
12612/12612 [=====] - 3s 271us/sample - loss: 0.1534
- accuracy: 0.9597
Epoch 28/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.1505
- accuracy: 0.9622
Epoch 29/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.1490
- accuracy: 0.9624
Epoch 30/500
12612/12612 [=====] - 3s 262us/sample - loss: 0.1458
- accuracy: 0.9647
Epoch 31/500
12612/12612 [=====] - 3s 271us/sample - loss: 0.1440
- accuracy: 0.9628
Epoch 32/500
12612/12612 [=====] - 3s 261us/sample - loss: 0.1414
- accuracy: 0.9654
Epoch 33/500
12612/12612 [=====] - 3s 269us/sample - loss: 0.1401
```

```
- accuracy: 0.9655
Epoch 34/500
12612/12612 [=====] - 3s 274us/sample - loss: 0.1371
- accuracy: 0.9673
Epoch 35/500
12612/12612 [=====] - 3s 261us/sample - loss: 0.1362
- accuracy: 0.9673
Epoch 36/500
12612/12612 [=====] - 3s 274us/sample - loss: 0.1340
- accuracy: 0.9690
Epoch 37/500
12612/12612 [=====] - 3s 260us/sample - loss: 0.1316
- accuracy: 0.9696
Epoch 38/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.1291
- accuracy: 0.9698
Epoch 39/500
12612/12612 [=====] - 3s 272us/sample - loss: 0.1262
- accuracy: 0.9712
Epoch 40/500
12612/12612 [=====] - 3s 263us/sample - loss: 0.1254
- accuracy: 0.9710
Epoch 41/500
12612/12612 [=====] - 3s 269us/sample - loss: 0.1233
- accuracy: 0.9720
```

```
Epoch 42/500
12612/12612 [=====] - 3s 257us/sample - loss: 0.1216
- accuracy: 0.9726
Epoch 43/500
12612/12612 [=====] - 4s 284us/sample - loss: 0.1194
- accuracy: 0.9735
Epoch 44/500
12612/12612 [=====] - 3s 273us/sample - loss: 0.1178
- accuracy: 0.9745
Epoch 45/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.1156
- accuracy: 0.9757
Epoch 46/500
12612/12612 [=====] - 3s 273us/sample - loss: 0.1144
- accuracy: 0.9750
Epoch 47/500
12612/12612 [=====] - 3s 266us/sample - loss: 0.1126
- accuracy: 0.9753
Epoch 48/500
12612/12612 [=====] - 4s 296us/sample - loss: 0.1110
- accuracy: 0.9768
Epoch 49/500
12612/12612 [=====] - 4s 289us/sample - loss: 0.1098
- accuracy: 0.9780
Epoch 50/500
```

```
12612/12612 [=====] - 3s 264us/sample - loss: 0.1081
- accuracy: 0.9772
Epoch 51/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.1065
- accuracy: 0.9785
Epoch 52/500
12612/12612 [=====] - 4s 278us/sample - loss: 0.1055
- accuracy: 0.9788
Epoch 53/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.1036
- accuracy: 0.9791
Epoch 54/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.1030
- accuracy: 0.9798
Epoch 55/500
12612/12612 [=====] - 3s 268us/sample - loss: 0.1019
- accuracy: 0.9796
Epoch 56/500
12612/12612 [=====] - 3s 277us/sample - loss: 0.1005
- accuracy: 0.9802
Epoch 57/500
12612/12612 [=====] - 4s 278us/sample - loss: 0.0993
- accuracy: 0.9806
Epoch 58/500
12612/12612 [=====] - 3s 272us/sample - loss: 0.0984
```

```
- accuracy: 0.9808
Epoch 59/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0971
- accuracy: 0.9810
Epoch 60/500
12612/12612 [=====] - 3s 274us/sample - loss: 0.0963
- accuracy: 0.9816
Epoch 61/500
12612/12612 [=====] - 4s 289us/sample - loss: 0.0943
- accuracy: 0.9814
Epoch 62/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.0935
- accuracy: 0.9818
Epoch 63/500
12612/12612 [=====] - 3s 265us/sample - loss: 0.0933
- accuracy: 0.9811
Epoch 64/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0916
- accuracy: 0.9818
Epoch 65/500
12612/12612 [=====] - 3s 266us/sample - loss: 0.0914
- accuracy: 0.9821
Epoch 66/500
12612/12612 [=====] - 4s 292us/sample - loss: 0.0901
- accuracy: 0.9830
```

```
Epoch 67/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.0890
- accuracy: 0.9830
Epoch 68/500
12612/12612 [=====] - 3s 270us/sample - loss: 0.0879
- accuracy: 0.9833
Epoch 69/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0876
- accuracy: 0.9839
Epoch 70/500
12612/12612 [=====] - 3s 274us/sample - loss: 0.0866
- accuracy: 0.9838
Epoch 71/500
12612/12612 [=====] - 4s 278us/sample - loss: 0.0855
- accuracy: 0.9841
Epoch 72/500
12612/12612 [=====] - 4s 292us/sample - loss: 0.0856
- accuracy: 0.9847
Epoch 73/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.0844
- accuracy: 0.9839
Epoch 74/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0835
- accuracy: 0.9834
Epoch 75/500
```

```
12612/12612 [=====] - 4s 281us/sample - loss: 0.0825
- accuracy: 0.9850
Epoch 76/500
12612/12612 [=====] - 3s 269us/sample - loss: 0.0815
- accuracy: 0.9854
Epoch 77/500
12612/12612 [=====] - 4s 291us/sample - loss: 0.0811
- accuracy: 0.9853
Epoch 78/500
12612/12612 [=====] - 3s 272us/sample - loss: 0.0814
- accuracy: 0.9847
Epoch 79/500
12612/12612 [=====] - 4s 279us/sample - loss: 0.0799
- accuracy: 0.9851
Epoch 80/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0792
- accuracy: 0.9853
Epoch 81/500
12612/12612 [=====] - 3s 262us/sample - loss: 0.0790
- accuracy: 0.9852
Epoch 82/500
12612/12612 [=====] - 4s 284us/sample - loss: 0.0782
- accuracy: 0.9857
Epoch 83/500
12612/12612 [=====] - 3s 266us/sample - loss: 0.0772
```



```
- accuracy: 0.9856
Epoch 84/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0774
- accuracy: 0.9864
Epoch 85/500
12612/12612 [=====] - 4s 302us/sample - loss: 0.0760
- accuracy: 0.9864
Epoch 86/500
12612/12612 [=====] - 3s 268us/sample - loss: 0.0758
- accuracy: 0.9859
Epoch 87/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0765
- accuracy: 0.9854
Epoch 88/500
12612/12612 [=====] - 4s 289us/sample - loss: 0.0754
- accuracy: 0.9864
Epoch 89/500
12612/12612 [=====] - 3s 274us/sample - loss: 0.0743
- accuracy: 0.9871
Epoch 90/500
12612/12612 [=====] - 4s 292us/sample - loss: 0.0737
- accuracy: 0.9868
Epoch 91/500
12612/12612 [=====] - 3s 270us/sample - loss: 0.0732
- accuracy: 0.9871
```

```
Epoch 92/500
12612/12612 [=====] - 3s 277us/sample - loss: 0.0724
- accuracy: 0.9868
Epoch 93/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.0715
- accuracy: 0.9868
Epoch 94/500
12612/12612 [=====] - 3s 262us/sample - loss: 0.0722
- accuracy: 0.9874
Epoch 95/500
12612/12612 [=====] - 4s 278us/sample - loss: 0.0714
- accuracy: 0.9864
Epoch 96/500
12612/12612 [=====] - 3s 259us/sample - loss: 0.0705
- accuracy: 0.9876
Epoch 97/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0704
- accuracy: 0.9872
Epoch 98/500
12612/12612 [=====] - 4s 280us/sample - loss: 0.0697
- accuracy: 0.9869
Epoch 99/500
12612/12612 [=====] - 3s 258us/sample - loss: 0.0691
- accuracy: 0.9870
Epoch 100/500
```

```
12612/12612 [=====] - 3s 277us/sample - loss: 0.0691
- accuracy: 0.9876
Epoch 101/500
12612/12612 [=====] - 3s 260us/sample - loss: 0.0685
- accuracy: 0.9877
Epoch 102/500
12612/12612 [=====] - 3s 273us/sample - loss: 0.0689
- accuracy: 0.9877
Epoch 103/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0681
- accuracy: 0.9882
Epoch 104/500
12612/12612 [=====] - 3s 273us/sample - loss: 0.0674
- accuracy: 0.9880
Epoch 105/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0669
- accuracy: 0.9879
Epoch 106/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.0669
- accuracy: 0.9882
Epoch 107/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.0666
- accuracy: 0.9880
Epoch 108/500
12612/12612 [=====] - 4s 306us/sample - loss: 0.0658
```

```
- accuracy: 0.9887
Epoch 109/500
12612/12612 [=====] - 3s 269us/sample - loss: 0.0658
- accuracy: 0.9884
Epoch 110/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0662
- accuracy: 0.9880
Epoch 111/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0647
- accuracy: 0.9884
Epoch 112/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.0648
- accuracy: 0.9880
Epoch 113/500
12612/12612 [=====] - 4s 302us/sample - loss: 0.0637
- accuracy: 0.9885
Epoch 114/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.0637
- accuracy: 0.9886
Epoch 115/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0652
- accuracy: 0.9880
Epoch 116/500
12612/12612 [=====] - 4s 299us/sample - loss: 0.0641
- accuracy: 0.9883
```

```
Epoch 117/500
12612/12612 [=====] - 3s 271us/sample - loss: 0.0632
- accuracy: 0.9888
Epoch 118/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0626
- accuracy: 0.9887
Epoch 119/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0625
- accuracy: 0.9883
Epoch 120/500
12612/12612 [=====] - 3s 268us/sample - loss: 0.0623
- accuracy: 0.9888
Epoch 121/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0622
- accuracy: 0.9885
Epoch 122/500
12612/12612 [=====] - 4s 291us/sample - loss: 0.0610
- accuracy: 0.9891
Epoch 123/500
12612/12612 [=====] - 3s 275us/sample - loss: 0.0609
- accuracy: 0.9896
Epoch 124/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0607
- accuracy: 0.9890
Epoch 125/500
```

```
12612/12612 [=====] - 4s 356us/sample - loss: 0.0607
- accuracy: 0.9891
Epoch 126/500
12612/12612 [=====] - 3s 264us/sample - loss: 0.0609
- accuracy: 0.9891
Epoch 127/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0604
- accuracy: 0.9890
Epoch 128/500
12612/12612 [=====] - 3s 259us/sample - loss: 0.0602
- accuracy: 0.9891
Epoch 129/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0589
- accuracy: 0.9891
Epoch 130/500
12612/12612 [=====] - 4s 279us/sample - loss: 0.0598
- accuracy: 0.9895
Epoch 131/500
12612/12612 [=====] - 3s 268us/sample - loss: 0.0586
- accuracy: 0.9895
Epoch 132/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.0587
- accuracy: 0.9897
Epoch 133/500
12612/12612 [=====] - 4s 314us/sample - loss: 0.0586
```

```
- accuracy: 0.9895
Epoch 134/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0577
- accuracy: 0.9906
Epoch 135/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0582
- accuracy: 0.9895
Epoch 136/500
12612/12612 [=====] - 3s 264us/sample - loss: 0.0576
- accuracy: 0.9902
Epoch 137/500
12612/12612 [=====] - 4s 320us/sample - loss: 0.0575
- accuracy: 0.9899
Epoch 138/500
12612/12612 [=====] - 4s 293us/sample - loss: 0.0568
- accuracy: 0.9897
Epoch 139/500
12612/12612 [=====] - 3s 272us/sample - loss: 0.0568
- accuracy: 0.9900
Epoch 140/500
12612/12612 [=====] - 4s 327us/sample - loss: 0.0566
- accuracy: 0.9902
Epoch 141/500
12612/12612 [=====] - 5s 395us/sample - loss: 0.0563
- accuracy: 0.9903
```

```
Epoch 142/500
12612/12612 [=====] - 4s 304us/sample - loss: 0.0568
- accuracy: 0.9902
Epoch 143/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0559
- accuracy: 0.9899
Epoch 144/500
12612/12612 [=====] - 4s 308us/sample - loss: 0.0561
- accuracy: 0.9906
Epoch 145/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0566
- accuracy: 0.9903
Epoch 146/500
12612/12612 [=====] - 4s 293us/sample - loss: 0.0551
- accuracy: 0.9902
Epoch 147/500
12612/12612 [=====] - 4s 298us/sample - loss: 0.0563
- accuracy: 0.9895
Epoch 148/500
12612/12612 [=====] - 4s 280us/sample - loss: 0.0550
- accuracy: 0.9902
Epoch 149/500
12612/12612 [=====] - 4s 312us/sample - loss: 0.0540
- accuracy: 0.9904
Epoch 150/500
```



```
12612/12612 [=====] - 4s 306us/sample - loss: 0.0548
- accuracy: 0.9903
Epoch 151/500
12612/12612 [=====] - 3s 272us/sample - loss: 0.0542
- accuracy: 0.9902
Epoch 152/500
12612/12612 [=====] - 4s 316us/sample - loss: 0.0543
- accuracy: 0.9906
Epoch 153/500
12612/12612 [=====] - 4s 342us/sample - loss: 0.0536
- accuracy: 0.9906
Epoch 154/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0541
- accuracy: 0.9910
Epoch 155/500
12612/12612 [=====] - 4s 316us/sample - loss: 0.0532
- accuracy: 0.9903
Epoch 156/500
12612/12612 [=====] - 4s 306us/sample - loss: 0.0535
- accuracy: 0.9904
Epoch 157/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.0536
- accuracy: 0.9905
Epoch 158/500
12612/12612 [=====] - 4s 304us/sample - loss: 0.0533
```

```
- accuracy: 0.9906
Epoch 159/500
12612/12612 [=====] - 4s 309us/sample - loss: 0.0530
- accuracy: 0.9904
Epoch 160/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0533
- accuracy: 0.9906
Epoch 161/500
12612/12612 [=====] - 4s 303us/sample - loss: 0.0531
- accuracy: 0.9908
Epoch 162/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0520
- accuracy: 0.9903
Epoch 163/500
12612/12612 [=====] - 3s 269us/sample - loss: 0.0524
- accuracy: 0.9913
Epoch 164/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0523
- accuracy: 0.9907
Epoch 165/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0516
- accuracy: 0.9916
Epoch 166/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0521
- accuracy: 0.9911
```

```
Epoch 167/500
12612/12612 [=====] - 4s 299us/sample - loss: 0.0517
- accuracy: 0.9906
Epoch 168/500
12612/12612 [=====] - 4s 279us/sample - loss: 0.0517
- accuracy: 0.9908
Epoch 169/500
12612/12612 [=====] - 4s 307us/sample - loss: 0.0509
- accuracy: 0.9911
Epoch 170/500
12612/12612 [=====] - 4s 308us/sample - loss: 0.0502
- accuracy: 0.9917
Epoch 171/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0507
- accuracy: 0.9911
Epoch 172/500
12612/12612 [=====] - 4s 292us/sample - loss: 0.0508
- accuracy: 0.9911
Epoch 173/500
12612/12612 [=====] - 4s 300us/sample - loss: 0.0504
- accuracy: 0.9908
Epoch 174/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0508
- accuracy: 0.9914
Epoch 175/500
```

```
12612/12612 [=====] - 4s 305us/sample - loss: 0.0496
- accuracy: 0.9914
Epoch 176/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0504
- accuracy: 0.9912
Epoch 177/500
12612/12612 [=====] - 4s 284us/sample - loss: 0.0497
- accuracy: 0.9910
Epoch 178/500
12612/12612 [=====] - 4s 303us/sample - loss: 0.0496
- accuracy: 0.9914
Epoch 179/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0493
- accuracy: 0.9916
Epoch 180/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0495
- accuracy: 0.9911
Epoch 181/500
12612/12612 [=====] - 4s 306us/sample - loss: 0.0490
- accuracy: 0.9914
Epoch 182/500
12612/12612 [=====] - 4s 293us/sample - loss: 0.0493
- accuracy: 0.9916
Epoch 183/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0489
```

```
- accuracy: 0.9914
Epoch 184/500
12612/12612 [=====] - 4s 322us/sample - loss: 0.0485
- accuracy: 0.9914
Epoch 185/500
12612/12612 [=====] - 4s 302us/sample - loss: 0.0486
- accuracy: 0.9915
Epoch 186/500
12612/12612 [=====] - 4s 306us/sample - loss: 0.0478
- accuracy: 0.9918
Epoch 187/500
12612/12612 [=====] - 4s 321us/sample - loss: 0.0485
- accuracy: 0.9914
Epoch 188/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0480
- accuracy: 0.9917
Epoch 189/500
12612/12612 [=====] - 4s 308us/sample - loss: 0.0474
- accuracy: 0.9914
Epoch 190/500
12612/12612 [=====] - 4s 307us/sample - loss: 0.0491
- accuracy: 0.9914
Epoch 191/500
12612/12612 [=====] - 3s 270us/sample - loss: 0.0481
- accuracy: 0.9914
```

```
Epoch 192/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0473
- accuracy: 0.9915
Epoch 193/500
12612/12612 [=====] - 4s 320us/sample - loss: 0.0471
- accuracy: 0.9917
Epoch 194/500
12612/12612 [=====] - 4s 331us/sample - loss: 0.0479
- accuracy: 0.9916
Epoch 195/500
12612/12612 [=====] - 4s 304us/sample - loss: 0.0470
- accuracy: 0.9918
Epoch 196/500
12612/12612 [=====] - 5s 384us/sample - loss: 0.0466
- accuracy: 0.9921
Epoch 197/500
12612/12612 [=====] - 4s 279us/sample - loss: 0.0467
- accuracy: 0.9918
Epoch 198/500
12612/12612 [=====] - 3s 274us/sample - loss: 0.0469
- accuracy: 0.9920
Epoch 199/500
12612/12612 [=====] - 4s 305us/sample - loss: 0.0468
- accuracy: 0.9917
Epoch 200/500
```

```
12612/12612 [=====] - 3s 262us/sample - loss: 0.0469
- accuracy: 0.9922
Epoch 201/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.0457
- accuracy: 0.9922
Epoch 202/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0460
- accuracy: 0.9919
Epoch 203/500
12612/12612 [=====] - 3s 274us/sample - loss: 0.0458
- accuracy: 0.9922
Epoch 204/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0456
- accuracy: 0.9922
Epoch 205/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0462
- accuracy: 0.9922
Epoch 206/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0458
- accuracy: 0.9920
Epoch 207/500
12612/12612 [=====] - 4s 306us/sample - loss: 0.0456
- accuracy: 0.9922
Epoch 208/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0454
```

```
- accuracy: 0.9925
Epoch 209/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0451
- accuracy: 0.9926
Epoch 210/500
12612/12612 [=====] - 4s 284us/sample - loss: 0.0453
- accuracy: 0.9921
Epoch 211/500
12612/12612 [=====] - 3s 267us/sample - loss: 0.0447
- accuracy: 0.9923
Epoch 212/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0445
- accuracy: 0.9925
Epoch 213/500
12612/12612 [=====] - 3s 277us/sample - loss: 0.0460
- accuracy: 0.9919
Epoch 214/500
12612/12612 [=====] - 3s 268us/sample - loss: 0.0449
- accuracy: 0.9925
Epoch 215/500
12612/12612 [=====] - 4s 284us/sample - loss: 0.0450
- accuracy: 0.9918
Epoch 216/500
12612/12612 [=====] - 3s 264us/sample - loss: 0.0448
- accuracy: 0.9925
```



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Epoch 217/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0446
- accuracy: 0.9919
Epoch 218/500
12612/12612 [=====] - 4s 291us/sample - loss: 0.0439
- accuracy: 0.9927
Epoch 219/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0449
- accuracy: 0.9925
Epoch 220/500
12612/12612 [=====] - 4s 300us/sample - loss: 0.0440
- accuracy: 0.9929
Epoch 221/500
12612/12612 [=====] - 4s 293us/sample - loss: 0.0441
- accuracy: 0.9922
Epoch 222/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0434
- accuracy: 0.9921
Epoch 223/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0436
- accuracy: 0.9923
Epoch 224/500
12612/12612 [=====] - 3s 267us/sample - loss: 0.0437
- accuracy: 0.9925
Epoch 225/500
```

```
12612/12612 [=====] - 4s 290us/sample - loss: 0.0432
- accuracy: 0.9929
Epoch 226/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.0442
- accuracy: 0.9920
Epoch 227/500
12612/12612 [=====] - 3s 267us/sample - loss: 0.0433
- accuracy: 0.9925
Epoch 228/500
12612/12612 [=====] - 4s 300us/sample - loss: 0.0428
- accuracy: 0.9925
Epoch 229/500
12612/12612 [=====] - 4s 334us/sample - loss: 0.0432
- accuracy: 0.9923
Epoch 230/500
12612/12612 [=====] - 4s 298us/sample - loss: 0.0433
- accuracy: 0.9922
Epoch 231/500
12612/12612 [=====] - 4s 318us/sample - loss: 0.0430
- accuracy: 0.9925
Epoch 232/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0428
- accuracy: 0.9925
Epoch 233/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.0429
```

```
- accuracy: 0.9923
Epoch 234/500
12612/12612 [=====] - 4s 278us/sample - loss: 0.0429
- accuracy: 0.9925
Epoch 235/500
12612/12612 [=====] - 3s 264us/sample - loss: 0.0425
- accuracy: 0.9929
Epoch 236/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0427
- accuracy: 0.9921
Epoch 237/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0423
- accuracy: 0.9925
Epoch 238/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.0425
- accuracy: 0.9925
Epoch 239/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0421
- accuracy: 0.9925
Epoch 240/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0412
- accuracy: 0.9929
Epoch 241/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0423
- accuracy: 0.9928
```

```
Epoch 242/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0417
- accuracy: 0.9924
Epoch 243/500
12612/12612 [=====] - 4s 279us/sample - loss: 0.0414
- accuracy: 0.9929
Epoch 244/500
12612/12612 [=====] - 4s 302us/sample - loss: 0.0415
- accuracy: 0.9926
Epoch 245/500
12612/12612 [=====] - 4s 299us/sample - loss: 0.0410
- accuracy: 0.9932
Epoch 246/500
12612/12612 [=====] - 4s 280us/sample - loss: 0.0410
- accuracy: 0.9929
Epoch 247/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0418
- accuracy: 0.9925
Epoch 248/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0415
- accuracy: 0.9928
Epoch 249/500
12612/12612 [=====] - 3s 275us/sample - loss: 0.0411
- accuracy: 0.9930
Epoch 250/500
```

```
12612/12612 [=====] - 4s 296us/sample - loss: 0.0410
- accuracy: 0.9925
Epoch 251/500
12612/12612 [=====] - 3s 269us/sample - loss: 0.0410
- accuracy: 0.9926
Epoch 252/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0403
- accuracy: 0.9933
Epoch 253/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0403
- accuracy: 0.9925
Epoch 254/500
12612/12612 [=====] - 3s 267us/sample - loss: 0.0413
- accuracy: 0.9929
Epoch 255/500
12612/12612 [=====] - 4s 279us/sample - loss: 0.0411
- accuracy: 0.9926
Epoch 256/500
12612/12612 [=====] - 4s 284us/sample - loss: 0.0411
- accuracy: 0.9927
Epoch 257/500
12612/12612 [=====] - 3s 265us/sample - loss: 0.0408
- accuracy: 0.9930
Epoch 258/500
12612/12612 [=====] - 3s 273us/sample - loss: 0.0402
```

```
- accuracy: 0.9930
Epoch 259/500
12612/12612 [=====] - 3s 263us/sample - loss: 0.0405
- accuracy: 0.9929
Epoch 260/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.0402
- accuracy: 0.9929
Epoch 261/500
12612/12612 [=====] - 3s 266us/sample - loss: 0.0404
- accuracy: 0.9928
Epoch 262/500
12612/12612 [=====] - 3s 270us/sample - loss: 0.0397
- accuracy: 0.9927
Epoch 263/500
12612/12612 [=====] - 4s 280us/sample - loss: 0.0397
- accuracy: 0.9929
Epoch 264/500
12612/12612 [=====] - 3s 260us/sample - loss: 0.0395
- accuracy: 0.9933
Epoch 265/500
12612/12612 [=====] - 4s 278us/sample - loss: 0.0400
- accuracy: 0.9929
Epoch 266/500
12612/12612 [=====] - 3s 267us/sample - loss: 0.0394
- accuracy: 0.9931
```

```
Epoch 267/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0391
- accuracy: 0.9929
Epoch 268/500
12612/12612 [=====] - 4s 289us/sample - loss: 0.0401
- accuracy: 0.9932
Epoch 269/500
12612/12612 [=====] - 3s 270us/sample - loss: 0.0394
- accuracy: 0.9931
Epoch 270/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0389
- accuracy: 0.9933
Epoch 271/500
12612/12612 [=====] - 4s 289us/sample - loss: 0.0397
- accuracy: 0.9933
Epoch 272/500
12612/12612 [=====] - 3s 266us/sample - loss: 0.0394
- accuracy: 0.9930
Epoch 273/500
12612/12612 [=====] - 4s 310us/sample - loss: 0.0388
- accuracy: 0.9937
Epoch 274/500
12612/12612 [=====] - 3s 268us/sample - loss: 0.0386
- accuracy: 0.9930
Epoch 275/500
```

```
12612/12612 [=====] - 3s 274us/sample - loss: 0.0388
- accuracy: 0.9932
Epoch 276/500
12612/12612 [=====] - 4s 280us/sample - loss: 0.0383
- accuracy: 0.9936
Epoch 277/500
12612/12612 [=====] - 3s 260us/sample - loss: 0.0393
- accuracy: 0.9930
Epoch 278/500
12612/12612 [=====] - 5s 361us/sample - loss: 0.0386
- accuracy: 0.9929
Epoch 279/500
12612/12612 [=====] - 5s 374us/sample - loss: 0.0389
- accuracy: 0.9928
Epoch 280/500
12612/12612 [=====] - 3s 266us/sample - loss: 0.0381
- accuracy: 0.9934
Epoch 281/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0386
- accuracy: 0.9929
Epoch 282/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0384
- accuracy: 0.9935
Epoch 283/500
12612/12612 [=====] - 3s 259us/sample - loss: 0.0385
```



```
- accuracy: 0.9931
Epoch 284/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.0381
- accuracy: 0.9929
Epoch 285/500
12612/12612 [=====] - 3s 265us/sample - loss: 0.0379
- accuracy: 0.9936
Epoch 286/500
12612/12612 [=====] - 3s 275us/sample - loss: 0.0378
- accuracy: 0.9935
Epoch 287/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0385
- accuracy: 0.9930
Epoch 288/500
12612/12612 [=====] - 4s 300us/sample - loss: 0.0379
- accuracy: 0.9932
Epoch 289/500
12612/12612 [=====] - 4s 294us/sample - loss: 0.0384
- accuracy: 0.9932
Epoch 290/500
12612/12612 [=====] - 6s 484us/sample - loss: 0.0380
- accuracy: 0.9933
Epoch 291/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0369
- accuracy: 0.9936
```

```
Epoch 292/500
12612/12612 [=====] - 3s 264us/sample - loss: 0.0374
- accuracy: 0.9932
Epoch 293/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0398
- accuracy: 0.9929
Epoch 294/500
12612/12612 [=====] - 3s 258us/sample - loss: 0.0371
- accuracy: 0.9934
Epoch 295/500
12612/12612 [=====] - 4s 289us/sample - loss: 0.0371
- accuracy: 0.9934
Epoch 296/500
12612/12612 [=====] - 4s 305us/sample - loss: 0.0370
- accuracy: 0.9940
Epoch 297/500
12612/12612 [=====] - 3s 260us/sample - loss: 0.0371
- accuracy: 0.9935
Epoch 298/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.0370
- accuracy: 0.9934
Epoch 299/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0368
- accuracy: 0.9936
Epoch 300/500
```

```
12612/12612 [=====] - 4s 285us/sample - loss: 0.0371
- accuracy: 0.9931
Epoch 301/500
12612/12612 [=====] - 4s 289us/sample - loss: 0.0371
- accuracy: 0.9935
Epoch 302/500
12612/12612 [=====] - 4s 347us/sample - loss: 0.0377
- accuracy: 0.9933
Epoch 303/500
12612/12612 [=====] - 5s 382us/sample - loss: 0.0371
- accuracy: 0.9929
Epoch 304/500
12612/12612 [=====] - 5s 402us/sample - loss: 0.0365
- accuracy: 0.9938
Epoch 305/500
12612/12612 [=====] - 5s 431us/sample - loss: 0.0367
- accuracy: 0.9934
Epoch 306/500
12612/12612 [=====] - 4s 348us/sample - loss: 0.0363
- accuracy: 0.9937
Epoch 307/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.0364
- accuracy: 0.9935
Epoch 308/500
12612/12612 [=====] - 4s 304us/sample - loss: 0.0362
```

```
- accuracy: 0.9935
Epoch 309/500
12612/12612 [=====] - 4s 328us/sample - loss: 0.0370
- accuracy: 0.9937
Epoch 310/500
12612/12612 [=====] - 3s 264us/sample - loss: 0.0378
- accuracy: 0.9931
Epoch 311/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0358
- accuracy: 0.9937
Epoch 312/500
12612/12612 [=====] - 4s 326us/sample - loss: 0.0363
- accuracy: 0.9935
Epoch 313/500
12612/12612 [=====] - 4s 316us/sample - loss: 0.0363
- accuracy: 0.9936
Epoch 314/500
12612/12612 [=====] - 4s 303us/sample - loss: 0.0360
- accuracy: 0.9934
Epoch 315/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0363
- accuracy: 0.9937
Epoch 316/500
12612/12612 [=====] - 3s 275us/sample - loss: 0.0360
- accuracy: 0.9938
```

```
Epoch 317/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0361
- accuracy: 0.9938
Epoch 318/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0361
- accuracy: 0.9937
Epoch 319/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0355
- accuracy: 0.9937
Epoch 320/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0356
- accuracy: 0.9937
Epoch 321/500
12612/12612 [=====] - 3s 263us/sample - loss: 0.0356
- accuracy: 0.9933
Epoch 322/500
12612/12612 [=====] - 4s 279us/sample - loss: 0.0364
- accuracy: 0.9931
Epoch 323/500
12612/12612 [=====] - 4s 326us/sample - loss: 0.0360
- accuracy: 0.9934
Epoch 324/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0355
- accuracy: 0.9938
Epoch 325/500
```

```
12612/12612 [=====] - 4s 286us/sample - loss: 0.0360
- accuracy: 0.9936
Epoch 326/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0351
- accuracy: 0.9937
Epoch 327/500
12612/12612 [=====] - 3s 269us/sample - loss: 0.0356
- accuracy: 0.9937
Epoch 328/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.0352
- accuracy: 0.9938
Epoch 329/500
12612/12612 [=====] - 3s 261us/sample - loss: 0.0351
- accuracy: 0.9937
Epoch 330/500
12612/12612 [=====] - 4s 278us/sample - loss: 0.0353
- accuracy: 0.9941
Epoch 331/500
12612/12612 [=====] - 3s 275us/sample - loss: 0.0348
- accuracy: 0.9940
Epoch 332/500
12612/12612 [=====] - 3s 268us/sample - loss: 0.0352
- accuracy: 0.9938
Epoch 333/500
12612/12612 [=====] - 4s 285us/sample - loss: 0.0347
```

```
- accuracy: 0.9937
Epoch 334/500
12612/12612 [=====] - 3s 261us/sample - loss: 0.0352
- accuracy: 0.9933
Epoch 335/500
12612/12612 [=====] - 4s 279us/sample - loss: 0.0358
- accuracy: 0.9935
Epoch 336/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.0346
- accuracy: 0.9941
Epoch 337/500
12612/12612 [=====] - 3s 264us/sample - loss: 0.0347
- accuracy: 0.9937
Epoch 338/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0343
- accuracy: 0.9937
Epoch 339/500
12612/12612 [=====] - 3s 258us/sample - loss: 0.0343
- accuracy: 0.9940
Epoch 340/500
12612/12612 [=====] - 4s 355us/sample - loss: 0.0348
- accuracy: 0.9939
Epoch 341/500
12612/12612 [=====] - 4s 352us/sample - loss: 0.0345
- accuracy: 0.9941
```

```
Epoch 342/500
12612/12612 [=====] - 5s 388us/sample - loss: 0.0343
- accuracy: 0.9941
Epoch 343/500
12612/12612 [=====] - 4s 351us/sample - loss: 0.0344
- accuracy: 0.9933
Epoch 344/500
12612/12612 [=====] - 5s 359us/sample - loss: 0.0347
- accuracy: 0.9939
Epoch 345/500
12612/12612 [=====] - 4s 310us/sample - loss: 0.0345
- accuracy: 0.9942
Epoch 346/500
12612/12612 [=====] - 4s 291us/sample - loss: 0.0341
- accuracy: 0.9940
Epoch 347/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0337
- accuracy: 0.9942
Epoch 348/500
12612/12612 [=====] - 4s 346us/sample - loss: 0.0339
- accuracy: 0.9941
Epoch 349/500
12612/12612 [=====] - 4s 336us/sample - loss: 0.0342
- accuracy: 0.9937
Epoch 350/500
```



```
12612/12612 [=====] - 4s 319us/sample - loss: 0.0334
- accuracy: 0.9941
Epoch 351/500
12612/12612 [=====] - 4s 356us/sample - loss: 0.0340
- accuracy: 0.9935
Epoch 352/500
12612/12612 [=====] - 4s 315us/sample - loss: 0.0353
- accuracy: 0.9939
Epoch 353/500
12612/12612 [=====] - 4s 303us/sample - loss: 0.0333
- accuracy: 0.9941
Epoch 354/500
12612/12612 [=====] - 4s 303us/sample - loss: 0.0335
- accuracy: 0.9942
Epoch 355/500
12612/12612 [=====] - 5s 386us/sample - loss: 0.0334
- accuracy: 0.9941
Epoch 356/500
12612/12612 [=====] - 4s 293us/sample - loss: 0.0330
- accuracy: 0.9937
Epoch 357/500
12612/12612 [=====] - 4s 298us/sample - loss: 0.0335
- accuracy: 0.9945
Epoch 358/500
12612/12612 [=====] - 4s 299us/sample - loss: 0.0334
```

```
- accuracy: 0.9936
Epoch 359/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.0336
- accuracy: 0.9940
Epoch 360/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0332
- accuracy: 0.9945
Epoch 361/500
12612/12612 [=====] - 4s 296us/sample - loss: 0.0344
- accuracy: 0.9941
Epoch 362/500
12612/12612 [=====] - 3s 277us/sample - loss: 0.0329
- accuracy: 0.9944
Epoch 363/500
12612/12612 [=====] - 4s 304us/sample - loss: 0.0348
- accuracy: 0.9936
Epoch 364/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0330
- accuracy: 0.9940
Epoch 365/500
12612/12612 [=====] - 3s 275us/sample - loss: 0.0323
- accuracy: 0.9942
Epoch 366/500
12612/12612 [=====] - 4s 302us/sample - loss: 0.0328
- accuracy: 0.9942
```

```
Epoch 367/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0329
- accuracy: 0.9944
Epoch 368/500
12612/12612 [=====] - 4s 304us/sample - loss: 0.0327
- accuracy: 0.9945
Epoch 369/500
12612/12612 [=====] - 4s 312us/sample - loss: 0.0331
- accuracy: 0.9943
Epoch 370/500
12612/12612 [=====] - 4s 286us/sample - loss: 0.0327
- accuracy: 0.9939
Epoch 371/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0321
- accuracy: 0.9944
Epoch 372/500
12612/12612 [=====] - 4s 331us/sample - loss: 0.0326
- accuracy: 0.9941
Epoch 373/500
12612/12612 [=====] - 3s 275us/sample - loss: 0.0322
- accuracy: 0.9941
Epoch 374/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0326
- accuracy: 0.9941
Epoch 375/500
```

```
12612/12612 [=====] - 4s 287us/sample - loss: 0.0320
- accuracy: 0.9943
Epoch 376/500
12612/12612 [=====] - 3s 263us/sample - loss: 0.0328
- accuracy: 0.9938
Epoch 377/500
12612/12612 [=====] - 4s 290us/sample - loss: 0.0323
- accuracy: 0.9944
Epoch 378/500
12612/12612 [=====] - 3s 266us/sample - loss: 0.0324
- accuracy: 0.9943
Epoch 379/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0324
- accuracy: 0.9941
Epoch 380/500
12612/12612 [=====] - 4s 283us/sample - loss: 0.0318
- accuracy: 0.9945
Epoch 381/500
12612/12612 [=====] - 3s 264us/sample - loss: 0.0321
- accuracy: 0.9944
Epoch 382/500
12612/12612 [=====] - 4s 282us/sample - loss: 0.0321
- accuracy: 0.9943
Epoch 383/500
12612/12612 [=====] - 3s 275us/sample - loss: 0.0319
```

```
- accuracy: 0.9944
Epoch 384/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.0318
- accuracy: 0.9940
Epoch 385/500
12612/12612 [=====] - 4s 284us/sample - loss: 0.0319
- accuracy: 0.9944
Epoch 386/500
12612/12612 [=====] - 3s 276us/sample - loss: 0.0323
- accuracy: 0.9944
Epoch 387/500
12612/12612 [=====] - 4s 316us/sample - loss: 0.0321
- accuracy: 0.9941
Epoch 388/500
12612/12612 [=====] - 4s 303us/sample - loss: 0.0322
- accuracy: 0.9940
Epoch 389/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0315
- accuracy: 0.9941
Epoch 390/500
12612/12612 [=====] - 4s 308us/sample - loss: 0.0311
- accuracy: 0.9948
Epoch 391/500
12612/12612 [=====] - 5s 397us/sample - loss: 0.0327
- accuracy: 0.9941
```

```
Epoch 392/500
12612/12612 [=====] - 5s 424us/sample - loss: 0.0319
- accuracy: 0.9941
Epoch 393/500
12612/12612 [=====] - 5s 397us/sample - loss: 0.0325
- accuracy: 0.9941
Epoch 394/500
12612/12612 [=====] - 5s 381us/sample - loss: 0.0318
- accuracy: 0.9942
Epoch 395/500
12612/12612 [=====] - 5s 417us/sample - loss: 0.0318
- accuracy: 0.9943
Epoch 396/500
12612/12612 [=====] - 4s 342us/sample - loss: 0.0317
- accuracy: 0.9944
Epoch 397/500
12612/12612 [=====] - 4s 350us/sample - loss: 0.0313
- accuracy: 0.9947
Epoch 398/500
12612/12612 [=====] - 4s 298us/sample - loss: 0.0315
- accuracy: 0.9942
Epoch 399/500
12612/12612 [=====] - 4s 345us/sample - loss: 0.0311
- accuracy: 0.9946
Epoch 400/500
```

```
12612/12612 [=====] - 4s 338us/sample - loss: 0.0317
- accuracy: 0.9944
Epoch 401/500
12612/12612 [=====] - 4s 337us/sample - loss: 0.0316
- accuracy: 0.9944
Epoch 402/500
12612/12612 [=====] - 4s 333us/sample - loss: 0.0320
- accuracy: 0.9938
Epoch 403/500
12612/12612 [=====] - 4s 340us/sample - loss: 0.0307
- accuracy: 0.9945
Epoch 404/500
12612/12612 [=====] - 4s 342us/sample - loss: 0.0308
- accuracy: 0.9942
Epoch 405/500
12612/12612 [=====] - 4s 315us/sample - loss: 0.0310
- accuracy: 0.9948
Epoch 406/500
12612/12612 [=====] - 5s 358us/sample - loss: 0.0310
- accuracy: 0.9944
Epoch 407/500
12612/12612 [=====] - 4s 348us/sample - loss: 0.0308
- accuracy: 0.9943
Epoch 408/500
12612/12612 [=====] - 4s 341us/sample - loss: 0.0310
```

```
- accuracy: 0.9948
Epoch 409/500
12612/12612 [=====] - 4s 310us/sample - loss: 0.0313
- accuracy: 0.9944
Epoch 410/500
12612/12612 [=====] - 4s 323us/sample - loss: 0.0304
- accuracy: 0.9947
Epoch 411/500
12612/12612 [=====] - 4s 328us/sample - loss: 0.0305
- accuracy: 0.9943
Epoch 412/500
12612/12612 [=====] - 4s 327us/sample - loss: 0.0312
- accuracy: 0.9941
Epoch 413/500
12612/12612 [=====] - 4s 323us/sample - loss: 0.0308
- accuracy: 0.9943
Epoch 414/500
12612/12612 [=====] - 4s 351us/sample - loss: 0.0310
- accuracy: 0.9941
Epoch 415/500
12612/12612 [=====] - 4s 302us/sample - loss: 0.0304
- accuracy: 0.9942
Epoch 416/500
12612/12612 [=====] - 4s 302us/sample - loss: 0.0299
- accuracy: 0.9946
```



```
Epoch 417/500
12612/12612 [=====] - 4s 348us/sample - loss: 0.0303
- accuracy: 0.9944
Epoch 418/500
12612/12612 [=====] - 4s 279us/sample - loss: 0.0303
- accuracy: 0.9948
Epoch 419/500
12612/12612 [=====] - 4s 308us/sample - loss: 0.0301
- accuracy: 0.9948
Epoch 420/500
12612/12612 [=====] - 4s 338us/sample - loss: 0.0304
- accuracy: 0.9943
Epoch 421/500
12612/12612 [=====] - 4s 324us/sample - loss: 0.0304
- accuracy: 0.9945
Epoch 422/500
12612/12612 [=====] - 4s 314us/sample - loss: 0.0300
- accuracy: 0.9944
Epoch 423/500
12612/12612 [=====] - 4s 335us/sample - loss: 0.0302
- accuracy: 0.9942
Epoch 424/500
12612/12612 [=====] - 4s 321us/sample - loss: 0.0296
- accuracy: 0.9944
Epoch 425/500
```

```
12612/12612 [=====] - 4s 315us/sample - loss: 0.0294
- accuracy: 0.9944
Epoch 426/500
12612/12612 [=====] - 4s 313us/sample - loss: 0.0297
- accuracy: 0.9944
Epoch 427/500
12612/12612 [=====] - 4s 352us/sample - loss: 0.0302
- accuracy: 0.9949
Epoch 428/500
12612/12612 [=====] - 4s 296us/sample - loss: 0.0300
- accuracy: 0.9945
Epoch 429/500
12612/12612 [=====] - 4s 313us/sample - loss: 0.0304
- accuracy: 0.9949
Epoch 430/500
12612/12612 [=====] - 6s 497us/sample - loss: 0.0297
- accuracy: 0.9950
Epoch 431/500
12612/12612 [=====] - 6s 510us/sample - loss: 0.0305
- accuracy: 0.9947
Epoch 432/500
12612/12612 [=====] - 6s 457us/sample - loss: 0.0301
- accuracy: 0.9941
Epoch 433/500
12612/12612 [=====] - 5s 429us/sample - loss: 0.0297
```

```
- accuracy: 0.9948
Epoch 434/500
12612/12612 [=====] - 5s 392us/sample - loss: 0.0295
- accuracy: 0.9946
Epoch 435/500
12612/12612 [=====] - 5s 383us/sample - loss: 0.0303
- accuracy: 0.9944
Epoch 436/500
12612/12612 [=====] - 5s 393us/sample - loss: 0.0304
- accuracy: 0.9943
Epoch 437/500
12612/12612 [=====] - 4s 346us/sample - loss: 0.0296
- accuracy: 0.9946
Epoch 438/500
12612/12612 [=====] - 4s 333us/sample - loss: 0.0289
- accuracy: 0.9948
Epoch 439/500
12612/12612 [=====] - 4s 330us/sample - loss: 0.0295
- accuracy: 0.9944
Epoch 440/500
12612/12612 [=====] - 4s 295us/sample - loss: 0.0296
- accuracy: 0.9945
Epoch 441/500
12612/12612 [=====] - 4s 322us/sample - loss: 0.0301
- accuracy: 0.9946
```

```
Epoch 442/500
12612/12612 [=====] - 4s 315us/sample - loss: 0.0290
- accuracy: 0.9948
Epoch 443/500
12612/12612 [=====] - 4s 291us/sample - loss: 0.0288
- accuracy: 0.9948
Epoch 444/500
12612/12612 [=====] - 6s 462us/sample - loss: 0.0298
- accuracy: 0.9944
Epoch 445/500
12612/12612 [=====] - 4s 336us/sample - loss: 0.0291
- accuracy: 0.9948
Epoch 446/500
12612/12612 [=====] - 4s 322us/sample - loss: 0.0291
- accuracy: 0.9950
Epoch 447/500
12612/12612 [=====] - 4s 293us/sample - loss: 0.0293
- accuracy: 0.9943
Epoch 448/500
12612/12612 [=====] - 4s 313us/sample - loss: 0.0293
- accuracy: 0.9947
Epoch 449/500
12612/12612 [=====] - 4s 333us/sample - loss: 0.0292
- accuracy: 0.9948
Epoch 450/500
```

```
12612/12612 [=====] - 4s 303us/sample - loss: 0.0307
- accuracy: 0.9947
Epoch 451/500
12612/12612 [=====] - 4s 325us/sample - loss: 0.0293
- accuracy: 0.9948
Epoch 452/500
12612/12612 [=====] - 4s 324us/sample - loss: 0.0293
- accuracy: 0.9948
Epoch 453/500
12612/12612 [=====] - 4s 320us/sample - loss: 0.0286
- accuracy: 0.9947
Epoch 454/500
12612/12612 [=====] - 4s 306us/sample - loss: 0.0293
- accuracy: 0.9944
Epoch 455/500
12612/12612 [=====] - 4s 315us/sample - loss: 0.0294
- accuracy: 0.9944
Epoch 456/500
12612/12612 [=====] - 4s 314us/sample - loss: 0.0293
- accuracy: 0.9948
Epoch 457/500
12612/12612 [=====] - 4s 297us/sample - loss: 0.0284
- accuracy: 0.9948
Epoch 458/500
12612/12612 [=====] - 4s 327us/sample - loss: 0.0280
```

```
- accuracy: 0.9950
Epoch 459/500
12612/12612 [=====] - 4s 326us/sample - loss: 0.0286
- accuracy: 0.9950
Epoch 460/500
12612/12612 [=====] - 4s 293us/sample - loss: 0.0299
- accuracy: 0.9949
Epoch 461/500
12612/12612 [=====] - 4s 313us/sample - loss: 0.0290
- accuracy: 0.9949
Epoch 462/500
12612/12612 [=====] - 4s 316us/sample - loss: 0.0296
- accuracy: 0.9945
Epoch 463/500
12612/12612 [=====] - 4s 305us/sample - loss: 0.0282
- accuracy: 0.9949
Epoch 464/500
12612/12612 [=====] - 5s 357us/sample - loss: 0.0285
- accuracy: 0.9948
Epoch 465/500
12612/12612 [=====] - 4s 343us/sample - loss: 0.0290
- accuracy: 0.9949
Epoch 466/500
12612/12612 [=====] - 4s 333us/sample - loss: 0.0284
- accuracy: 0.9950
```

```
Epoch 467/500
12612/12612 [=====] - 4s 332us/sample - loss: 0.0283
- accuracy: 0.9949
Epoch 468/500
12612/12612 [=====] - 4s 339us/sample - loss: 0.0280
- accuracy: 0.9951
Epoch 469/500
12612/12612 [=====] - 4s 342us/sample - loss: 0.0288
- accuracy: 0.9948
Epoch 470/500
12612/12612 [=====] - 4s 335us/sample - loss: 0.0292
- accuracy: 0.9948
Epoch 471/500
12612/12612 [=====] - 4s 339us/sample - loss: 0.0281
- accuracy: 0.9952
Epoch 472/500
12612/12612 [=====] - 4s 332us/sample - loss: 0.0282
- accuracy: 0.9945
Epoch 473/500
12612/12612 [=====] - 4s 304us/sample - loss: 0.0276
- accuracy: 0.9954
Epoch 474/500
12612/12612 [=====] - 4s 298us/sample - loss: 0.0280
- accuracy: 0.9950
Epoch 475/500
```

```
12612/12612 [=====] - 4s 304us/sample - loss: 0.0286
- accuracy: 0.9947
Epoch 476/500
12612/12612 [=====] - 4s 287us/sample - loss: 0.0277
- accuracy: 0.9944
Epoch 477/500
12612/12612 [=====] - 4s 303us/sample - loss: 0.0277
- accuracy: 0.9946
Epoch 478/500
12612/12612 [=====] - 4s 304us/sample - loss: 0.0285
- accuracy: 0.9946
Epoch 479/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.0280
- accuracy: 0.9945
Epoch 480/500
12612/12612 [=====] - 4s 307us/sample - loss: 0.0279
- accuracy: 0.9952
Epoch 481/500
12612/12612 [=====] - 4s 310us/sample - loss: 0.0278
- accuracy: 0.9946
Epoch 482/500
12612/12612 [=====] - 4s 281us/sample - loss: 0.0277
- accuracy: 0.9950
Epoch 483/500
12612/12612 [=====] - 4s 291us/sample - loss: 0.0278
```



```
- accuracy: 0.9950
Epoch 484/500
12612/12612 [=====] - 3s 255us/sample - loss: 0.0281
- accuracy: 0.9947
Epoch 485/500
12612/12612 [=====] - 5s 413us/sample - loss: 0.0274
- accuracy: 0.9952
Epoch 486/500
12612/12612 [=====] - 4s 321us/sample - loss: 0.0275
- accuracy: 0.9950
Epoch 487/500
12612/12612 [=====] - 4s 311us/sample - loss: 0.0272
- accuracy: 0.9951
Epoch 488/500
12612/12612 [=====] - 3s 247us/sample - loss: 0.0279
- accuracy: 0.9948
Epoch 489/500
12612/12612 [=====] - 4s 327us/sample - loss: 0.0281
- accuracy: 0.9950
Epoch 490/500
12612/12612 [=====] - 3s 224us/sample - loss: 0.0277
- accuracy: 0.9951
Epoch 491/500
12612/12612 [=====] - 3s 245us/sample - loss: 0.0272
- accuracy: 0.9947
```

```
Epoch 492/500
12612/12612 [=====] - 3s 217us/sample - loss: 0.0272
- accuracy: 0.9950
Epoch 493/500
12612/12612 [=====] - 3s 234us/sample - loss: 0.0275
- accuracy: 0.9945
Epoch 494/500
12612/12612 [=====] - 3s 218us/sample - loss: 0.0278
- accuracy: 0.9946
Epoch 495/500
12612/12612 [=====] - 3s 253us/sample - loss: 0.0272
- accuracy: 0.9950
Epoch 496/500
12612/12612 [=====] - 3s 241us/sample - loss: 0.0270
- accuracy: 0.9947
Epoch 497/500
12612/12612 [=====] - 3s 247us/sample - loss: 0.0271
- accuracy: 0.9952
Epoch 498/500
12612/12612 [=====] - 3s 256us/sample - loss: 0.0274
- accuracy: 0.9954
Epoch 499/500
12612/12612 [=====] - 3s 235us/sample - loss: 0.0274
- accuracy: 0.9952
Epoch 500/500
```

```
12612/12612 [=====] - 3s 230us/sample - loss: 0.0276
- accuracy: 0.9948
2893/2893 [=====] - 1s 248us/sample

class_weight_Fold_5: {0: 0.11008117308195861, 1: 9.82753246753247}
```

```
pos_weight: 0.9
thresholdNum: 0.5
```

```
Average of train loss Fold_5: 0.0659
Average of yPredProbability Fold_5: 0.0078
```

classification_report_Fold_5:			
	precision	recall	f1-score
Normal 0	1.00	0.99	1.00
Anomaly 1	0.00	0.00	0.00
			support
			2883
			10
accuracy			0.99
macro avg	0.50	0.50	0.50
weighted avg	0.99	0.99	0.99
			2893
			2893
			2893

Normal 0	0.99	0.90	0.94	14337
Anomaly 1	0.00	0.06	0.01	86

accuracy			0.89	14423
macro avg	0.50	0.48	0.47	14423
weighted avg	0.99	0.89	0.94	14423

confusion_matrix_AllFolds:

True Negatives: 12833
False Positives: 1504
False Negatives: 81
True Positives: 5

Average threshold_rt AllFolds: 0.4
Average precision_rt AllFolds: 0.0
Average recall_rt AllFolds: 0.1

Main End running time: 210609_005606, *****

Process finished with exit code 0