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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: 210506_221051, *****
```

Name of corresponding python code file: finalTest\_CV

doScaleAfterSplit= True approach.

shiftNumber: 2, windowLength: 2  
makeNoiseByJitter: False

Number of Rows Aucual yXRolled\_SelFeat\_Transformed :  
Total: 14520  
Anomalies(positives): 89 (0.61% of total)

baseFileName of output Folders and Plots name: finalTest\_CV

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

Start running time Fold\_1: 210506\_221051 , -----:

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 With DTW Approach\_Fold\_1: 210506\_221052  
,+++++

Data Augmentation MSE Label 1==> mean: 0.024537, min: 9e-06, max: 0.242738

Data Augmentation MSE Label 1==> mean: 0.022614, min: 7e-06, max: 0.146733

Data Augmentation MSE Label 1==> mean: 0.018301, min: 4e-06, max: 0.223734

Data Augmentation MSE Label 1==> mean: 0.017527, min: 6e-06, max: 0.126986

Data Augmentation MSE Label 1==> mean: 0.022645, min: 1.1e-05, max: 0.197896  
Data Augmentation MSE Label 1==> mean: 0.023874, min: 2.1e-05, max: 0.194082  
Data Augmentation MSE Label 1==> mean: 0.020542, min: 8e-06, max: 0.13048  
Data Augmentation MSE Label 1==> mean: 0.020648, min: 1e-06, max: 0.151451  
Data Augmentation MSE Label 1==> mean: 0.022965, min: 1.8e-05, max: 0.103816  
Data Augmentation MSE Label 1==> mean: 0.021539, min: 3.7e-05, max: 0.14761  
Data Augmentation MSE Label 1==> mean: 0.022346, min: 3.8e-05, max: 0.157128  
Data Augmentation MSE Label 1==> mean: 0.019965, min: 2e-05, max: 0.1012  
Data Augmentation MSE Label 1==> mean: 0.018106, min: 6e-06, max: 0.109742  
Data Augmentation MSE Label 1==> mean: 0.021157, min: 0.0, max: 0.148671

Generated this amount: 826 ,Synthetic data With DTW Approach\_Fold\_1

MSE All generated Augmented data Fold\_1:

mean: 0.021197  
min: 1.3e-05  
max: 0.155876

End running time Data Augmentation With DTW Approach\_Fold\_1: 210506\_221052  
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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, number0fSplits:5, flagSeed: True,  
train\_val\_split\_Shuffle: False, FitShuffle: True

Start Creating new folder for each run: 210506\_221052

2021-05-06 22:10:52.553476: I tensorflow/core/platform/cpu\_feature\_guard.cc:142] Your CPU supports instructions that this TensorFlow binary was not compiled to use: AVX AVX2  
2021-05-06 22:10:52.555994: 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.

Cross Validation Model.summary():

Model: "sequential"

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

Total params: 79,481

## Cross Validation Model config:

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activity_regularizer': None, 'kernel_constraint': None, 'bias_constraint':
None}, {'class_name': 'Dense', 'config': {'name': 'dense_3', 'trainable':
True, 'dtype': 'float32', 'units': 1, 'activation': 'sigmoid', 'use_bias':
True, 'kernel_initializer': {'class_name': 'GlorotUniform', 'config': {'seed
': None}}, 'bias_initializer': {'class_name': 'Zeros', 'config': {}},
kernel_regularizer': None, 'bias_regularizer': None, 'activity_regularizer':
None, 'kernel_constraint': None, 'bias_constraint': None}}]}

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Train on 12380 samples

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Epoch 1/500
12380/12380 [=====] - 1s 100us/sample - loss: 3.2437
- accuracy: 0.9262
Epoch 2/500
12380/12380 [=====] - 1s 63us/sample - loss: 1.6642
- accuracy: 0.9284
Epoch 3/500
12380/12380 [=====] - 1s 71us/sample - loss: 0.8835
- accuracy: 0.9284
Epoch 4/500
12380/12380 [=====] - 1s 70us/sample - loss: 0.5252
- accuracy: 0.9285
Epoch 5/500
12380/12380 [=====] - 1s 81us/sample - loss: 0.3674
- accuracy: 0.9285

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Epoch 6/500
12380/12380 [=====] - 1s 72us/sample - loss: 0.2990
- accuracy: 0.9288
Epoch 7/500
12380/12380 [=====] - 1s 73us/sample - loss: 0.2698
- accuracy: 0.9287
Epoch 8/500
12380/12380 [=====] - 1s 69us/sample - loss: 0.2563
- accuracy: 0.9288
Epoch 9/500
12380/12380 [=====] - 1s 77us/sample - loss: 0.2498
- accuracy: 0.9290
Epoch 10/500
12380/12380 [=====] - 1s 78us/sample - loss: 0.2460
- accuracy: 0.9292
Epoch 11/500
12380/12380 [=====] - 1s 106us/sample - loss: 0.2433
- accuracy: 0.9291
Epoch 12/500
12380/12380 [=====] - 1s 86us/sample - loss: 0.2417
- accuracy: 0.9293
Epoch 13/500
12380/12380 [=====] - 1s 88us/sample - loss: 0.2402
- accuracy: 0.9293
Epoch 14/500
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12380/12380 [=====] - 1s 92us/sample - loss: 0.2394
- accuracy: 0.9295
Epoch 15/500
12380/12380 [=====] - 1s 97us/sample - loss: 0.2377
- accuracy: 0.9296
Epoch 16/500
12380/12380 [=====] - 1s 98us/sample - loss: 0.2370
- accuracy: 0.9295
Epoch 17/500
12380/12380 [=====] - 1s 94us/sample - loss: 0.2365
- accuracy: 0.9296
Epoch 18/500
12380/12380 [=====] - 1s 84us/sample - loss: 0.2357
- accuracy: 0.9295
Epoch 19/500
12380/12380 [=====] - 1s 91us/sample - loss: 0.2343
- accuracy: 0.9295
Epoch 20/500
12380/12380 [=====] - 1s 95us/sample - loss: 0.2344
- accuracy: 0.9298
Epoch 21/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.2330
- accuracy: 0.9298
Epoch 22/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.2328
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- accuracy: 0.9299
Epoch 23/500
12380/12380 [=====] - 2s 133us/sample - loss: 0.2320
- accuracy: 0.9297
Epoch 24/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.2313
- accuracy: 0.9300
Epoch 25/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.2306
- accuracy: 0.9296
Epoch 26/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.2304
- accuracy: 0.9299
Epoch 27/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.2294
- accuracy: 0.9299
Epoch 28/500
12380/12380 [=====] - 2s 127us/sample - loss: 0.2291
- accuracy: 0.9300
Epoch 29/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.2281
- accuracy: 0.9300
Epoch 30/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.2282
- accuracy: 0.9304
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Epoch 31/500
12380/12380 [=====] - 2s 133us/sample - loss: 0.2275
- accuracy: 0.9300
Epoch 32/500
12380/12380 [=====] - 2s 135us/sample - loss: 0.2278
- accuracy: 0.9303
Epoch 33/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.2262
- accuracy: 0.9305
Epoch 34/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.2261
- accuracy: 0.9298
Epoch 35/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.2255
- accuracy: 0.9304
Epoch 36/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.2254
- accuracy: 0.9299
Epoch 37/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.2248
- accuracy: 0.9313
Epoch 38/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.2241
- accuracy: 0.9309
Epoch 39/500
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12380/12380 [=====] - 1s 117us/sample - loss: 0.2240
- accuracy: 0.9307
Epoch 40/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.2229
- accuracy: 0.9313
Epoch 41/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.2225
- accuracy: 0.9304
Epoch 42/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.2220
- accuracy: 0.9308
Epoch 43/500
12380/12380 [=====] - 2s 140us/sample - loss: 0.2216
- accuracy: 0.9307
Epoch 44/500
12380/12380 [=====] - 2s 128us/sample - loss: 0.2205
- accuracy: 0.9313
Epoch 45/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.2199
- accuracy: 0.9313
Epoch 46/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.2201
- accuracy: 0.9312
Epoch 47/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.2197
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- accuracy: 0.9315
Epoch 48/500
12380/12380 [=====] - 2s 129us/sample - loss: 0.2190
- accuracy: 0.9312
Epoch 49/500
12380/12380 [=====] - 2s 158us/sample - loss: 0.2184
- accuracy: 0.9317
Epoch 50/500
12380/12380 [=====] - 2s 178us/sample - loss: 0.2175
- accuracy: 0.9319
Epoch 51/500
12380/12380 [=====] - 2s 166us/sample - loss: 0.2168
- accuracy: 0.9323
Epoch 52/500
12380/12380 [=====] - 2s 147us/sample - loss: 0.2163
- accuracy: 0.9321
Epoch 53/500
12380/12380 [=====] - 2s 162us/sample - loss: 0.2163
- accuracy: 0.9330
Epoch 54/500
12380/12380 [=====] - 2s 143us/sample - loss: 0.2152
- accuracy: 0.9314
Epoch 55/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.2146
- accuracy: 0.9323
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Epoch 56/500
12380/12380 [=====] - 2s 131us/sample - loss: 0.2137
- accuracy: 0.9324
Epoch 57/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.2131
- accuracy: 0.9324
Epoch 58/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.2127
- accuracy: 0.9326
Epoch 59/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.2112
- accuracy: 0.9326
Epoch 60/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.2103
- accuracy: 0.9331
Epoch 61/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.2108
- accuracy: 0.9328
Epoch 62/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.2094
- accuracy: 0.9336
Epoch 63/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.2084
- accuracy: 0.9334
Epoch 64/500
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12380/12380 [=====] - 1s 117us/sample - loss: 0.2075
- accuracy: 0.9333
Epoch 65/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.2068
- accuracy: 0.9332
Epoch 66/500
12380/12380 [=====] - 2s 127us/sample - loss: 0.2057
- accuracy: 0.9337
Epoch 67/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.2042
- accuracy: 0.9342
Epoch 68/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.2044
- accuracy: 0.9340
Epoch 69/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.2031
- accuracy: 0.9338
Epoch 70/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.2029
- accuracy: 0.9340
Epoch 71/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.2014
- accuracy: 0.9341
Epoch 72/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.2011
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- accuracy: 0.9348
Epoch 73/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.2000
- accuracy: 0.9347
Epoch 74/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1996
- accuracy: 0.9352
Epoch 75/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.1978
- accuracy: 0.9359
Epoch 76/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.1982
- accuracy: 0.9350
Epoch 77/500
12380/12380 [=====] - 2s 126us/sample - loss: 0.1963
- accuracy: 0.9351
Epoch 78/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1966
- accuracy: 0.9359
Epoch 79/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.1953
- accuracy: 0.9351
Epoch 80/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1947
- accuracy: 0.9361
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Epoch 81/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.1939
- accuracy: 0.9359
Epoch 82/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.1929
- accuracy: 0.9367
Epoch 83/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1921
- accuracy: 0.9363
Epoch 84/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.1921
- accuracy: 0.9368
Epoch 85/500
12380/12380 [=====] - 2s 125us/sample - loss: 0.1900
- accuracy: 0.9368
Epoch 86/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1893
- accuracy: 0.9362
Epoch 87/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.1884
- accuracy: 0.9372
Epoch 88/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.1875
- accuracy: 0.9368
Epoch 89/500
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12380/12380 [=====] - 1s 120us/sample - loss: 0.1871
- accuracy: 0.9372
Epoch 90/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1866
- accuracy: 0.9368
Epoch 91/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.1862
- accuracy: 0.9380
Epoch 92/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.1850
- accuracy: 0.9379
Epoch 93/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.1841
- accuracy: 0.9382
Epoch 94/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1834
- accuracy: 0.9381
Epoch 95/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1824
- accuracy: 0.9396
Epoch 96/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1811
- accuracy: 0.9385
Epoch 97/500
12380/12380 [=====] - 2s 121us/sample - loss: 0.1804
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- accuracy: 0.9385
Epoch 98/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.1796
- accuracy: 0.9392
Epoch 99/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.1795
- accuracy: 0.9384
Epoch 100/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.1789
- accuracy: 0.9396
Epoch 101/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1772
- accuracy: 0.9390
Epoch 102/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.1765
- accuracy: 0.9390
Epoch 103/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.1754
- accuracy: 0.9392
Epoch 104/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1745
- accuracy: 0.9390
Epoch 105/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.1734
- accuracy: 0.9396
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Epoch 106/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1734
- accuracy: 0.9414
Epoch 107/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.1731
- accuracy: 0.9403
Epoch 108/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1723
- accuracy: 0.9407
Epoch 109/500
12380/12380 [=====] - 2s 133us/sample - loss: 0.1707
- accuracy: 0.9409
Epoch 110/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.1697
- accuracy: 0.9413
Epoch 111/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1692
- accuracy: 0.9412
Epoch 112/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1681
- accuracy: 0.9420
Epoch 113/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.1672
- accuracy: 0.9413
Epoch 114/500
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12380/12380 [=====] - 1s 116us/sample - loss: 0.1664
- accuracy: 0.9429
Epoch 115/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1659
- accuracy: 0.9420
Epoch 116/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.1636
- accuracy: 0.9439
Epoch 117/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1638
- accuracy: 0.9432
Epoch 118/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.1632
- accuracy: 0.9442
Epoch 119/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.1613
- accuracy: 0.9437
Epoch 120/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1605
- accuracy: 0.9432
Epoch 121/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.1605
- accuracy: 0.9449
Epoch 122/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.1585
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- accuracy: 0.9458
Epoch 123/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.1587
- accuracy: 0.9443
Epoch 124/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1572
- accuracy: 0.9466
Epoch 125/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.1553
- accuracy: 0.9457
Epoch 126/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1542
- accuracy: 0.9456
Epoch 127/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.1543
- accuracy: 0.9469
Epoch 128/500
12380/12380 [=====] - 2s 129us/sample - loss: 0.1545
- accuracy: 0.9473
Epoch 129/500
12380/12380 [=====] - 2s 167us/sample - loss: 0.1526
- accuracy: 0.9476
Epoch 130/500
12380/12380 [=====] - 2s 121us/sample - loss: 0.1516
- accuracy: 0.9473
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Epoch 131/500
12380/12380 [=====] - 2s 128us/sample - loss: 0.1518
- accuracy: 0.9464
Epoch 132/500
12380/12380 [=====] - 2s 128us/sample - loss: 0.1495
- accuracy: 0.9489
Epoch 133/500
12380/12380 [=====] - 2s 159us/sample - loss: 0.1489
- accuracy: 0.9494
Epoch 134/500
12380/12380 [=====] - 2s 150us/sample - loss: 0.1485
- accuracy: 0.9501
Epoch 135/500
12380/12380 [=====] - 2s 129us/sample - loss: 0.1486
- accuracy: 0.9483
Epoch 136/500
12380/12380 [=====] - 2s 128us/sample - loss: 0.1463
- accuracy: 0.9511
Epoch 137/500
12380/12380 [=====] - 2s 126us/sample - loss: 0.1465
- accuracy: 0.9493
Epoch 138/500
12380/12380 [=====] - 2s 128us/sample - loss: 0.1446
- accuracy: 0.9505
Epoch 139/500
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12380/12380 [=====] - 1s 117us/sample - loss: 0.1439
- accuracy: 0.9519
Epoch 140/500
12380/12380 [=====] - 2s 125us/sample - loss: 0.1433
- accuracy: 0.9514
Epoch 141/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.1419
- accuracy: 0.9526
Epoch 142/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.1412
- accuracy: 0.9516
Epoch 143/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1421
- accuracy: 0.9518
Epoch 144/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.1397
- accuracy: 0.9538
Epoch 145/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1382
- accuracy: 0.9542
Epoch 146/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1397
- accuracy: 0.9557
Epoch 147/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1383
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- accuracy: 0.9539
Epoch 148/500
12380/12380 [=====] - 2s 127us/sample - loss: 0.1376
- accuracy: 0.9540
Epoch 149/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1358
- accuracy: 0.9544
Epoch 150/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1346
- accuracy: 0.9558
Epoch 151/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1334
- accuracy: 0.9557
Epoch 152/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.1327
- accuracy: 0.9569
Epoch 153/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1316
- accuracy: 0.9568
Epoch 154/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.1314
- accuracy: 0.9565
Epoch 155/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1311
- accuracy: 0.9580
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Epoch 156/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.1285
- accuracy: 0.9587
Epoch 157/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1305
- accuracy: 0.9582
Epoch 158/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.1288
- accuracy: 0.9589
Epoch 159/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1278
- accuracy: 0.9599
Epoch 160/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1282
- accuracy: 0.9603
Epoch 161/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1267
- accuracy: 0.9620
Epoch 162/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.1273
- accuracy: 0.9599
Epoch 163/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1250
- accuracy: 0.9609
Epoch 164/500
```

```
12380/12380 [=====] - 1s 120us/sample - loss: 0.1245
- accuracy: 0.9609
Epoch 165/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.1236
- accuracy: 0.9620
Epoch 166/500
12380/12380 [=====] - 1s 107us/sample - loss: 0.1228
- accuracy: 0.9621
Epoch 167/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1227
- accuracy: 0.9625
Epoch 168/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.1221
- accuracy: 0.9628
Epoch 169/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1218
- accuracy: 0.9628
Epoch 170/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.1217
- accuracy: 0.9626
Epoch 171/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.1194
- accuracy: 0.9637
Epoch 172/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.1196
```

```
- accuracy: 0.9641
Epoch 173/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1187
- accuracy: 0.9647
Epoch 174/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.1180
- accuracy: 0.9642
Epoch 175/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1188
- accuracy: 0.9642
Epoch 176/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.1157
- accuracy: 0.9665
Epoch 177/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1167
- accuracy: 0.9658
Epoch 178/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1172
- accuracy: 0.9637
Epoch 179/500
12380/12380 [=====] - 1s 107us/sample - loss: 0.1150
- accuracy: 0.9664
Epoch 180/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.1139
- accuracy: 0.9658
```

```
Epoch 181/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1137
- accuracy: 0.9653
Epoch 182/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1122
- accuracy: 0.9671
Epoch 183/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.1142
- accuracy: 0.9685
Epoch 184/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.1126
- accuracy: 0.9669
Epoch 185/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1115
- accuracy: 0.9661
Epoch 186/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.1113
- accuracy: 0.9663
Epoch 187/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.1121
- accuracy: 0.9669
Epoch 188/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.1084
- accuracy: 0.9680
Epoch 189/500
```

```
12380/12380 [=====] - 1s 114us/sample - loss: 0.1100
- accuracy: 0.9683
Epoch 190/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1078
- accuracy: 0.9687
Epoch 191/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.1087
- accuracy: 0.9687
Epoch 192/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.1070
- accuracy: 0.9693
Epoch 193/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.1086
- accuracy: 0.9691
Epoch 194/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.1063
- accuracy: 0.9701
Epoch 195/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.1055
- accuracy: 0.9705
Epoch 196/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.1058
- accuracy: 0.9700
Epoch 197/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1049
```

```
- accuracy: 0.9697
Epoch 198/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.1044
- accuracy: 0.9692
Epoch 199/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1042
- accuracy: 0.9714
Epoch 200/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.1027
- accuracy: 0.9723
Epoch 201/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.1027
- accuracy: 0.9709
Epoch 202/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.1032
- accuracy: 0.9708
Epoch 203/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.1031
- accuracy: 0.9704
Epoch 204/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.1011
- accuracy: 0.9714
Epoch 205/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.1024
- accuracy: 0.9719
```

```
Epoch 206/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0993
- accuracy: 0.9736
Epoch 207/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.1005
- accuracy: 0.9716
Epoch 208/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0987
- accuracy: 0.9724
Epoch 209/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0975
- accuracy: 0.9731
Epoch 210/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0996
- accuracy: 0.9717
Epoch 211/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0989
- accuracy: 0.9729
Epoch 212/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0983
- accuracy: 0.9718
Epoch 213/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0977
- accuracy: 0.9728
Epoch 214/500
```



```
12380/12380 [=====] - 1s 119us/sample - loss: 0.0974
- accuracy: 0.9737
Epoch 215/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0963
- accuracy: 0.9753
Epoch 216/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0960
- accuracy: 0.9734
Epoch 217/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0952
- accuracy: 0.9740
Epoch 218/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0977
- accuracy: 0.9733
Epoch 219/500
12380/12380 [=====] - 1s 106us/sample - loss: 0.0951
- accuracy: 0.9742
Epoch 220/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0949
- accuracy: 0.9746
Epoch 221/500
12380/12380 [=====] - 2s 126us/sample - loss: 0.0936
- accuracy: 0.9761
Epoch 222/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0932
```

```
- accuracy: 0.9751
Epoch 223/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0952
- accuracy: 0.9734
Epoch 224/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0933
- accuracy: 0.9744
Epoch 225/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0921
- accuracy: 0.9746
Epoch 226/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0926
- accuracy: 0.9748
Epoch 227/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0924
- accuracy: 0.9755
Epoch 228/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0917
- accuracy: 0.9754
Epoch 229/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.0909
- accuracy: 0.9760
Epoch 230/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0913
- accuracy: 0.9762
```

```
Epoch 231/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0915
- accuracy: 0.9758
Epoch 232/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0888
- accuracy: 0.9772
Epoch 233/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0925
- accuracy: 0.9755
Epoch 234/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0889
- accuracy: 0.9766
Epoch 235/500
12380/12380 [=====] - 1s 107us/sample - loss: 0.0878
- accuracy: 0.9777
Epoch 236/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0885
- accuracy: 0.9776
Epoch 237/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0890
- accuracy: 0.9764
Epoch 238/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0862
- accuracy: 0.9775
Epoch 239/500
```

```
12380/12380 [=====] - 1s 112us/sample - loss: 0.0870
- accuracy: 0.9773
Epoch 240/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0865
- accuracy: 0.9779
Epoch 241/500
12380/12380 [=====] - 2s 121us/sample - loss: 0.0862
- accuracy: 0.9784
Epoch 242/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0860
- accuracy: 0.9781
Epoch 243/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0854
- accuracy: 0.9773
Epoch 244/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0861
- accuracy: 0.9776
Epoch 245/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0867
- accuracy: 0.9782
Epoch 246/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0852
- accuracy: 0.9776
Epoch 247/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0837
```

```
- accuracy: 0.9794
Epoch 248/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0843
- accuracy: 0.9795
Epoch 249/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0823
- accuracy: 0.9795
Epoch 250/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0855
- accuracy: 0.9785
Epoch 251/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0826
- accuracy: 0.9803
Epoch 252/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0818
- accuracy: 0.9790
Epoch 253/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0825
- accuracy: 0.9797
Epoch 254/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0838
- accuracy: 0.9788
Epoch 255/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0806
- accuracy: 0.9813
```

```
Epoch 256/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0814
- accuracy: 0.9801
Epoch 257/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0816
- accuracy: 0.9800
Epoch 258/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0797
- accuracy: 0.9805
Epoch 259/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0806
- accuracy: 0.9802
Epoch 260/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0805
- accuracy: 0.9802
Epoch 261/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0802
- accuracy: 0.9801
Epoch 262/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0796
- accuracy: 0.9802
Epoch 263/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0793
- accuracy: 0.9810
Epoch 264/500
```

```
12380/12380 [=====] - 1s 113us/sample - loss: 0.0800
- accuracy: 0.9800
Epoch 265/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0793
- accuracy: 0.9794
Epoch 266/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0785
- accuracy: 0.9802
Epoch 267/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0781
- accuracy: 0.9813
Epoch 268/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0779
- accuracy: 0.9813
Epoch 269/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0773
- accuracy: 0.9819
Epoch 270/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0781
- accuracy: 0.9809
Epoch 271/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0768
- accuracy: 0.9809
Epoch 272/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0767
```

```
- accuracy: 0.9816
Epoch 273/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0785
- accuracy: 0.9807
Epoch 274/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0753
- accuracy: 0.9831
Epoch 275/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0762
- accuracy: 0.9824
Epoch 276/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0761
- accuracy: 0.9818
Epoch 277/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0761
- accuracy: 0.9813
Epoch 278/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0754
- accuracy: 0.9821
Epoch 279/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0752
- accuracy: 0.9828
Epoch 280/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0746
- accuracy: 0.9816
```



```
Epoch 281/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0759
- accuracy: 0.9817
Epoch 282/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0749
- accuracy: 0.9817
Epoch 283/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0737
- accuracy: 0.9834
Epoch 284/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0722
- accuracy: 0.9839
Epoch 285/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0735
- accuracy: 0.9823
Epoch 286/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0733
- accuracy: 0.9822
Epoch 287/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0724
- accuracy: 0.9842
Epoch 288/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.0731
- accuracy: 0.9830
Epoch 289/500
```

```
12380/12380 [=====] - 1s 118us/sample - loss: 0.0711
- accuracy: 0.9847
Epoch 290/500
12380/12380 [=====] - 2s 126us/sample - loss: 0.0715
- accuracy: 0.9836
Epoch 291/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0732
- accuracy: 0.9828
Epoch 292/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0732
- accuracy: 0.9834
Epoch 293/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0732
- accuracy: 0.9830
Epoch 294/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0715
- accuracy: 0.9822
Epoch 295/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.0697
- accuracy: 0.9841
Epoch 296/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.0714
- accuracy: 0.9848
Epoch 297/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0711
```

```
- accuracy: 0.9835
Epoch 298/500
12380/12380 [=====] - 2s 125us/sample - loss: 0.0721
- accuracy: 0.9829
Epoch 299/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0707
- accuracy: 0.9833
Epoch 300/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0701
- accuracy: 0.9838
Epoch 301/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0693
- accuracy: 0.9843
Epoch 302/500
12380/12380 [=====] - 2s 127us/sample - loss: 0.0703
- accuracy: 0.9838
Epoch 303/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0703
- accuracy: 0.9846
Epoch 304/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0695
- accuracy: 0.9845
Epoch 305/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0699
- accuracy: 0.9829
```

```
Epoch 306/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0693
- accuracy: 0.9838
Epoch 307/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0705
- accuracy: 0.9834
Epoch 308/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0692
- accuracy: 0.9838
Epoch 309/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0676
- accuracy: 0.9851
Epoch 310/500
12380/12380 [=====] - 2s 136us/sample - loss: 0.0673
- accuracy: 0.9852
Epoch 311/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0670
- accuracy: 0.9850
Epoch 312/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0687
- accuracy: 0.9852
Epoch 313/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0698
- accuracy: 0.9833
Epoch 314/500
```

```
12380/12380 [=====] - 2s 123us/sample - loss: 0.0665
- accuracy: 0.9858
Epoch 315/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0680
- accuracy: 0.9834
Epoch 316/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0662
- accuracy: 0.9855
Epoch 317/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0657
- accuracy: 0.9857
Epoch 318/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.0678
- accuracy: 0.9842
Epoch 319/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0660
- accuracy: 0.9862
Epoch 320/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0647
- accuracy: 0.9863
Epoch 321/500
12380/12380 [=====] - 2s 126us/sample - loss: 0.0671
- accuracy: 0.9845
Epoch 322/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0656
```

```
- accuracy: 0.9846
Epoch 323/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0642
- accuracy: 0.9867
Epoch 324/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0662
- accuracy: 0.9846
Epoch 325/500
12380/12380 [=====] - 2s 126us/sample - loss: 0.0658
- accuracy: 0.9841
Epoch 326/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0655
- accuracy: 0.9863
Epoch 327/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0652
- accuracy: 0.9843
Epoch 328/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0641
- accuracy: 0.9859
Epoch 329/500
12380/12380 [=====] - 2s 125us/sample - loss: 0.0643
- accuracy: 0.9857
Epoch 330/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0642
- accuracy: 0.9856
```

```
Epoch 331/500
12380/12380 [=====] - 1s 106us/sample - loss: 0.0641
- accuracy: 0.9867
Epoch 332/500
12380/12380 [=====] - 1s 106us/sample - loss: 0.0653
- accuracy: 0.9858
Epoch 333/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.0638
- accuracy: 0.9854
Epoch 334/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0624
- accuracy: 0.9864
Epoch 335/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0632
- accuracy: 0.9863
Epoch 336/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0624
- accuracy: 0.9862
Epoch 337/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0628
- accuracy: 0.9866
Epoch 338/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0640
- accuracy: 0.9852
Epoch 339/500
```

```
12380/12380 [=====] - 1s 114us/sample - loss: 0.0625
- accuracy: 0.9869
Epoch 340/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0617
- accuracy: 0.9871
Epoch 341/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0609
- accuracy: 0.9875
Epoch 342/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0626
- accuracy: 0.9859
Epoch 343/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0615
- accuracy: 0.9868
Epoch 344/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0614
- accuracy: 0.9880
Epoch 345/500
12380/12380 [=====] - 2s 125us/sample - loss: 0.0616
- accuracy: 0.9865
Epoch 346/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0616
- accuracy: 0.9867
Epoch 347/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0626
```



```
- accuracy: 0.9865
Epoch 348/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0605
- accuracy: 0.9876
Epoch 349/500
12380/12380 [=====] - 2s 129us/sample - loss: 0.0608
- accuracy: 0.9873
Epoch 350/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0621
- accuracy: 0.9862
Epoch 351/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0592
- accuracy: 0.9886
Epoch 352/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0606
- accuracy: 0.9868
Epoch 353/500
12380/12380 [=====] - 2s 128us/sample - loss: 0.0605
- accuracy: 0.9863
Epoch 354/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0598
- accuracy: 0.9877
Epoch 355/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0601
- accuracy: 0.9877
```

```
Epoch 356/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0593
- accuracy: 0.9877
Epoch 357/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.0582
- accuracy: 0.9884
Epoch 358/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0601
- accuracy: 0.9867
Epoch 359/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0588
- accuracy: 0.9876
Epoch 360/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0598
- accuracy: 0.9860
Epoch 361/500
12380/12380 [=====] - 2s 126us/sample - loss: 0.0604
- accuracy: 0.9867
Epoch 362/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0588
- accuracy: 0.9880
Epoch 363/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0576
- accuracy: 0.9889
Epoch 364/500
```

```

12380/12380 [=====] - 1s 112us/sample - loss: 0.0595
- accuracy: 0.9870
Epoch 365/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.0581
- accuracy: 0.9879
Epoch 366/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0576
- accuracy: 0.9888
Epoch 367/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0582
- accuracy: 0.9877
Epoch 368/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.0576
- accuracy: 0.9875
Epoch 369/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0577
- accuracy: 0.9876
Epoch 370/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0565
- accuracy: 0.9884
Epoch 371/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.0577
- accuracy: 0.9880
Epoch 372/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0587

```

```
- accuracy: 0.9873
Epoch 373/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.0568
- accuracy: 0.9884
Epoch 374/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0587
- accuracy: 0.9875
Epoch 375/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0571
- accuracy: 0.9875
Epoch 376/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0571
- accuracy: 0.9881
Epoch 377/500
12380/12380 [=====] - 2s 121us/sample - loss: 0.0581
- accuracy: 0.9868
Epoch 378/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0560
- accuracy: 0.9884
Epoch 379/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0566
- accuracy: 0.9885
Epoch 380/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0575
- accuracy: 0.9876
```

```
Epoch 381/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0568
- accuracy: 0.9882
Epoch 382/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0563
- accuracy: 0.9886
Epoch 383/500
12380/12380 [=====] - 1s 106us/sample - loss: 0.0545
- accuracy: 0.9897
Epoch 384/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0567
- accuracy: 0.9883
Epoch 385/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0548
- accuracy: 0.9891
Epoch 386/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0549
- accuracy: 0.9885
Epoch 387/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0563
- accuracy: 0.9884
Epoch 388/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0548
- accuracy: 0.9891
Epoch 389/500
```

```
12380/12380 [=====] - 1s 115us/sample - loss: 0.0548
- accuracy: 0.9898
Epoch 390/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0560
- accuracy: 0.9882
Epoch 391/500
12380/12380 [=====] - 1s 107us/sample - loss: 0.0549
- accuracy: 0.9887
Epoch 392/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0553
- accuracy: 0.9892
Epoch 393/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0545
- accuracy: 0.9901
Epoch 394/500
12380/12380 [=====] - 2s 125us/sample - loss: 0.0547
- accuracy: 0.9891
Epoch 395/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.0547
- accuracy: 0.9889
Epoch 396/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0528
- accuracy: 0.9900
Epoch 397/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0540
```

```
- accuracy: 0.9894
Epoch 398/500
12380/12380 [=====] - 2s 128us/sample - loss: 0.0541
- accuracy: 0.9894
Epoch 399/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0545
- accuracy: 0.9885
Epoch 400/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.0538
- accuracy: 0.9894
Epoch 401/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0532
- accuracy: 0.9885
Epoch 402/500
12380/12380 [=====] - 2s 128us/sample - loss: 0.0540
- accuracy: 0.9889
Epoch 403/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0536
- accuracy: 0.9887
Epoch 404/500
12380/12380 [=====] - 1s 107us/sample - loss: 0.0530
- accuracy: 0.9903
Epoch 405/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0529
- accuracy: 0.9905
```

```
Epoch 406/500
12380/12380 [=====] - 2s 128us/sample - loss: 0.0523
- accuracy: 0.9901
Epoch 407/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0532
- accuracy: 0.9887
Epoch 408/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0534
- accuracy: 0.9893
Epoch 409/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0520
- accuracy: 0.9898
Epoch 410/500
12380/12380 [=====] - 2s 127us/sample - loss: 0.0533
- accuracy: 0.9890
Epoch 411/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0521
- accuracy: 0.9897
Epoch 412/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0529
- accuracy: 0.9897
Epoch 413/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0511
- accuracy: 0.9893
Epoch 414/500
```



```
12380/12380 [=====] - 2s 130us/sample - loss: 0.0527
- accuracy: 0.9889
Epoch 415/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0516
- accuracy: 0.9905
Epoch 416/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0510
- accuracy: 0.9898
Epoch 417/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0510
- accuracy: 0.9898
Epoch 418/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0517
- accuracy: 0.9898
Epoch 419/500
12380/12380 [=====] - 1s 106us/sample - loss: 0.0531
- accuracy: 0.9888
Epoch 420/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0515
- accuracy: 0.9895
Epoch 421/500
12380/12380 [=====] - 1s 104us/sample - loss: 0.0517
- accuracy: 0.9901
Epoch 422/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0507
```

```
- accuracy: 0.9898
Epoch 423/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0496
- accuracy: 0.9902
Epoch 424/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0520
- accuracy: 0.9890
Epoch 425/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0519
- accuracy: 0.9889
Epoch 426/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.0509
- accuracy: 0.9895
Epoch 427/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0507
- accuracy: 0.9904
Epoch 428/500
12380/12380 [=====] - 1s 105us/sample - loss: 0.0494
- accuracy: 0.9907
Epoch 429/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0506
- accuracy: 0.9903
Epoch 430/500
12380/12380 [=====] - 2s 130us/sample - loss: 0.0499
- accuracy: 0.9899
```

```
Epoch 431/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0488
- accuracy: 0.9906
Epoch 432/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0511
- accuracy: 0.9897
Epoch 433/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0485
- accuracy: 0.9910
Epoch 434/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.0498
- accuracy: 0.9895
Epoch 435/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0510
- accuracy: 0.9898
Epoch 436/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0495
- accuracy: 0.9901
Epoch 437/500
12380/12380 [=====] - 1s 107us/sample - loss: 0.0500
- accuracy: 0.9899
Epoch 438/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0490
- accuracy: 0.9897
Epoch 439/500
```

```
12380/12380 [=====] - 1s 121us/sample - loss: 0.0492
- accuracy: 0.9901
Epoch 440/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0485
- accuracy: 0.9909
Epoch 441/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0486
- accuracy: 0.9903
Epoch 442/500
12380/12380 [=====] - 1s 118us/sample - loss: 0.0495
- accuracy: 0.9914
Epoch 443/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0485
- accuracy: 0.9906
Epoch 444/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0491
- accuracy: 0.9905
Epoch 445/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0490
- accuracy: 0.9904
Epoch 446/500
12380/12380 [=====] - 1s 114us/sample - loss: 0.0485
- accuracy: 0.9905
Epoch 447/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0477
```

```
- accuracy: 0.9913
Epoch 448/500
12380/12380 [=====] - 1s 107us/sample - loss: 0.0478
- accuracy: 0.9910
Epoch 449/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0485
- accuracy: 0.9911
Epoch 450/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0467
- accuracy: 0.9911
Epoch 451/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0483
- accuracy: 0.9908
Epoch 452/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0467
- accuracy: 0.9911
Epoch 453/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0477
- accuracy: 0.9916
Epoch 454/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0483
- accuracy: 0.9900
Epoch 455/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.0487
- accuracy: 0.9900
```

```
Epoch 456/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0473
- accuracy: 0.9908
Epoch 457/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0477
- accuracy: 0.9893
Epoch 458/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0468
- accuracy: 0.9911
Epoch 459/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.0479
- accuracy: 0.9898
Epoch 460/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0469
- accuracy: 0.9903
Epoch 461/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0469
- accuracy: 0.9914
Epoch 462/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0465
- accuracy: 0.9922
Epoch 463/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0457
- accuracy: 0.9917
Epoch 464/500
```

```
12380/12380 [=====] - 1s 116us/sample - loss: 0.0473
- accuracy: 0.9907
Epoch 465/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0466
- accuracy: 0.9918
Epoch 466/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0470
- accuracy: 0.9904
Epoch 467/500
12380/12380 [=====] - 2s 125us/sample - loss: 0.0456
- accuracy: 0.9926
Epoch 468/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0457
- accuracy: 0.9914
Epoch 469/500
12380/12380 [=====] - 1s 109us/sample - loss: 0.0451
- accuracy: 0.9918
Epoch 470/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0464
- accuracy: 0.9906
Epoch 471/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0453
- accuracy: 0.9914
Epoch 472/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0476
```

```
- accuracy: 0.9900
Epoch 473/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0464
- accuracy: 0.9908
Epoch 474/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0456
- accuracy: 0.9918
Epoch 475/500
12380/12380 [=====] - 1s 121us/sample - loss: 0.0464
- accuracy: 0.9908
Epoch 476/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0445
- accuracy: 0.9923
Epoch 477/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0453
- accuracy: 0.9912
Epoch 478/500
12380/12380 [=====] - 1s 115us/sample - loss: 0.0461
- accuracy: 0.9905
Epoch 479/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0446
- accuracy: 0.9914
Epoch 480/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0451
- accuracy: 0.9918
```



```
Epoch 481/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0447
- accuracy: 0.9926
Epoch 482/500
12380/12380 [=====] - 1s 117us/sample - loss: 0.0445
- accuracy: 0.9918
Epoch 483/500
12380/12380 [=====] - 2s 125us/sample - loss: 0.0437
- accuracy: 0.9927
Epoch 484/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0454
- accuracy: 0.9913
Epoch 485/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0448
- accuracy: 0.9917
Epoch 486/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0440
- accuracy: 0.9924
Epoch 487/500
12380/12380 [=====] - 2s 123us/sample - loss: 0.0440
- accuracy: 0.9914
Epoch 488/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0437
- accuracy: 0.9922
Epoch 489/500
```

```
12380/12380 [=====] - 1s 110us/sample - loss: 0.0430
- accuracy: 0.9931
Epoch 490/500
12380/12380 [=====] - 1s 113us/sample - loss: 0.0453
- accuracy: 0.9909
Epoch 491/500
12380/12380 [=====] - 1s 119us/sample - loss: 0.0434
- accuracy: 0.9923
Epoch 492/500
12380/12380 [=====] - 1s 110us/sample - loss: 0.0431
- accuracy: 0.9920
Epoch 493/500
12380/12380 [=====] - 1s 108us/sample - loss: 0.0430
- accuracy: 0.9922
Epoch 494/500
12380/12380 [=====] - 1s 120us/sample - loss: 0.0440
- accuracy: 0.9922
Epoch 495/500
12380/12380 [=====] - 2s 122us/sample - loss: 0.0438
- accuracy: 0.9914
Epoch 496/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0433
- accuracy: 0.9919
Epoch 497/500
12380/12380 [=====] - 1s 112us/sample - loss: 0.0434
```

```
- accuracy: 0.9918
Epoch 498/500
12380/12380 [=====] - 1s 116us/sample - loss: 0.0429
- accuracy: 0.9921
Epoch 499/500
12380/12380 [=====] - 2s 124us/sample - loss: 0.0431
- accuracy: 0.9918
Epoch 500/500
12380/12380 [=====] - 1s 111us/sample - loss: 0.0436
- accuracy: 0.9912
2872/2872 [=====] - 0s 74us/sample
```

```
class_weight_Fold_1: {0: 0.4307959982601131, 1: 8.39322033898305}
```

```
pos_weight: 0.6
thresholdNum: 0.5
```

```
Average of train loss Fold_1: 0.1202
Average of yPredProbability Fold_1: 0.0368
```

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

Normal 0	0.99	0.97	0.98	2845
Anomaly 1	0.00	0.00	0.00	27

accuracy			0.96	2872
macro avg	0.50	0.48	0.49	2872
weighted avg	0.98	0.96	0.97	2872

confusion\_matrix\_Fold\_1:

True Negatives: 2747

False Positives: 98

False Negatives: 27

True Positives: 0

End running time Fold\_1: 210506\_222252 ,-----.

Start running time Fold\_2: 210506\_222252 ,-----:

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 With DTW Approach\_Fold\_2: 210506\_222252  
,+++++

Data Augmentation MSE Label 1==> mean: 0.023911, min: 0.0, max: 0.226564

Data Augmentation MSE Label 1==> mean: 0.022327, min: 0.0, max: 0.204221

Data Augmentation MSE Label 1==> mean: 0.02255, min: 0.0, max: 0.181377

Data Augmentation MSE Label 1==> mean: 0.024622, min: 0.0, max: 0.12071

Data Augmentation MSE Label 1==> mean: 0.019754, min: 0.0, max: 0.193394

Data Augmentation MSE Label 1==> mean: 0.023045, min: 0.0, max: 0.251268

Data Augmentation MSE Label 1==> mean: 0.022651, min: 0.0, max: 0.170583

Data Augmentation MSE Label 1==> mean: 0.022393, min: 0.0, max: 0.12107

Data Augmentation MSE Label 1==> mean: 0.025259, min: 0.0, max: 0.311711

Data Augmentation MSE Label 1==> mean: 0.022715, min: 0.0, max: 0.179101

Data Augmentation MSE Label 1==> mean: 0.025533, min: 0.0, max: 0.254359

```
Data Augmentation MSE Label 1==> mean: 0.02812, min: 0.0, max: 0.177343
Data Augmentation MSE Label 1==> mean: 0.02296, min: 0.0, max: 0.288605
Data Augmentation MSE Label 1==> mean: 0.02269, min: 0.0, max: 0.145799
```

Generated this amount: 1064 ,Synthetic data With DTW Approach\_Fold\_2

```
MSE All generated Augmented data Fold_2:
mean: 0.023466
min: 0.0
max: 0.201865
```

```
End running time Data Augmentation With DTW Approach_Fold_2: 210506_222253
,+++++
```

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 [=====] - 2s 196us/sample - loss: 3.1638

- accuracy: 0.9096

Epoch 2/500

12599/12599 [=====] - 1s 109us/sample - loss: 1.5706

- accuracy: 0.9109

Epoch 3/500

12599/12599 [=====] - 1s 117us/sample - loss: 0.8359

- accuracy: 0.9116

Epoch 4/500

12599/12599 [=====] - 2s 122us/sample - loss: 0.5173

- accuracy: 0.9119

Epoch 5/500

12599/12599 [=====] - 1s 110us/sample - loss: 0.3843

- accuracy: 0.9129

Epoch 6/500

12599/12599 [=====] - 1s 110us/sample - loss: 0.3284

```
- accuracy: 0.9123
Epoch 7/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.3038
- accuracy: 0.9129
Epoch 8/500
12599/12599 [=====] - 2s 138us/sample - loss: 0.2924
- accuracy: 0.9128
Epoch 9/500
12599/12599 [=====] - 2s 120us/sample - loss: 0.2862
- accuracy: 0.9128
Epoch 10/500
12599/12599 [=====] - 2s 121us/sample - loss: 0.2816
- accuracy: 0.9135
Epoch 11/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.2792
- accuracy: 0.9136
Epoch 12/500
12599/12599 [=====] - 2s 125us/sample - loss: 0.2773
- accuracy: 0.9135
Epoch 13/500
12599/12599 [=====] - 1s 111us/sample - loss: 0.2754
- accuracy: 0.9143
Epoch 14/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.2742
- accuracy: 0.9139
```



```
Epoch 15/500
12599/12599 [=====] - 1s 114us/sample - loss: 0.2725
- accuracy: 0.9138
Epoch 16/500
12599/12599 [=====] - 2s 124us/sample - loss: 0.2712
- accuracy: 0.9140
Epoch 17/500
12599/12599 [=====] - 1s 112us/sample - loss: 0.2703
- accuracy: 0.9148
Epoch 18/500
12599/12599 [=====] - 2s 119us/sample - loss: 0.2690
- accuracy: 0.9146
Epoch 19/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.2682
- accuracy: 0.9140
Epoch 20/500
12599/12599 [=====] - 2s 126us/sample - loss: 0.2671
- accuracy: 0.9146
Epoch 21/500
12599/12599 [=====] - 1s 114us/sample - loss: 0.2662
- accuracy: 0.9148
Epoch 22/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.2659
- accuracy: 0.9148
Epoch 23/500
```

```
12599/12599 [=====] - 1s 119us/sample - loss: 0.2643
- accuracy: 0.9144
Epoch 24/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.2637
- accuracy: 0.9151
Epoch 25/500
12599/12599 [=====] - 1s 112us/sample - loss: 0.2635
- accuracy: 0.9148
Epoch 26/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.2619
- accuracy: 0.9147
Epoch 27/500
12599/12599 [=====] - 2s 119us/sample - loss: 0.2609
- accuracy: 0.9150
Epoch 28/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.2605
- accuracy: 0.9151
Epoch 29/500
12599/12599 [=====] - 1s 112us/sample - loss: 0.2604
- accuracy: 0.9150
Epoch 30/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.2592
- accuracy: 0.9145
Epoch 31/500
12599/12599 [=====] - 2s 122us/sample - loss: 0.2589
```

```
- accuracy: 0.9158
Epoch 32/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.2578
- accuracy: 0.9159
Epoch 33/500
12599/12599 [=====] - 1s 112us/sample - loss: 0.2568
- accuracy: 0.9159
Epoch 34/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.2564
- accuracy: 0.9155
Epoch 35/500
12599/12599 [=====] - 2s 122us/sample - loss: 0.2555
- accuracy: 0.9152
Epoch 36/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.2550
- accuracy: 0.9153
Epoch 37/500
12599/12599 [=====] - 1s 112us/sample - loss: 0.2540
- accuracy: 0.9157
Epoch 38/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.2533
- accuracy: 0.9155
Epoch 39/500
12599/12599 [=====] - 2s 125us/sample - loss: 0.2528
- accuracy: 0.9155
```

```
Epoch 40/500
12599/12599 [=====] - 1s 111us/sample - loss: 0.2523
- accuracy: 0.9161
Epoch 41/500
12599/12599 [=====] - 1s 111us/sample - loss: 0.2513
- accuracy: 0.9166
Epoch 42/500
12599/12599 [=====] - 2s 121us/sample - loss: 0.2507
- accuracy: 0.9163
Epoch 43/500
12599/12599 [=====] - 2s 123us/sample - loss: 0.2495
- accuracy: 0.9161
Epoch 44/500
12599/12599 [=====] - 1s 110us/sample - loss: 0.2491
- accuracy: 0.9163
Epoch 45/500
12599/12599 [=====] - 1s 111us/sample - loss: 0.2478
- accuracy: 0.9160
Epoch 46/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.2473
- accuracy: 0.9162
Epoch 47/500
12599/12599 [=====] - 2s 124us/sample - loss: 0.2467
- accuracy: 0.9164
Epoch 48/500
```

```
12599/12599 [=====] - 1s 114us/sample - loss: 0.2462
- accuracy: 0.9169
Epoch 49/500
12599/12599 [=====] - 1s 110us/sample - loss: 0.2452
- accuracy: 0.9167
Epoch 50/500
12599/12599 [=====] - 2s 120us/sample - loss: 0.2444
- accuracy: 0.9167
Epoch 51/500
12599/12599 [=====] - 2s 124us/sample - loss: 0.2428
- accuracy: 0.9172
Epoch 52/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.2416
- accuracy: 0.9174
Epoch 53/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.2417
- accuracy: 0.9177
Epoch 54/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.2397
- accuracy: 0.9173
Epoch 55/500
12599/12599 [=====] - 2s 124us/sample - loss: 0.2397
- accuracy: 0.9180
Epoch 56/500
12599/12599 [=====] - 1s 109us/sample - loss: 0.2387
```

```
- accuracy: 0.9178
Epoch 57/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.2379
- accuracy: 0.9178
Epoch 58/500
12599/12599 [=====] - 1s 114us/sample - loss: 0.2362
- accuracy: 0.9188
Epoch 59/500
12599/12599 [=====] - 2s 125us/sample - loss: 0.2355
- accuracy: 0.9186
Epoch 60/500
12599/12599 [=====] - 1s 115us/sample - loss: 0.2347
- accuracy: 0.9186
Epoch 61/500
12599/12599 [=====] - 1s 115us/sample - loss: 0.2333
- accuracy: 0.9191
Epoch 62/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.2325
- accuracy: 0.9196
Epoch 63/500
12599/12599 [=====] - 2s 123us/sample - loss: 0.2310
- accuracy: 0.9198
Epoch 64/500
12599/12599 [=====] - 1s 115us/sample - loss: 0.2298
- accuracy: 0.9212
```

```
Epoch 65/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.2291
- accuracy: 0.9207
Epoch 66/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.2279
- accuracy: 0.9215
Epoch 67/500
12599/12599 [=====] - 2s 122us/sample - loss: 0.2261
- accuracy: 0.9213
Epoch 68/500
12599/12599 [=====] - 1s 112us/sample - loss: 0.2256
- accuracy: 0.9226
Epoch 69/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.2241
- accuracy: 0.9232
Epoch 70/500
12599/12599 [=====] - 1s 109us/sample - loss: 0.2229
- accuracy: 0.9219
Epoch 71/500
12599/12599 [=====] - 2s 124us/sample - loss: 0.2229
- accuracy: 0.9233
Epoch 72/500
12599/12599 [=====] - 1s 112us/sample - loss: 0.2216
- accuracy: 0.9238
Epoch 73/500
```

```
12599/12599 [=====] - 1s 115us/sample - loss: 0.2208
- accuracy: 0.9232
Epoch 74/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.2201
- accuracy: 0.9236
Epoch 75/500
12599/12599 [=====] - 2s 121us/sample - loss: 0.2181
- accuracy: 0.9251
Epoch 76/500
12599/12599 [=====] - 1s 112us/sample - loss: 0.2173
- accuracy: 0.9256
Epoch 77/500
12599/12599 [=====] - 1s 115us/sample - loss: 0.2174
- accuracy: 0.9241
Epoch 78/500
12599/12599 [=====] - 1s 114us/sample - loss: 0.2150
- accuracy: 0.9259
Epoch 79/500
12599/12599 [=====] - 2s 123us/sample - loss: 0.2144
- accuracy: 0.9269
Epoch 80/500
12599/12599 [=====] - 1s 111us/sample - loss: 0.2141
- accuracy: 0.9271
Epoch 81/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.2117
```



```
- accuracy: 0.9266
Epoch 82/500
12599/12599 [=====] - 1s 115us/sample - loss: 0.2106
- accuracy: 0.9282
Epoch 83/500
12599/12599 [=====] - 2s 122us/sample - loss: 0.2118
- accuracy: 0.9282
Epoch 84/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.2101
- accuracy: 0.9284
Epoch 85/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.2087
- accuracy: 0.9289
Epoch 86/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.2069
- accuracy: 0.9290
Epoch 87/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.2059
- accuracy: 0.9302
Epoch 88/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.2053
- accuracy: 0.9302
Epoch 89/500
12599/12599 [=====] - 2s 120us/sample - loss: 0.2040
- accuracy: 0.9309
```

```
Epoch 90/500
12599/12599 [=====] - 1s 115us/sample - loss: 0.2023
- accuracy: 0.9306
Epoch 91/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.2022
- accuracy: 0.9299
Epoch 92/500
12599/12599 [=====] - 1s 111us/sample - loss: 0.2015
- accuracy: 0.9318
Epoch 93/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.1999
- accuracy: 0.9328
Epoch 94/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.1997
- accuracy: 0.9312
Epoch 95/500
12599/12599 [=====] - 2s 120us/sample - loss: 0.1979
- accuracy: 0.9344
Epoch 96/500
12599/12599 [=====] - 1s 109us/sample - loss: 0.1986
- accuracy: 0.9333
Epoch 97/500
12599/12599 [=====] - 2s 120us/sample - loss: 0.1959
- accuracy: 0.9342
Epoch 98/500
```

```
12599/12599 [=====] - 1s 116us/sample - loss: 0.1951
- accuracy: 0.9354
Epoch 99/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.1962
- accuracy: 0.9340
Epoch 100/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.1939
- accuracy: 0.9352
Epoch 101/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.1936
- accuracy: 0.9353
Epoch 102/500
12599/12599 [=====] - 2s 122us/sample - loss: 0.1921
- accuracy: 0.9353
Epoch 103/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.1907
- accuracy: 0.9372
Epoch 104/500
12599/12599 [=====] - 1s 115us/sample - loss: 0.1895
- accuracy: 0.9363
Epoch 105/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.1895
- accuracy: 0.9379
Epoch 106/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.1884
```

```
- accuracy: 0.9390
Epoch 107/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.1878
- accuracy: 0.9379
Epoch 108/500
12599/12599 [=====] - 1s 110us/sample - loss: 0.1862
- accuracy: 0.9382
Epoch 109/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.1850
- accuracy: 0.9406
Epoch 110/500
12599/12599 [=====] - 2s 120us/sample - loss: 0.1846
- accuracy: 0.9411
Epoch 111/500
12599/12599 [=====] - 1s 111us/sample - loss: 0.1828
- accuracy: 0.9415
Epoch 112/500
12599/12599 [=====] - 2s 120us/sample - loss: 0.1829
- accuracy: 0.9402
Epoch 113/500
12599/12599 [=====] - 1s 111us/sample - loss: 0.1819
- accuracy: 0.9404
Epoch 114/500
12599/12599 [=====] - 2s 126us/sample - loss: 0.1805
- accuracy: 0.9393
```

```
Epoch 115/500
12599/12599 [=====] - 1s 114us/sample - loss: 0.1799
- accuracy: 0.9413
Epoch 116/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.1795
- accuracy: 0.9410
Epoch 117/500
12599/12599 [=====] - 1s 114us/sample - loss: 0.1794
- accuracy: 0.9421
Epoch 118/500
12599/12599 [=====] - 2s 122us/sample - loss: 0.1779
- accuracy: 0.9413
Epoch 119/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.1787
- accuracy: 0.9424
Epoch 120/500
12599/12599 [=====] - 1s 119us/sample - loss: 0.1758
- accuracy: 0.9436
Epoch 121/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.1738
- accuracy: 0.9444
Epoch 122/500
12599/12599 [=====] - 2s 120us/sample - loss: 0.1756
- accuracy: 0.9428
Epoch 123/500
```

```
12599/12599 [=====] - 1s 112us/sample - loss: 0.1731
- accuracy: 0.9447
Epoch 124/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.1723
- accuracy: 0.9452
Epoch 125/500
12599/12599 [=====] - 1s 115us/sample - loss: 0.1717
- accuracy: 0.9459
Epoch 126/500
12599/12599 [=====] - 2s 125us/sample - loss: 0.1715
- accuracy: 0.9441
Epoch 127/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.1702
- accuracy: 0.9456
Epoch 128/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.1693
- accuracy: 0.9453
Epoch 129/500
12599/12599 [=====] - 1s 113us/sample - loss: 0.1688
- accuracy: 0.9456
Epoch 130/500
12599/12599 [=====] - 2s 126us/sample - loss: 0.1673
- accuracy: 0.9482
Epoch 131/500
12599/12599 [=====] - 1s 111us/sample - loss: 0.1662
```

```
- accuracy: 0.9490
Epoch 132/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.1660
- accuracy: 0.9482
Epoch 133/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.1646
- accuracy: 0.9491
Epoch 134/500
12599/12599 [=====] - 2s 124us/sample - loss: 0.1634
- accuracy: 0.9482
Epoch 135/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.1653
- accuracy: 0.9484
Epoch 136/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.1632
- accuracy: 0.9485
Epoch 137/500
12599/12599 [=====] - 1s 114us/sample - loss: 0.1622
- accuracy: 0.9492
Epoch 138/500
12599/12599 [=====] - 2s 123us/sample - loss: 0.1622
- accuracy: 0.9492
Epoch 139/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.1611
- accuracy: 0.9508
```

```
Epoch 140/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.1594
- accuracy: 0.9506
Epoch 141/500
12599/12599 [=====] - 1s 114us/sample - loss: 0.1595
- accuracy: 0.9494
Epoch 142/500
12599/12599 [=====] - 2s 122us/sample - loss: 0.1577
- accuracy: 0.9525
Epoch 143/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.1586
- accuracy: 0.9508
Epoch 144/500
12599/12599 [=====] - 1s 116us/sample - loss: 0.1578
- accuracy: 0.9511
Epoch 145/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.1574
- accuracy: 0.9502
Epoch 146/500
12599/12599 [=====] - 1s 118us/sample - loss: 0.1567
- accuracy: 0.9521
Epoch 147/500
12599/12599 [=====] - 1s 117us/sample - loss: 0.1548
- accuracy: 0.9517
Epoch 148/500
```



```
12599/12599 [=====] - 1s 107us/sample - loss: 0.1541
- accuracy: 0.9514
Epoch 149/500
12599/12599 [=====] - 1s 92us/sample - loss: 0.1550
- accuracy: 0.9522
Epoch 150/500
12599/12599 [=====] - 1s 104us/sample - loss: 0.1538
- accuracy: 0.9532
Epoch 151/500
12599/12599 [=====] - 2s 120us/sample - loss: 0.1521
- accuracy: 0.9546
Epoch 152/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.1520
- accuracy: 0.9554
Epoch 153/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1507
- accuracy: 0.9556
Epoch 154/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.1490
- accuracy: 0.9559
Epoch 155/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.1500
- accuracy: 0.9562
Epoch 156/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1487
```

```
- accuracy: 0.9545
Epoch 157/500
12599/12599 [=====] - 1s 94us/sample - loss: 0.1493
- accuracy: 0.9559
Epoch 158/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1466
- accuracy: 0.9556
Epoch 159/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1469
- accuracy: 0.9563
Epoch 160/500
12599/12599 [=====] - 1s 93us/sample - loss: 0.1469
- accuracy: 0.9576
Epoch 161/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1461
- accuracy: 0.9572
Epoch 162/500
12599/12599 [=====] - 1s 92us/sample - loss: 0.1442
- accuracy: 0.9576
Epoch 163/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1430
- accuracy: 0.9575
Epoch 164/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1449
- accuracy: 0.9572
```

```
Epoch 165/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.1431
- accuracy: 0.9583
Epoch 166/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1429
- accuracy: 0.9575
Epoch 167/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.1405
- accuracy: 0.9615
Epoch 168/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1409
- accuracy: 0.9599
Epoch 169/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1406
- accuracy: 0.9595
Epoch 170/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.1400
- accuracy: 0.9587
Epoch 171/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.1385
- accuracy: 0.9600
Epoch 172/500
12599/12599 [=====] - 1s 97us/sample - loss: 0.1402
- accuracy: 0.9584
Epoch 173/500
```

```
12599/12599 [=====] - 1s 83us/sample - loss: 0.1365
- accuracy: 0.9615
Epoch 174/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1372
- accuracy: 0.9615
Epoch 175/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.1377
- accuracy: 0.9594
Epoch 176/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1362
- accuracy: 0.9609
Epoch 177/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.1376
- accuracy: 0.9622
Epoch 178/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1340
- accuracy: 0.9624
Epoch 179/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1349
- accuracy: 0.9617
Epoch 180/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.1363
- accuracy: 0.9618
Epoch 181/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.1333
```

```
- accuracy: 0.9634
Epoch 182/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.1343
- accuracy: 0.9617
Epoch 183/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.1330
- accuracy: 0.9625
Epoch 184/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1339
- accuracy: 0.9615
Epoch 185/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.1318
- accuracy: 0.9626
Epoch 186/500
12599/12599 [=====] - 1s 93us/sample - loss: 0.1302
- accuracy: 0.9636
Epoch 187/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1322
- accuracy: 0.9613
Epoch 188/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.1305
- accuracy: 0.9631
Epoch 189/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1295
- accuracy: 0.9632
```

```
Epoch 190/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1293
- accuracy: 0.9648
Epoch 191/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.1293
- accuracy: 0.9642
Epoch 192/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1281
- accuracy: 0.9652
Epoch 193/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.1283
- accuracy: 0.9641
Epoch 194/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1262
- accuracy: 0.9648
Epoch 195/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1307
- accuracy: 0.9640
Epoch 196/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.1256
- accuracy: 0.9648
Epoch 197/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1261
- accuracy: 0.9650
Epoch 198/500
```

```
12599/12599 [=====] - 1s 90us/sample - loss: 0.1268
- accuracy: 0.9659
Epoch 199/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1274
- accuracy: 0.9629
Epoch 200/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1251
- accuracy: 0.9648
Epoch 201/500
12599/12599 [=====] - 1s 92us/sample - loss: 0.1234
- accuracy: 0.9669
Epoch 202/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.1251
- accuracy: 0.9656
Epoch 203/500
12599/12599 [=====] - 1s 88us/sample - loss: 0.1220
- accuracy: 0.9667
Epoch 204/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1227
- accuracy: 0.9654
Epoch 205/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1241
- accuracy: 0.9652
Epoch 206/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1219
```

```
- accuracy: 0.9671
Epoch 207/500
12599/12599 [=====] - 1s 93us/sample - loss: 0.1215
- accuracy: 0.9653
Epoch 208/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1220
- accuracy: 0.9670
Epoch 209/500
12599/12599 [=====] - 1s 88us/sample - loss: 0.1229
- accuracy: 0.9656
Epoch 210/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1193
- accuracy: 0.9675
Epoch 211/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.1209
- accuracy: 0.9683
Epoch 212/500
12599/12599 [=====] - 1s 99us/sample - loss: 0.1216
- accuracy: 0.9670
Epoch 213/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.1208
- accuracy: 0.9667
Epoch 214/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.1216
- accuracy: 0.9654
```



```
Epoch 215/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1183
- accuracy: 0.9687
Epoch 216/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1174
- accuracy: 0.9681
Epoch 217/500
12599/12599 [=====] - 1s 98us/sample - loss: 0.1196
- accuracy: 0.9670
Epoch 218/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1176
- accuracy: 0.9692
Epoch 219/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.1172
- accuracy: 0.9684
Epoch 220/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1166
- accuracy: 0.9688
Epoch 221/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1161
- accuracy: 0.9695
Epoch 222/500
12599/12599 [=====] - 1s 94us/sample - loss: 0.1166
- accuracy: 0.9690
Epoch 223/500
```

```
12599/12599 [=====] - 1s 84us/sample - loss: 0.1160
- accuracy: 0.9698
Epoch 224/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.1143
- accuracy: 0.9691
Epoch 225/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1145
- accuracy: 0.9698
Epoch 226/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1165
- accuracy: 0.9701
Epoch 227/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.1153
- accuracy: 0.9675
Epoch 228/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.1134
- accuracy: 0.9699
Epoch 229/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.1123
- accuracy: 0.9708
Epoch 230/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1161
- accuracy: 0.9702
Epoch 231/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1126
```

```
- accuracy: 0.9692
Epoch 232/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1129
- accuracy: 0.9709
Epoch 233/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.1113
- accuracy: 0.9705
Epoch 234/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1118
- accuracy: 0.9705
Epoch 235/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1115
- accuracy: 0.9707
Epoch 236/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1116
- accuracy: 0.9709
Epoch 237/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1109
- accuracy: 0.9698
Epoch 238/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.1108
- accuracy: 0.9711
Epoch 239/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1100
- accuracy: 0.9715
```

```
Epoch 240/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.1096
- accuracy: 0.9710
Epoch 241/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1094
- accuracy: 0.9710
Epoch 242/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1080
- accuracy: 0.9722
Epoch 243/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.1083
- accuracy: 0.9716
Epoch 244/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1090
- accuracy: 0.9710
Epoch 245/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.1080
- accuracy: 0.9724
Epoch 246/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1078
- accuracy: 0.9717
Epoch 247/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1062
- accuracy: 0.9727
Epoch 248/500
```

```
12599/12599 [=====] - 1s 90us/sample - loss: 0.1074
- accuracy: 0.9711
Epoch 249/500
12599/12599 [=====] - 1s 88us/sample - loss: 0.1061
- accuracy: 0.9726
Epoch 250/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.1069
- accuracy: 0.9720
Epoch 251/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1055
- accuracy: 0.9722
Epoch 252/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1062
- accuracy: 0.9707
Epoch 253/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1034
- accuracy: 0.9746
Epoch 254/500
12599/12599 [=====] - 1s 92us/sample - loss: 0.1060
- accuracy: 0.9730
Epoch 255/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.1050
- accuracy: 0.9731
Epoch 256/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1042
```

```
- accuracy: 0.9732
Epoch 257/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.1039
- accuracy: 0.9730
Epoch 258/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1042
- accuracy: 0.9735
Epoch 259/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.1038
- accuracy: 0.9732
Epoch 260/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.1030
- accuracy: 0.9743
Epoch 261/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1029
- accuracy: 0.9739
Epoch 262/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1038
- accuracy: 0.9730
Epoch 263/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.1025
- accuracy: 0.9740
Epoch 264/500
12599/12599 [=====] - 1s 94us/sample - loss: 0.1020
- accuracy: 0.9740
```

```
Epoch 265/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.1010
- accuracy: 0.9755
Epoch 266/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.1019
- accuracy: 0.9747
Epoch 267/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1012
- accuracy: 0.9727
Epoch 268/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.1023
- accuracy: 0.9725
Epoch 269/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.1026
- accuracy: 0.9732
Epoch 270/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.0995
- accuracy: 0.9746
Epoch 271/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.1015
- accuracy: 0.9731
Epoch 272/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0997
- accuracy: 0.9745
Epoch 273/500
```

```
12599/12599 [=====] - 1s 83us/sample - loss: 0.0996
- accuracy: 0.9742
Epoch 274/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0997
- accuracy: 0.9740
Epoch 275/500
12599/12599 [=====] - 1s 94us/sample - loss: 0.0988
- accuracy: 0.9763
Epoch 276/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.0986
- accuracy: 0.9748
Epoch 277/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0988
- accuracy: 0.9752
Epoch 278/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0993
- accuracy: 0.9745
Epoch 279/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0979
- accuracy: 0.9751
Epoch 280/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0989
- accuracy: 0.9759
Epoch 281/500
12599/12599 [=====] - 1s 88us/sample - loss: 0.0965
```



```
- accuracy: 0.9760
Epoch 282/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.0964
- accuracy: 0.9763
Epoch 283/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0975
- accuracy: 0.9758
Epoch 284/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0964
- accuracy: 0.9767
Epoch 285/500
12599/12599 [=====] - 1s 94us/sample - loss: 0.0979
- accuracy: 0.9754
Epoch 286/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0958
- accuracy: 0.9761
Epoch 287/500
12599/12599 [=====] - 1s 88us/sample - loss: 0.0977
- accuracy: 0.9748
Epoch 288/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.0968
- accuracy: 0.9767
Epoch 289/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0968
- accuracy: 0.9760
```

```
Epoch 290/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0960
- accuracy: 0.9757
Epoch 291/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0946
- accuracy: 0.9765
Epoch 292/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.0965
- accuracy: 0.9760
Epoch 293/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0961
- accuracy: 0.9756
Epoch 294/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0939
- accuracy: 0.9762
Epoch 295/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.0934
- accuracy: 0.9768
Epoch 296/500
12599/12599 [=====] - 1s 94us/sample - loss: 0.0938
- accuracy: 0.9773
Epoch 297/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.0945
- accuracy: 0.9764
Epoch 298/500
```

```
12599/12599 [=====] - 1s 83us/sample - loss: 0.0926
- accuracy: 0.9772
Epoch 299/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0943
- accuracy: 0.9779
Epoch 300/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0927
- accuracy: 0.9773
Epoch 301/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0921
- accuracy: 0.9784
Epoch 302/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.0934
- accuracy: 0.9763
Epoch 303/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0934
- accuracy: 0.9756
Epoch 304/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0917
- accuracy: 0.9781
Epoch 305/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0942
- accuracy: 0.9771
Epoch 306/500
12599/12599 [=====] - 1s 94us/sample - loss: 0.0925
```

```
- accuracy: 0.9771
Epoch 307/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.0927
- accuracy: 0.9767
Epoch 308/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0907
- accuracy: 0.9794
Epoch 309/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0920
- accuracy: 0.9762
Epoch 310/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0903
- accuracy: 0.9793
Epoch 311/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0919
- accuracy: 0.9758
Epoch 312/500
12599/12599 [=====] - 1s 93us/sample - loss: 0.0920
- accuracy: 0.9775
Epoch 313/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0908
- accuracy: 0.9778
Epoch 314/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0904
- accuracy: 0.9793
```

```
Epoch 315/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0892
- accuracy: 0.9782
Epoch 316/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0888
- accuracy: 0.9787
Epoch 317/500
12599/12599 [=====] - 1s 94us/sample - loss: 0.0892
- accuracy: 0.9785
Epoch 318/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.0888
- accuracy: 0.9783
Epoch 319/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0893
- accuracy: 0.9778
Epoch 320/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0883
- accuracy: 0.9791
Epoch 321/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0887
- accuracy: 0.9781
Epoch 322/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.0892
- accuracy: 0.9789
Epoch 323/500
```

```
12599/12599 [=====] - 1s 91us/sample - loss: 0.0872
- accuracy: 0.9788
Epoch 324/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0880
- accuracy: 0.9787
Epoch 325/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0891
- accuracy: 0.9790
Epoch 326/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0876
- accuracy: 0.9796
Epoch 327/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0868
- accuracy: 0.9793
Epoch 328/500
12599/12599 [=====] - 1s 93us/sample - loss: 0.0869
- accuracy: 0.9799
Epoch 329/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0876
- accuracy: 0.9795
Epoch 330/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0860
- accuracy: 0.9814
Epoch 331/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0870
```

```
- accuracy: 0.9802
Epoch 332/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0865
- accuracy: 0.9790
Epoch 333/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0852
- accuracy: 0.9801
Epoch 334/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.0856
- accuracy: 0.9806
Epoch 335/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0859
- accuracy: 0.9798
Epoch 336/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0872
- accuracy: 0.9798
Epoch 337/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0855
- accuracy: 0.9788
Epoch 338/500
12599/12599 [=====] - 1s 97us/sample - loss: 0.0850
- accuracy: 0.9806
Epoch 339/500
12599/12599 [=====] - 1s 101us/sample - loss: 0.0858
- accuracy: 0.9793
```

```
Epoch 340/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.0852
- accuracy: 0.9803
Epoch 341/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0851
- accuracy: 0.9790
Epoch 342/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0845
- accuracy: 0.9811
Epoch 343/500
12599/12599 [=====] - 1s 97us/sample - loss: 0.0840
- accuracy: 0.9812
Epoch 344/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.0837
- accuracy: 0.9806
Epoch 345/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0835
- accuracy: 0.9810
Epoch 346/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0827
- accuracy: 0.9815
Epoch 347/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0843
- accuracy: 0.9799
Epoch 348/500
```



```
12599/12599 [=====] - 1s 95us/sample - loss: 0.0836
- accuracy: 0.9806
Epoch 349/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.0824
- accuracy: 0.9811
Epoch 350/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0852
- accuracy: 0.9799
Epoch 351/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0824
- accuracy: 0.9818
Epoch 352/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0820
- accuracy: 0.9803
Epoch 353/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.0822
- accuracy: 0.9809
Epoch 354/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0827
- accuracy: 0.9810
Epoch 355/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0836
- accuracy: 0.9809
Epoch 356/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0836
```

```
- accuracy: 0.9792
Epoch 357/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0813
- accuracy: 0.9811
Epoch 358/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0816
- accuracy: 0.9807
Epoch 359/500
12599/12599 [=====] - 1s 98us/sample - loss: 0.0808
- accuracy: 0.9809
Epoch 360/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.0812
- accuracy: 0.9815
Epoch 361/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0807
- accuracy: 0.9809
Epoch 362/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0811
- accuracy: 0.9806
Epoch 363/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0807
- accuracy: 0.9821
Epoch 364/500
12599/12599 [=====] - 1s 100us/sample - loss: 0.0803
- accuracy: 0.9806
```

```
Epoch 365/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0803
- accuracy: 0.9813
Epoch 366/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0795
- accuracy: 0.9811
Epoch 367/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0801
- accuracy: 0.9824
Epoch 368/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0805
- accuracy: 0.9813
Epoch 369/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.0791
- accuracy: 0.9812
Epoch 370/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.0793
- accuracy: 0.9821
Epoch 371/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0795
- accuracy: 0.9825
Epoch 372/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0792
- accuracy: 0.9821
Epoch 373/500
```

```
12599/12599 [=====] - 1s 84us/sample - loss: 0.0790
- accuracy: 0.9821
Epoch 374/500
12599/12599 [=====] - 1s 92us/sample - loss: 0.0788
- accuracy: 0.9821
Epoch 375/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0795
- accuracy: 0.9830
Epoch 376/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0804
- accuracy: 0.9809
Epoch 377/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0783
- accuracy: 0.9830
Epoch 378/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0779
- accuracy: 0.9829
Epoch 379/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0769
- accuracy: 0.9836
Epoch 380/500
12599/12599 [=====] - 1s 98us/sample - loss: 0.0782
- accuracy: 0.9821
Epoch 381/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0765
```

```
- accuracy: 0.9829
Epoch 382/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0784
- accuracy: 0.9825
Epoch 383/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0794
- accuracy: 0.9808
Epoch 384/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0775
- accuracy: 0.9822
Epoch 385/500
12599/12599 [=====] - 1s 101us/sample - loss: 0.0764
- accuracy: 0.9842
Epoch 386/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.0768
- accuracy: 0.9838
Epoch 387/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0767
- accuracy: 0.9827
Epoch 388/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0762
- accuracy: 0.9827
Epoch 389/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0762
- accuracy: 0.9821
```

```
Epoch 390/500
12599/12599 [=====] - 1s 98us/sample - loss: 0.0771
- accuracy: 0.9820
Epoch 391/500
12599/12599 [=====] - 1s 88us/sample - loss: 0.0764
- accuracy: 0.9833
Epoch 392/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0760
- accuracy: 0.9829
Epoch 393/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0782
- accuracy: 0.9819
Epoch 394/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0752
- accuracy: 0.9846
Epoch 395/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.0759
- accuracy: 0.9829
Epoch 396/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0741
- accuracy: 0.9841
Epoch 397/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0749
- accuracy: 0.9832
Epoch 398/500
```

```
12599/12599 [=====] - 1s 82us/sample - loss: 0.0755
- accuracy: 0.9831
Epoch 399/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0761
- accuracy: 0.9835
Epoch 400/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0736
- accuracy: 0.9847
Epoch 401/500
12599/12599 [=====] - 1s 103us/sample - loss: 0.0743
- accuracy: 0.9838
Epoch 402/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0747
- accuracy: 0.9844
Epoch 403/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0752
- accuracy: 0.9830
Epoch 404/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0748
- accuracy: 0.9834
Epoch 405/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0743
- accuracy: 0.9842
Epoch 406/500
12599/12599 [=====] - 1s 99us/sample - loss: 0.0748
```

```
- accuracy: 0.9837
Epoch 407/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.0751
- accuracy: 0.9830
Epoch 408/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0740
- accuracy: 0.9844
Epoch 409/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0733
- accuracy: 0.9836
Epoch 410/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0740
- accuracy: 0.9836
Epoch 411/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.0735
- accuracy: 0.9839
Epoch 412/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.0719
- accuracy: 0.9842
Epoch 413/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0736
- accuracy: 0.9836
Epoch 414/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0716
- accuracy: 0.9848
```



```
Epoch 415/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0729
- accuracy: 0.9836
Epoch 416/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0715
- accuracy: 0.9842
Epoch 417/500
12599/12599 [=====] - 1s 97us/sample - loss: 0.0724
- accuracy: 0.9847
Epoch 418/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0728
- accuracy: 0.9838
Epoch 419/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0745
- accuracy: 0.9833
Epoch 420/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0729
- accuracy: 0.9838
Epoch 421/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0724
- accuracy: 0.9848
Epoch 422/500
12599/12599 [=====] - 1s 99us/sample - loss: 0.0707
- accuracy: 0.9853
Epoch 423/500
```

```
12599/12599 [=====] - 1s 84us/sample - loss: 0.0727
- accuracy: 0.9840
Epoch 424/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0703
- accuracy: 0.9853
Epoch 425/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0712
- accuracy: 0.9850
Epoch 426/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0713
- accuracy: 0.9854
Epoch 427/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0703
- accuracy: 0.9848
Epoch 428/500
12599/12599 [=====] - 1s 88us/sample - loss: 0.0722
- accuracy: 0.9833
Epoch 429/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0710
- accuracy: 0.9848
Epoch 430/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0689
- accuracy: 0.9856
Epoch 431/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0699
```

```
- accuracy: 0.9861
Epoch 432/500
12599/12599 [=====] - 1s 88us/sample - loss: 0.0697
- accuracy: 0.9848
Epoch 433/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.0704
- accuracy: 0.9858
Epoch 434/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0703
- accuracy: 0.9853
Epoch 435/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0719
- accuracy: 0.9836
Epoch 436/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0696
- accuracy: 0.9852
Epoch 437/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0687
- accuracy: 0.9856
Epoch 438/500
12599/12599 [=====] - 1s 102us/sample - loss: 0.0698
- accuracy: 0.9848
Epoch 439/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0686
- accuracy: 0.9863
```

```
Epoch 440/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0705
- accuracy: 0.9852
Epoch 441/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0701
- accuracy: 0.9845
Epoch 442/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0695
- accuracy: 0.9854
Epoch 443/500
12599/12599 [=====] - 1s 97us/sample - loss: 0.0685
- accuracy: 0.9857
Epoch 444/500
12599/12599 [=====] - 1s 86us/sample - loss: 0.0700
- accuracy: 0.9847
Epoch 445/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0686
- accuracy: 0.9855
Epoch 446/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0677
- accuracy: 0.9855
Epoch 447/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.0690
- accuracy: 0.9858
Epoch 448/500
```

```
12599/12599 [=====] - 1s 101us/sample - loss: 0.0720
- accuracy: 0.9848
Epoch 449/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0679
- accuracy: 0.9860
Epoch 450/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0667
- accuracy: 0.9866
Epoch 451/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0690
- accuracy: 0.9856
Epoch 452/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0691
- accuracy: 0.9853
Epoch 453/500
12599/12599 [=====] - 1s 92us/sample - loss: 0.0684
- accuracy: 0.9852
Epoch 454/500
12599/12599 [=====] - 1s 92us/sample - loss: 0.0670
- accuracy: 0.9859
Epoch 455/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0673
- accuracy: 0.9867
Epoch 456/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0672
```

```
- accuracy: 0.9858
Epoch 457/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0687
- accuracy: 0.9857
Epoch 458/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0668
- accuracy: 0.9860
Epoch 459/500
12599/12599 [=====] - 1s 99us/sample - loss: 0.0693
- accuracy: 0.9837
Epoch 460/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0687
- accuracy: 0.9856
Epoch 461/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0674
- accuracy: 0.9857
Epoch 462/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0662
- accuracy: 0.9868
Epoch 463/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0657
- accuracy: 0.9865
Epoch 464/500
12599/12599 [=====] - 1s 103us/sample - loss: 0.0662
- accuracy: 0.9871
```

```
Epoch 465/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0646
- accuracy: 0.9880
Epoch 466/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0690
- accuracy: 0.9845
Epoch 467/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0670
- accuracy: 0.9859
Epoch 468/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0654
- accuracy: 0.9868
Epoch 469/500
12599/12599 [=====] - 1s 98us/sample - loss: 0.0653
- accuracy: 0.9876
Epoch 470/500
12599/12599 [=====] - 1s 88us/sample - loss: 0.0650
- accuracy: 0.9868
Epoch 471/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0661
- accuracy: 0.9871
Epoch 472/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.0646
- accuracy: 0.9867
Epoch 473/500
```

```
12599/12599 [=====] - 1s 85us/sample - loss: 0.0687
- accuracy: 0.9845
Epoch 474/500
12599/12599 [=====] - 1s 93us/sample - loss: 0.0646
- accuracy: 0.9871
Epoch 475/500
12599/12599 [=====] - 1s 92us/sample - loss: 0.0657
- accuracy: 0.9867
Epoch 476/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0640
- accuracy: 0.9875
Epoch 477/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0652
- accuracy: 0.9874
Epoch 478/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0641
- accuracy: 0.9878
Epoch 479/500
12599/12599 [=====] - 1s 90us/sample - loss: 0.0640
- accuracy: 0.9875
Epoch 480/500
12599/12599 [=====] - 1s 96us/sample - loss: 0.0643
- accuracy: 0.9871
Epoch 481/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0654
```



```
- accuracy: 0.9868
Epoch 482/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0627
- accuracy: 0.9880
Epoch 483/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0640
- accuracy: 0.9866
Epoch 484/500
12599/12599 [=====] - 1s 87us/sample - loss: 0.0659
- accuracy: 0.9858
Epoch 485/500
12599/12599 [=====] - 1s 98us/sample - loss: 0.0638
- accuracy: 0.9866
Epoch 486/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0645
- accuracy: 0.9865
Epoch 487/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0623
- accuracy: 0.9875
Epoch 488/500
12599/12599 [=====] - 1s 83us/sample - loss: 0.0636
- accuracy: 0.9869
Epoch 489/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.0634
- accuracy: 0.9871
```

```
Epoch 490/500
12599/12599 [=====] - 1s 98us/sample - loss: 0.0630
- accuracy: 0.9871
Epoch 491/500
12599/12599 [=====] - 1s 89us/sample - loss: 0.0634
- accuracy: 0.9872
Epoch 492/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0639
- accuracy: 0.9867
Epoch 493/500
12599/12599 [=====] - 1s 84us/sample - loss: 0.0641
- accuracy: 0.9862
Epoch 494/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0648
- accuracy: 0.9866
Epoch 495/500
12599/12599 [=====] - 1s 95us/sample - loss: 0.0614
- accuracy: 0.9883
Epoch 496/500
12599/12599 [=====] - 1s 91us/sample - loss: 0.0631
- accuracy: 0.9871
Epoch 497/500
12599/12599 [=====] - 1s 82us/sample - loss: 0.0626
- accuracy: 0.9875
Epoch 498/500
```

```
12599/12599 [=====] - 1s 83us/sample - loss: 0.0621
- accuracy: 0.9881
Epoch 499/500
12599/12599 [=====] - 1s 85us/sample - loss: 0.0619
- accuracy: 0.9880
Epoch 500/500
12599/12599 [=====] - 1s 93us/sample - loss: 0.0610
- accuracy: 0.9891
2891/2891 [=====] - 0s 66us/sample

class_weight_Fold_2: {0: 0.43979404834627805, 1: 6.631052631578947}
```

```
pos_weight: 0.6
thresholdNum: 0.5
```

```
Average of train loss Fold_2: 0.1413
Average of yPredProbability Fold_2: 0.3264
```

```
classification_report_Fold_2:
precision    recall  f1-score   support

Normal 0      1.00      0.68      0.81      2881
```

Anomaly 1	0.01	0.50	0.01	0.01	10
-----------	------	------	------	------	----

accuracy			0.68	2891
macro avg	0.50	0.59	0.41	2891
weighted avg	0.99	0.68	0.81	2891

confusion\_matrix\_Fold\_2:

True Negatives: 1964

False Positives: 917

False Negatives: 5

True Positives: 5

End running time Fold\_2: 210506\_223259, -----.

Start running time Fold\_3: 210506\_223259 , -----:-----:

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 With DTW Approach_Fold_3: 210506_223259
,+++++
```

Data Augmentation MSE Label 1==> mean: 0.022269, min: 0.0, max: 0.102606  
Data Augmentation MSE Label 1==> mean: 0.020967, min: 0.0, max: 0.15108  
Data Augmentation MSE Label 1==> mean: 0.019986, min: 0.0, max: 0.110593  
Data Augmentation MSE Label 1==> mean: 0.021024, min: 0.0, max: 0.168948  
Data Augmentation MSE Label 1==> mean: 0.022493, min: 0.0, max: 0.146835  
Data Augmentation MSE Label 1==> mean: 0.019296, min: 0.0, max: 0.217332  
Data Augmentation MSE Label 1==> mean: 0.019726, min: 0.0, max: 0.129375  
Data Augmentation MSE Label 1==> mean: 0.02313, min: 0.0, max: 0.22723  
Data Augmentation MSE Label 1==> mean: 0.023172, min: 0.0, max: 0.211013  
Data Augmentation MSE Label 1==> mean: 0.024035, min: 0.0, max: 0.154927  
Data Augmentation MSE Label 1==> mean: 0.023736, min: 0.0, max: 0.144427  
Data Augmentation MSE Label 1==> mean: 0.022023, min: 0.0, max: 0.176108

Data Augmentation MSE Label 1==> mean: 0.021498, min: 0.0, max: 0.1269

Data Augmentation MSE Label 1==> mean: 0.021878, min: 0.0, max: 0.202922

Generated this amount: 994 ,Synthetic data With DTW Approach\_Fold\_3

MSE All generated Augmented data Fold\_3:

mean: 0.021832

min: 0.0

max: 0.162164

End running time Data Augmentation With DTW Approach\_Fold\_3: 210506\_223300  
,+++++

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 [=====] - 1s 113us/sample - loss: 3.1699  
- accuracy: 0.9155

Epoch 2/500

12534/12534 [=====] - 1s 78us/sample - loss: 1.5882  
- accuracy: 0.9170

Epoch 3/500

12534/12534 [=====] - 1s 86us/sample - loss: 0.8500  
- accuracy: 0.9177

Epoch 4/500

12534/12534 [=====] - 1s 93us/sample - loss: 0.5196  
- accuracy: 0.9174

Epoch 5/500

12534/12534 [=====] - 1s 79us/sample - loss: 0.3773  
- accuracy: 0.9174

Epoch 6/500

12534/12534 [=====] - 1s 79us/sample - loss: 0.3152  
- accuracy: 0.9175

Epoch 7/500

```
12534/12534 [=====] - 1s 79us/sample - loss: 0.2875
- accuracy: 0.9178
Epoch 8/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.2746
- accuracy: 0.9170
Epoch 9/500
12534/12534 [=====] - 1s 96us/sample - loss: 0.2676
- accuracy: 0.9178
Epoch 10/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.2633
- accuracy: 0.9174
Epoch 11/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.2616
- accuracy: 0.9181
Epoch 12/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.2600
- accuracy: 0.9172
Epoch 13/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2583
- accuracy: 0.9178
Epoch 14/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.2573
- accuracy: 0.9179
Epoch 15/500
12534/12534 [=====] - 1s 94us/sample - loss: 0.2558
```



```
- accuracy: 0.9180
Epoch 16/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2552
- accuracy: 0.9181
Epoch 17/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2544
- accuracy: 0.9179
Epoch 18/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2533
- accuracy: 0.9181
Epoch 19/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.2528
- accuracy: 0.9185
Epoch 20/500
12534/12534 [=====] - 1s 91us/sample - loss: 0.2523
- accuracy: 0.9185
Epoch 21/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.2516
- accuracy: 0.9183
Epoch 22/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2510
- accuracy: 0.9186
Epoch 23/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2502
- accuracy: 0.9185
```

```
Epoch 24/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.2497
- accuracy: 0.9189
Epoch 25/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.2486
- accuracy: 0.9183
Epoch 26/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.2485
- accuracy: 0.9187
Epoch 27/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2477
- accuracy: 0.9185
Epoch 28/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2476
- accuracy: 0.9190
Epoch 29/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2463
- accuracy: 0.9182
Epoch 30/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.2462
- accuracy: 0.9193
Epoch 31/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.2457
- accuracy: 0.9187
Epoch 32/500
```

```
12534/12534 [=====] - 1s 82us/sample - loss: 0.2451
- accuracy: 0.9189
Epoch 33/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2443
- accuracy: 0.9186
Epoch 34/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2441
- accuracy: 0.9196
Epoch 35/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.2438
- accuracy: 0.9182
Epoch 36/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.2427
- accuracy: 0.9188
Epoch 37/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.2415
- accuracy: 0.9180
Epoch 38/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.2413
- accuracy: 0.9189
Epoch 39/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2413
- accuracy: 0.9180
Epoch 40/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.2406
```

```
- accuracy: 0.9181
Epoch 41/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.2394
- accuracy: 0.9186
Epoch 42/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.2397
- accuracy: 0.9188
Epoch 43/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.2387
- accuracy: 0.9190
Epoch 44/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.2382
- accuracy: 0.9193
Epoch 45/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2370
- accuracy: 0.9192
Epoch 46/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.2371
- accuracy: 0.9192
Epoch 47/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.2359
- accuracy: 0.9193
Epoch 48/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.2356
- accuracy: 0.9190
```

```
Epoch 49/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2348
- accuracy: 0.9196
Epoch 50/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2338
- accuracy: 0.9194
Epoch 51/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2332
- accuracy: 0.9205
Epoch 52/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.2328
- accuracy: 0.9196
Epoch 53/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.2329
- accuracy: 0.9201
Epoch 54/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2311
- accuracy: 0.9207
Epoch 55/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.2307
- accuracy: 0.9197
Epoch 56/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2294
- accuracy: 0.9197
Epoch 57/500
```

```
12534/12534 [=====] - 1s 89us/sample - loss: 0.2283
- accuracy: 0.9209
Epoch 58/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.2274
- accuracy: 0.9210
Epoch 59/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.2269
- accuracy: 0.9217
Epoch 60/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2254
- accuracy: 0.9217
Epoch 61/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.2250
- accuracy: 0.9221
Epoch 62/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.2239
- accuracy: 0.9222
Epoch 63/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.2226
- accuracy: 0.9221
Epoch 64/500
12534/12534 [=====] - 1s 98us/sample - loss: 0.2220
- accuracy: 0.9232
Epoch 65/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.2196
```

```
- accuracy: 0.9217
Epoch 66/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2194
- accuracy: 0.9228
Epoch 67/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2183
- accuracy: 0.9228
Epoch 68/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.2179
- accuracy: 0.9240
Epoch 69/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.2171
- accuracy: 0.9236
Epoch 70/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2152
- accuracy: 0.9243
Epoch 71/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.2149
- accuracy: 0.9234
Epoch 72/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.2138
- accuracy: 0.9244
Epoch 73/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.2123
- accuracy: 0.9248
```

```
Epoch 74/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.2105
- accuracy: 0.9248
Epoch 75/500
12534/12534 [=====] - 1s 91us/sample - loss: 0.2102
- accuracy: 0.9260
Epoch 76/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.2097
- accuracy: 0.9271
Epoch 77/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2072
- accuracy: 0.9276
Epoch 78/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.2067
- accuracy: 0.9276
Epoch 79/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.2068
- accuracy: 0.9272
Epoch 80/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.2039
- accuracy: 0.9285
Epoch 81/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.2043
- accuracy: 0.9295
Epoch 82/500
```



```
12534/12534 [=====] - 1s 80us/sample - loss: 0.2024
- accuracy: 0.9298
Epoch 83/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.2012
- accuracy: 0.9298
Epoch 84/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.2004
- accuracy: 0.9307
Epoch 85/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.1991
- accuracy: 0.9327
Epoch 86/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.1972
- accuracy: 0.9323
Epoch 87/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1961
- accuracy: 0.9321
Epoch 88/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1950
- accuracy: 0.9333
Epoch 89/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.1944
- accuracy: 0.9338
Epoch 90/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.1924
```

```
- accuracy: 0.9344
Epoch 91/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.1906
- accuracy: 0.9363
Epoch 92/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1901
- accuracy: 0.9365
Epoch 93/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1883
- accuracy: 0.9371
Epoch 94/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1879
- accuracy: 0.9382
Epoch 95/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1862
- accuracy: 0.9367
Epoch 96/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1843
- accuracy: 0.9390
Epoch 97/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.1833
- accuracy: 0.9390
Epoch 98/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1813
- accuracy: 0.9402
```

```
Epoch 99/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1795
- accuracy: 0.9399
Epoch 100/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.1789
- accuracy: 0.9402
Epoch 101/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1792
- accuracy: 0.9406
Epoch 102/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.1756
- accuracy: 0.9430
Epoch 103/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1762
- accuracy: 0.9428
Epoch 104/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1726
- accuracy: 0.9449
Epoch 105/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.1738
- accuracy: 0.9445
Epoch 106/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.1722
- accuracy: 0.9454
Epoch 107/500
```

```
12534/12534 [=====] - 1s 91us/sample - loss: 0.1717
- accuracy: 0.9452
Epoch 108/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.1692
- accuracy: 0.9449
Epoch 109/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1681
- accuracy: 0.9465
Epoch 110/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.1669
- accuracy: 0.9456
Epoch 111/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1653
- accuracy: 0.9472
Epoch 112/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1642
- accuracy: 0.9497
Epoch 113/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.1635
- accuracy: 0.9482
Epoch 114/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1632
- accuracy: 0.9483
Epoch 115/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1602
```

```
- accuracy: 0.9501
Epoch 116/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.1592
- accuracy: 0.9498
Epoch 117/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.1583
- accuracy: 0.9512
Epoch 118/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.1564
- accuracy: 0.9532
Epoch 119/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.1579
- accuracy: 0.9502
Epoch 120/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1567
- accuracy: 0.9528
Epoch 121/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1545
- accuracy: 0.9528
Epoch 122/500
12534/12534 [=====] - 1s 91us/sample - loss: 0.1524
- accuracy: 0.9536
Epoch 123/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.1509
- accuracy: 0.9552
```

```
Epoch 124/500
12534/12534 [=====] - 1s 91us/sample - loss: 0.1527
- accuracy: 0.9545
Epoch 125/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1516
- accuracy: 0.9543
Epoch 126/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1488
- accuracy: 0.9558
Epoch 127/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1482
- accuracy: 0.9543
Epoch 128/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1471
- accuracy: 0.9569
Epoch 129/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.1470
- accuracy: 0.9557
Epoch 130/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1450
- accuracy: 0.9584
Epoch 131/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1440
- accuracy: 0.9591
Epoch 132/500
```

```
12534/12534 [=====] - 1s 82us/sample - loss: 0.1429
- accuracy: 0.9574
Epoch 133/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1436
- accuracy: 0.9589
Epoch 134/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.1413
- accuracy: 0.9593
Epoch 135/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.1417
- accuracy: 0.9588
Epoch 136/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1394
- accuracy: 0.9611
Epoch 137/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1404
- accuracy: 0.9590
Epoch 138/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1387
- accuracy: 0.9608
Epoch 139/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1384
- accuracy: 0.9600
Epoch 140/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.1378
```

```
- accuracy: 0.9610
Epoch 141/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1366
- accuracy: 0.9619
Epoch 142/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1360
- accuracy: 0.9617
Epoch 143/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.1335
- accuracy: 0.9638
Epoch 144/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.1327
- accuracy: 0.9631
Epoch 145/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.1317
- accuracy: 0.9649
Epoch 146/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.1309
- accuracy: 0.9631
Epoch 147/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1298
- accuracy: 0.9647
Epoch 148/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1320
- accuracy: 0.9627
```



```
Epoch 149/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.1292
- accuracy: 0.9639
Epoch 150/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1281
- accuracy: 0.9667
Epoch 151/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.1289
- accuracy: 0.9660
Epoch 152/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1264
- accuracy: 0.9671
Epoch 153/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1261
- accuracy: 0.9659
Epoch 154/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.1258
- accuracy: 0.9668
Epoch 155/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1238
- accuracy: 0.9666
Epoch 156/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1254
- accuracy: 0.9660
Epoch 157/500
```

```
12534/12534 [=====] - 1s 85us/sample - loss: 0.1226
- accuracy: 0.9667
Epoch 158/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1217
- accuracy: 0.9686
Epoch 159/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1221
- accuracy: 0.9680
Epoch 160/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1219
- accuracy: 0.9678
Epoch 161/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1202
- accuracy: 0.9679
Epoch 162/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.1205
- accuracy: 0.9679
Epoch 163/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1201
- accuracy: 0.9673
Epoch 164/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1192
- accuracy: 0.9683
Epoch 165/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.1187
```

```
- accuracy: 0.9692
Epoch 166/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1186
- accuracy: 0.9701
Epoch 167/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.1162
- accuracy: 0.9707
Epoch 168/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.1174
- accuracy: 0.9695
Epoch 169/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1157
- accuracy: 0.9705
Epoch 170/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.1142
- accuracy: 0.9712
Epoch 171/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.1142
- accuracy: 0.9722
Epoch 172/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.1157
- accuracy: 0.9697
Epoch 173/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.1140
- accuracy: 0.9698
```

```
Epoch 174/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.1121
- accuracy: 0.9714
Epoch 175/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.1133
- accuracy: 0.9705
Epoch 176/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1119
- accuracy: 0.9707
Epoch 177/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1116
- accuracy: 0.9713
Epoch 178/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.1104
- accuracy: 0.9726
Epoch 179/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.1095
- accuracy: 0.9720
Epoch 180/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.1087
- accuracy: 0.9743
Epoch 181/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.1110
- accuracy: 0.9714
Epoch 182/500
```

```
12534/12534 [=====] - 1s 82us/sample - loss: 0.1105
- accuracy: 0.9711
Epoch 183/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.1090
- accuracy: 0.9730
Epoch 184/500
12534/12534 [=====] - 1s 91us/sample - loss: 0.1093
- accuracy: 0.9717
Epoch 185/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1059
- accuracy: 0.9732
Epoch 186/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.1084
- accuracy: 0.9734
Epoch 187/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.1055
- accuracy: 0.9733
Epoch 188/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1057
- accuracy: 0.9740
Epoch 189/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.1065
- accuracy: 0.9722
Epoch 190/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.1043
```

```
- accuracy: 0.9742
Epoch 191/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1045
- accuracy: 0.9749
Epoch 192/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.1035
- accuracy: 0.9747
Epoch 193/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.1044
- accuracy: 0.9737
Epoch 194/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.1037
- accuracy: 0.9738
Epoch 195/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.1019
- accuracy: 0.9756
Epoch 196/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1031
- accuracy: 0.9754
Epoch 197/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.1029
- accuracy: 0.9737
Epoch 198/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.1018
- accuracy: 0.9756
```

```
Epoch 199/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1006
- accuracy: 0.9760
Epoch 200/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.1004
- accuracy: 0.9753
Epoch 201/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0990
- accuracy: 0.9766
Epoch 202/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.1026
- accuracy: 0.9744
Epoch 203/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.1018
- accuracy: 0.9749
Epoch 204/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0988
- accuracy: 0.9759
Epoch 205/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0972
- accuracy: 0.9764
Epoch 206/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0970
- accuracy: 0.9763
Epoch 207/500
```

```
12534/12534 [=====] - 1s 80us/sample - loss: 0.0974
- accuracy: 0.9775
Epoch 208/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0982
- accuracy: 0.9753
Epoch 209/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0976
- accuracy: 0.9772
Epoch 210/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0954
- accuracy: 0.9783
Epoch 211/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0960
- accuracy: 0.9775
Epoch 212/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0948
- accuracy: 0.9783
Epoch 213/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0937
- accuracy: 0.9788
Epoch 214/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0964
- accuracy: 0.9767
Epoch 215/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0961
```



```
- accuracy: 0.9753
Epoch 216/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0943
- accuracy: 0.9775
Epoch 217/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0943
- accuracy: 0.9780
Epoch 218/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0936
- accuracy: 0.9781
Epoch 219/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0939
- accuracy: 0.9775
Epoch 220/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0937
- accuracy: 0.9773
Epoch 221/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0926
- accuracy: 0.9784
Epoch 222/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0935
- accuracy: 0.9771
Epoch 223/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0914
- accuracy: 0.9790
```

```
Epoch 224/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0927
- accuracy: 0.9774
Epoch 225/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0913
- accuracy: 0.9789
Epoch 226/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0919
- accuracy: 0.9793
Epoch 227/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.0912
- accuracy: 0.9794
Epoch 228/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0895
- accuracy: 0.9794
Epoch 229/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0886
- accuracy: 0.9792
Epoch 230/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0907
- accuracy: 0.9783
Epoch 231/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0892
- accuracy: 0.9796
Epoch 232/500
```

```
12534/12534 [=====] - 1s 82us/sample - loss: 0.0889
- accuracy: 0.9790
Epoch 233/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0882
- accuracy: 0.9790
Epoch 234/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0888
- accuracy: 0.9790
Epoch 235/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0879
- accuracy: 0.9793
Epoch 236/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0880
- accuracy: 0.9795
Epoch 237/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0866
- accuracy: 0.9796
Epoch 238/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0888
- accuracy: 0.9782
Epoch 239/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0870
- accuracy: 0.9789
Epoch 240/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0865
```

```
- accuracy: 0.9801
Epoch 241/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0866
- accuracy: 0.9806
Epoch 242/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0864
- accuracy: 0.9793
Epoch 243/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0863
- accuracy: 0.9797
Epoch 244/500
12534/12534 [=====] - 1s 91us/sample - loss: 0.0840
- accuracy: 0.9809
Epoch 245/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0849
- accuracy: 0.9814
Epoch 246/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0846
- accuracy: 0.9805
Epoch 247/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0861
- accuracy: 0.9803
Epoch 248/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0849
- accuracy: 0.9795
```

```
Epoch 249/500
12534/12534 [=====] - 1s 94us/sample - loss: 0.0847
- accuracy: 0.9805
Epoch 250/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0818
- accuracy: 0.9829
Epoch 251/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0833
- accuracy: 0.9820
Epoch 252/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0831
- accuracy: 0.9802
Epoch 253/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0841
- accuracy: 0.9801
Epoch 254/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0832
- accuracy: 0.9811
Epoch 255/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0835
- accuracy: 0.9805
Epoch 256/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0832
- accuracy: 0.9802
Epoch 257/500
```

```
12534/12534 [=====] - 1s 87us/sample - loss: 0.0826
- accuracy: 0.9808
Epoch 258/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0824
- accuracy: 0.9813
Epoch 259/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0816
- accuracy: 0.9820
Epoch 260/500
12534/12534 [=====] - 1s 94us/sample - loss: 0.0804
- accuracy: 0.9816
Epoch 261/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0817
- accuracy: 0.9819
Epoch 262/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0824
- accuracy: 0.9816
Epoch 263/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0799
- accuracy: 0.9814
Epoch 264/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0780
- accuracy: 0.9825
Epoch 265/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0798
```

```
- accuracy: 0.9814
Epoch 266/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0806
- accuracy: 0.9818
Epoch 267/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0785
- accuracy: 0.9832
Epoch 268/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0795
- accuracy: 0.9809
Epoch 269/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0796
- accuracy: 0.9807
Epoch 270/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0803
- accuracy: 0.9811
Epoch 271/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0786
- accuracy: 0.9821
Epoch 272/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0776
- accuracy: 0.9833
Epoch 273/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0778
- accuracy: 0.9826
```

```
Epoch 274/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0782
- accuracy: 0.9824
Epoch 275/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0783
- accuracy: 0.9823
Epoch 276/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0765
- accuracy: 0.9829
Epoch 277/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0778
- accuracy: 0.9834
Epoch 278/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0790
- accuracy: 0.9817
Epoch 279/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0757
- accuracy: 0.9828
Epoch 280/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0765
- accuracy: 0.9838
Epoch 281/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0768
- accuracy: 0.9825
Epoch 282/500
```



```
12534/12534 [=====] - 1s 92us/sample - loss: 0.0759
- accuracy: 0.9831
Epoch 283/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0764
- accuracy: 0.9828
Epoch 284/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0750
- accuracy: 0.9840
Epoch 285/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0770
- accuracy: 0.9826
Epoch 286/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0753
- accuracy: 0.9829
Epoch 287/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0744
- accuracy: 0.9838
Epoch 288/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0751
- accuracy: 0.9829
Epoch 289/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0745
- accuracy: 0.9834
Epoch 290/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0728
```

```
- accuracy: 0.9842
Epoch 291/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0742
- accuracy: 0.9848
Epoch 292/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0741
- accuracy: 0.9829
Epoch 293/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0728
- accuracy: 0.9845
Epoch 294/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0728
- accuracy: 0.9845
Epoch 295/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0734
- accuracy: 0.9839
Epoch 296/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0729
- accuracy: 0.9842
Epoch 297/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0741
- accuracy: 0.9832
Epoch 298/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0730
- accuracy: 0.9837
```

```
Epoch 299/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0730
- accuracy: 0.9842
Epoch 300/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0741
- accuracy: 0.9832
Epoch 301/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0737
- accuracy: 0.9827
Epoch 302/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0730
- accuracy: 0.9836
Epoch 303/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0724
- accuracy: 0.9832
Epoch 304/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.0727
- accuracy: 0.9844
Epoch 305/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0707
- accuracy: 0.9850
Epoch 306/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0717
- accuracy: 0.9845
Epoch 307/500
```

```
12534/12534 [=====] - 1s 80us/sample - loss: 0.0716
- accuracy: 0.9848
Epoch 308/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0717
- accuracy: 0.9840
Epoch 309/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0698
- accuracy: 0.9854
Epoch 310/500
12534/12534 [=====] - 1s 91us/sample - loss: 0.0701
- accuracy: 0.9858
Epoch 311/500
12534/12534 [=====] - 1s 101us/sample - loss: 0.0700
- accuracy: 0.9844
Epoch 312/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0705
- accuracy: 0.9844
Epoch 313/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0705
- accuracy: 0.9848
Epoch 314/500
12534/12534 [=====] - 1s 100us/sample - loss: 0.0706
- accuracy: 0.9848
Epoch 315/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0696
```

```
- accuracy: 0.9846
Epoch 316/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0698
- accuracy: 0.9842
Epoch 317/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0720
- accuracy: 0.9847
Epoch 318/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0707
- accuracy: 0.9844
Epoch 319/500
12534/12534 [=====] - 1s 95us/sample - loss: 0.0689
- accuracy: 0.9849
Epoch 320/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.0692
- accuracy: 0.9850
Epoch 321/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0690
- accuracy: 0.9849
Epoch 322/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0681
- accuracy: 0.9863
Epoch 323/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0691
- accuracy: 0.9849
```

```
Epoch 324/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0693
- accuracy: 0.9852
Epoch 325/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0679
- accuracy: 0.9852
Epoch 326/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0704
- accuracy: 0.9843
Epoch 327/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0685
- accuracy: 0.9847
Epoch 328/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0680
- accuracy: 0.9865
Epoch 329/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0689
- accuracy: 0.9845
Epoch 330/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.0660
- accuracy: 0.9874
Epoch 331/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0675
- accuracy: 0.9852
Epoch 332/500
```

```
12534/12534 [=====] - 1s 82us/sample - loss: 0.0664
- accuracy: 0.9875
Epoch 333/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0671
- accuracy: 0.9862
Epoch 334/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0674
- accuracy: 0.9864
Epoch 335/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0679
- accuracy: 0.9848
Epoch 336/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0655
- accuracy: 0.9872
Epoch 337/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0657
- accuracy: 0.9876
Epoch 338/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0656
- accuracy: 0.9859
Epoch 339/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0659
- accuracy: 0.9861
Epoch 340/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0682
```

```
- accuracy: 0.9856
Epoch 341/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0652
- accuracy: 0.9861
Epoch 342/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0652
- accuracy: 0.9873
Epoch 343/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0667
- accuracy: 0.9856
Epoch 344/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0673
- accuracy: 0.9855
Epoch 345/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0642
- accuracy: 0.9863
Epoch 346/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0651
- accuracy: 0.9856
Epoch 347/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0655
- accuracy: 0.9856
Epoch 348/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0642
- accuracy: 0.9867
```



```
Epoch 349/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0660
- accuracy: 0.9851
Epoch 350/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0647
- accuracy: 0.9865
Epoch 351/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0635
- accuracy: 0.9879
Epoch 352/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0640
- accuracy: 0.9864
Epoch 353/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0646
- accuracy: 0.9855
Epoch 354/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0637
- accuracy: 0.9865
Epoch 355/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0635
- accuracy: 0.9877
Epoch 356/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0633
- accuracy: 0.9872
Epoch 357/500
```

```
12534/12534 [=====] - 1s 90us/sample - loss: 0.0622
- accuracy: 0.9864
Epoch 358/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0629
- accuracy: 0.9868
Epoch 359/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0627
- accuracy: 0.9867
Epoch 360/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0626
- accuracy: 0.9866
Epoch 361/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0649
- accuracy: 0.9863
Epoch 362/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0625
- accuracy: 0.9868
Epoch 363/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0619
- accuracy: 0.9877
Epoch 364/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0641
- accuracy: 0.9866
Epoch 365/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0621
```

```
- accuracy: 0.9877
Epoch 366/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0617
- accuracy: 0.9868
Epoch 367/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0605
- accuracy: 0.9879
Epoch 368/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0602
- accuracy: 0.9879
Epoch 369/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0617
- accuracy: 0.9873
Epoch 370/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0608
- accuracy: 0.9877
Epoch 371/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0614
- accuracy: 0.9880
Epoch 372/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0603
- accuracy: 0.9879
Epoch 373/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0610
- accuracy: 0.9879
```

```
Epoch 374/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0606
- accuracy: 0.9880
Epoch 375/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0612
- accuracy: 0.9874
Epoch 376/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0606
- accuracy: 0.9876
Epoch 377/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0595
- accuracy: 0.9888
Epoch 378/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0595
- accuracy: 0.9888
Epoch 379/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0602
- accuracy: 0.9874
Epoch 380/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0598
- accuracy: 0.9876
Epoch 381/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0597
- accuracy: 0.9878
Epoch 382/500
```

```
12534/12534 [=====] - 1s 79us/sample - loss: 0.0598
- accuracy: 0.9875
Epoch 383/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0599
- accuracy: 0.9879
Epoch 384/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0595
- accuracy: 0.9879
Epoch 385/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0597
- accuracy: 0.9875
Epoch 386/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0610
- accuracy: 0.9876
Epoch 387/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0586
- accuracy: 0.9888
Epoch 388/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0580
- accuracy: 0.9876
Epoch 389/500
12534/12534 [=====] - 1s 91us/sample - loss: 0.0600
- accuracy: 0.9876
Epoch 390/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0587
```

```
- accuracy: 0.9885
Epoch 391/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0595
- accuracy: 0.9876
Epoch 392/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0599
- accuracy: 0.9878
Epoch 393/500
12534/12534 [=====] - 1s 79us/sample - loss: 0.0590
- accuracy: 0.9888
Epoch 394/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0595
- accuracy: 0.9872
Epoch 395/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.0585
- accuracy: 0.9887
Epoch 396/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0595
- accuracy: 0.9873
Epoch 397/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0578
- accuracy: 0.9891
Epoch 398/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0587
- accuracy: 0.9888
```

```
Epoch 399/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0603
- accuracy: 0.9873
Epoch 400/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0568
- accuracy: 0.9884
Epoch 401/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0588
- accuracy: 0.9876
Epoch 402/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0569
- accuracy: 0.9888
Epoch 403/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0578
- accuracy: 0.9888
Epoch 404/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0569
- accuracy: 0.9882
Epoch 405/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0566
- accuracy: 0.9888
Epoch 406/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0569
- accuracy: 0.9879
Epoch 407/500
```

```
12534/12534 [=====] - 1s 88us/sample - loss: 0.0571
- accuracy: 0.9897
Epoch 408/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0563
- accuracy: 0.9883
Epoch 409/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0579
- accuracy: 0.9879
Epoch 410/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0557
- accuracy: 0.9891
Epoch 411/500
12534/12534 [=====] - 1s 94us/sample - loss: 0.0558
- accuracy: 0.9896
Epoch 412/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0568
- accuracy: 0.9882
Epoch 413/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0566
- accuracy: 0.9888
Epoch 414/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0559
- accuracy: 0.9891
Epoch 415/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0559
```



```
- accuracy: 0.9891
Epoch 416/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0569
- accuracy: 0.9886
Epoch 417/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0555
- accuracy: 0.9893
Epoch 418/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0565
- accuracy: 0.9882
Epoch 419/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0546
- accuracy: 0.9902
Epoch 420/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0548
- accuracy: 0.9895
Epoch 421/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0556
- accuracy: 0.9899
Epoch 422/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0564
- accuracy: 0.9888
Epoch 423/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0547
- accuracy: 0.9894
```

```
Epoch 424/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0560
- accuracy: 0.9895
Epoch 425/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0552
- accuracy: 0.9883
Epoch 426/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0563
- accuracy: 0.9887
Epoch 427/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0549
- accuracy: 0.9890
Epoch 428/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0539
- accuracy: 0.9891
Epoch 429/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0546
- accuracy: 0.9892
Epoch 430/500
12534/12534 [=====] - 1s 101us/sample - loss: 0.0551
- accuracy: 0.9895
Epoch 431/500
12534/12534 [=====] - 1s 98us/sample - loss: 0.0538
- accuracy: 0.9905
Epoch 432/500
```

```
12534/12534 [=====] - 1s 105us/sample - loss: 0.0544
- accuracy: 0.9897
Epoch 433/500
12534/12534 [=====] - 1s 101us/sample - loss: 0.0533
- accuracy: 0.9900
Epoch 434/500
12534/12534 [=====] - 1s 104us/sample - loss: 0.0534
- accuracy: 0.9889
Epoch 435/500
12534/12534 [=====] - 1s 91us/sample - loss: 0.0545
- accuracy: 0.9898
Epoch 436/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0522
- accuracy: 0.9901
Epoch 437/500
12534/12534 [=====] - 1s 96us/sample - loss: 0.0556
- accuracy: 0.9880
Epoch 438/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0538
- accuracy: 0.9901
Epoch 439/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0536
- accuracy: 0.9891
Epoch 440/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0538
```

```
- accuracy: 0.9885
Epoch 441/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0538
- accuracy: 0.9897
Epoch 442/500
12534/12534 [=====] - 1s 109us/sample - loss: 0.0528
- accuracy: 0.9895
Epoch 443/500
12534/12534 [=====] - 1s 103us/sample - loss: 0.0537
- accuracy: 0.9890
Epoch 444/500
12534/12534 [=====] - 1s 90us/sample - loss: 0.0526
- accuracy: 0.9896
Epoch 445/500
12534/12534 [=====] - 1s 103us/sample - loss: 0.0523
- accuracy: 0.9890
Epoch 446/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0518
- accuracy: 0.9911
Epoch 447/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0529
- accuracy: 0.9901
Epoch 448/500
12534/12534 [=====] - 1s 97us/sample - loss: 0.0524
- accuracy: 0.9911
```

```
Epoch 449/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0539
- accuracy: 0.9891
Epoch 450/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0531
- accuracy: 0.9891
Epoch 451/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0518
- accuracy: 0.9903
Epoch 452/500
12534/12534 [=====] - 2s 121us/sample - loss: 0.0520
- accuracy: 0.9895
Epoch 453/500
12534/12534 [=====] - 1s 101us/sample - loss: 0.0521
- accuracy: 0.9898
Epoch 454/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0530
- accuracy: 0.9897
Epoch 455/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0522
- accuracy: 0.9891
Epoch 456/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0513
- accuracy: 0.9907
Epoch 457/500
```

```
12534/12534 [=====] - 1s 88us/sample - loss: 0.0529
- accuracy: 0.9887
Epoch 458/500
12534/12534 [=====] - 1s 94us/sample - loss: 0.0520
- accuracy: 0.9896
Epoch 459/500
12534/12534 [=====] - 1s 80us/sample - loss: 0.0503
- accuracy: 0.9905
Epoch 460/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0535
- accuracy: 0.9884
Epoch 461/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0523
- accuracy: 0.9903
Epoch 462/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0523
- accuracy: 0.9895
Epoch 463/500
12534/12534 [=====] - 1s 98us/sample - loss: 0.0509
- accuracy: 0.9907
Epoch 464/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0520
- accuracy: 0.9898
Epoch 465/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0515
```

```
- accuracy: 0.9905
Epoch 466/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0508
- accuracy: 0.9907
Epoch 467/500
12534/12534 [=====] - 1s 92us/sample - loss: 0.0508
- accuracy: 0.9901
Epoch 468/500
12534/12534 [=====] - 1s 101us/sample - loss: 0.0516
- accuracy: 0.9902
Epoch 469/500
12534/12534 [=====] - 1s 101us/sample - loss: 0.0512
- accuracy: 0.9907
Epoch 470/500
12534/12534 [=====] - 1s 95us/sample - loss: 0.0515
- accuracy: 0.9899
Epoch 471/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0499
- accuracy: 0.9912
Epoch 472/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0505
- accuracy: 0.9902
Epoch 473/500
12534/12534 [=====] - 1s 103us/sample - loss: 0.0507
- accuracy: 0.9903
```

```
Epoch 474/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0508
- accuracy: 0.9896
Epoch 475/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0508
- accuracy: 0.9901
Epoch 476/500
12534/12534 [=====] - 1s 89us/sample - loss: 0.0500
- accuracy: 0.9903
Epoch 477/500
12534/12534 [=====] - 1s 81us/sample - loss: 0.0494
- accuracy: 0.9911
Epoch 478/500
12534/12534 [=====] - 1s 101us/sample - loss: 0.0506
- accuracy: 0.9903
Epoch 479/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0499
- accuracy: 0.9907
Epoch 480/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0498
- accuracy: 0.9907
Epoch 481/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0487
- accuracy: 0.9910
Epoch 482/500
```



```
12534/12534 [=====] - 1s 87us/sample - loss: 0.0496
- accuracy: 0.9901
Epoch 483/500
12534/12534 [=====] - 1s 103us/sample - loss: 0.0494
- accuracy: 0.9908
Epoch 484/500
12534/12534 [=====] - 1s 93us/sample - loss: 0.0498
- accuracy: 0.9908
Epoch 485/500
12534/12534 [=====] - 1s 86us/sample - loss: 0.0496
- accuracy: 0.9907
Epoch 486/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0493
- accuracy: 0.9908
Epoch 487/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0488
- accuracy: 0.9910
Epoch 488/500
12534/12534 [=====] - 1s 88us/sample - loss: 0.0480
- accuracy: 0.9915
Epoch 489/500
12534/12534 [=====] - 1s 95us/sample - loss: 0.0486
- accuracy: 0.9911
Epoch 490/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0486
```

```
- accuracy: 0.9915
Epoch 491/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0492
- accuracy: 0.9903
Epoch 492/500
12534/12534 [=====] - 1s 82us/sample - loss: 0.0487
- accuracy: 0.9911
Epoch 493/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0488
- accuracy: 0.9905
Epoch 494/500
12534/12534 [=====] - 1s 109us/sample - loss: 0.0489
- accuracy: 0.9903
Epoch 495/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0473
- accuracy: 0.9912
Epoch 496/500
12534/12534 [=====] - 1s 84us/sample - loss: 0.0486
- accuracy: 0.9905
Epoch 497/500
12534/12534 [=====] - 1s 87us/sample - loss: 0.0489
- accuracy: 0.9909
Epoch 498/500
12534/12534 [=====] - 1s 83us/sample - loss: 0.0477
- accuracy: 0.9909
```

```
Epoch 499/500
12534/12534 [=====] - 1s 112us/sample - loss: 0.0478
- accuracy: 0.9921
Epoch 500/500
12534/12534 [=====] - 1s 85us/sample - loss: 0.0492
- accuracy: 0.9900
2887/2887 [=====] - 0s 57us/sample

class_weight_Fold_3: {0: 0.4371436044990845, 1: 7.061408450704225}
```

```
pos_weight: 0.6
thresholdNum: 0.5
```

```
Average of train loss Fold_3: 0.1232
Average of yPredProbability Fold_3: 0.2334
```

```
classification_report_Fold_3:
      precision    recall  f1-score   support

 Normal 0      0.99      0.79      0.88      2871
 Anomaly 1      0.00      0.19      0.01       16
```

accuracy		0.79	2887
macro avg	0.50	0.49	2887
weighted avg	0.99	0.79	2887

confusion\_matrix\_Fold\_3:

True Negatives: 2271

False Positives: 600

False Negatives: 13

True Positives: 3

End running time Fold\_3: 210506\_224155 ,-----.

Start running time Fold\_4: 210506\_224155 ,-----:

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 With DTW Approach\_Fold\_4: 210506\_224155  
,+++++

Data Augmentation MSE	Label 1==> mean: 0.016206,	min: 0.0,	max: 0.094345
Data Augmentation MSE	Label 1==> mean: 0.023009,	min: 0.0,	max: 0.152942
Data Augmentation MSE	Label 1==> mean: 0.019023,	min: 0.0,	max: 0.150447
Data Augmentation MSE	Label 1==> mean: 0.022848,	min: 0.0,	max: 0.360639
Data Augmentation MSE	Label 1==> mean: 0.018455,	min: 0.0,	max: 0.135141
Data Augmentation MSE	Label 1==> mean: 0.019473,	min: 0.0,	max: 0.261721
Data Augmentation MSE	Label 1==> mean: 0.018669,	min: 0.0,	max: 0.115957
Data Augmentation MSE	Label 1==> mean: 0.020062,	min: 0.0,	max: 0.109226
Data Augmentation MSE	Label 1==> mean: 0.020606,	min: 0.0,	max: 0.112856
Data Augmentation MSE	Label 1==> mean: 0.019064,	min: 0.0,	max: 0.137378
Data Augmentation MSE	Label 1==> mean: 0.017025,	min: 0.0,	max: 0.105189
Data Augmentation MSE	Label 1==> mean: 0.018775,	min: 0.0,	max: 0.165847
Data Augmentation MSE	Label 1==> mean: 0.017976,	min: 0.0,	max: 0.116014

Data Augmentation MSE Label 1==> mean: 0.021225, min: 0.0, max: 0.158282

Generated this amount: 896 ,Synthetic data With DTW Approach\_Fold\_4

MSE All generated Augmented data Fold\_4:

mean: 0.019458

min: 0.0

max: 0.155428

End running time Data Augmentation With DTW Approach\_Fold\_4: 210506\_224156  
,+++++

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	[=====]	- 1s 116us/sample	- loss: 3.3064
- accuracy:	0.9208			
Epoch 2/500	12443/12443	[=====]	- 1s 111us/sample	- loss: 1.7589
- accuracy:	0.9243			
Epoch 3/500	12443/12443	[=====]	- 1s 85us/sample	- loss: 0.9688
- accuracy:	0.9252			
Epoch 4/500	12443/12443	[=====]	- 1s 83us/sample	- loss: 0.5891
- accuracy:	0.9259			
Epoch 5/500	12443/12443	[=====]	- 1s 83us/sample	- loss: 0.4110
- accuracy:	0.9265			
Epoch 6/500	12443/12443	[=====]	- 1s 82us/sample	- loss: 0.3267
- accuracy:	0.9269			
Epoch 7/500	12443/12443	[=====]	- 1s 95us/sample	- loss: 0.2863
- accuracy:	0.9264			

```
Epoch 8/500
12443/12443 [=====] - 1s 89us/sample - loss: 0.2661
- accuracy: 0.9266
Epoch 9/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.2557
- accuracy: 0.9269
Epoch 10/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.2506
- accuracy: 0.9265
Epoch 11/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.2468
- accuracy: 0.9274
Epoch 12/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.2441
- accuracy: 0.9273
Epoch 13/500
12443/12443 [=====] - 1s 99us/sample - loss: 0.2425
- accuracy: 0.9273
Epoch 14/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.2411
- accuracy: 0.9284
Epoch 15/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.2404
- accuracy: 0.9278
Epoch 16/500
```



```
12443/12443 [=====] - 1s 83us/sample - loss: 0.2380
- accuracy: 0.9282
Epoch 17/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.2379
- accuracy: 0.9278
Epoch 18/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.2372
- accuracy: 0.9287
Epoch 19/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.2362
- accuracy: 0.9279
Epoch 20/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.2349
- accuracy: 0.9284
Epoch 21/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.2336
- accuracy: 0.9277
Epoch 22/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.2334
- accuracy: 0.9286
Epoch 23/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.2318
- accuracy: 0.9283
Epoch 24/500
12443/12443 [=====] - 1s 94us/sample - loss: 0.2311
```

```
- accuracy: 0.9286
Epoch 25/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.2303
- accuracy: 0.9293
Epoch 26/500
12443/12443 [=====] - 1s 89us/sample - loss: 0.2284
- accuracy: 0.9291
Epoch 27/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.2273
- accuracy: 0.9291
Epoch 28/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.2270
- accuracy: 0.9286
Epoch 29/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.2253
- accuracy: 0.9294
Epoch 30/500
12443/12443 [=====] - 1s 81us/sample - loss: 0.2250
- accuracy: 0.9297
Epoch 31/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.2228
- accuracy: 0.9296
Epoch 32/500
12443/12443 [=====] - 1s 81us/sample - loss: 0.2220
- accuracy: 0.9302
```

```
Epoch 33/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.2217
- accuracy: 0.9290
Epoch 34/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.2192
- accuracy: 0.9301
Epoch 35/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.2173
- accuracy: 0.9310
Epoch 36/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.2164
- accuracy: 0.9302
Epoch 37/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.2156
- accuracy: 0.9312
Epoch 38/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.2136
- accuracy: 0.9310
Epoch 39/500
12443/12443 [=====] - 1s 98us/sample - loss: 0.2125
- accuracy: 0.9314
Epoch 40/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.2117
- accuracy: 0.9314
Epoch 41/500
```

```
12443/12443 [=====] - 1s 110us/sample - loss: 0.2110
- accuracy: 0.9319
Epoch 42/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.2100
- accuracy: 0.9315
Epoch 43/500
12443/12443 [=====] - 1s 113us/sample - loss: 0.2085
- accuracy: 0.9318
Epoch 44/500
12443/12443 [=====] - 1s 98us/sample - loss: 0.2069
- accuracy: 0.9325
Epoch 45/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.2071
- accuracy: 0.9322
Epoch 46/500
12443/12443 [=====] - 1s 98us/sample - loss: 0.2049
- accuracy: 0.9330
Epoch 47/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.2031
- accuracy: 0.9338
Epoch 48/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.2028
- accuracy: 0.9331
Epoch 49/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.2013
```

```
- accuracy: 0.9346
Epoch 50/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.2002
- accuracy: 0.9335
Epoch 51/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.1990
- accuracy: 0.9353
Epoch 52/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.1981
- accuracy: 0.9344
Epoch 53/500
12443/12443 [=====] - 1s 98us/sample - loss: 0.1961
- accuracy: 0.9358
Epoch 54/500
12443/12443 [=====] - 1s 89us/sample - loss: 0.1959
- accuracy: 0.9369
Epoch 55/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.1960
- accuracy: 0.9360
Epoch 56/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.1934
- accuracy: 0.9376
Epoch 57/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.1925
- accuracy: 0.9378
```

```
Epoch 58/500
12443/12443 [=====] - 1s 92us/sample - loss: 0.1909
- accuracy: 0.9380
Epoch 59/500
12443/12443 [=====] - 1s 98us/sample - loss: 0.1918
- accuracy: 0.9379
Epoch 60/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.1896
- accuracy: 0.9389
Epoch 61/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.1891
- accuracy: 0.9388
Epoch 62/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.1873
- accuracy: 0.9404
Epoch 63/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.1864
- accuracy: 0.9399
Epoch 64/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.1850
- accuracy: 0.9413
Epoch 65/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.1856
- accuracy: 0.9392
Epoch 66/500
```

```
12443/12443 [=====] - 1s 117us/sample - loss: 0.1842
- accuracy: 0.9402
Epoch 67/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.1820
- accuracy: 0.9408
Epoch 68/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.1812
- accuracy: 0.9416
Epoch 69/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.1806
- accuracy: 0.9422
Epoch 70/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.1807
- accuracy: 0.9409
Epoch 71/500
12443/12443 [=====] - 1s 118us/sample - loss: 0.1773
- accuracy: 0.9436
Epoch 72/500
12443/12443 [=====] - 2s 121us/sample - loss: 0.1790
- accuracy: 0.9418
Epoch 73/500
12443/12443 [=====] - 2s 138us/sample - loss: 0.1752
- accuracy: 0.9432
Epoch 74/500
12443/12443 [=====] - 2s 133us/sample - loss: 0.1751
```

```
- accuracy: 0.9445
Epoch 75/500
12443/12443 [=====] - 2s 122us/sample - loss: 0.1741
- accuracy: 0.9439
Epoch 76/500
12443/12443 [=====] - 2s 170us/sample - loss: 0.1732
- accuracy: 0.9457
Epoch 77/500
12443/12443 [=====] - 2s 131us/sample - loss: 0.1721
- accuracy: 0.9435
Epoch 78/500
12443/12443 [=====] - 1s 113us/sample - loss: 0.1703
- accuracy: 0.9462
Epoch 79/500
12443/12443 [=====] - 2s 136us/sample - loss: 0.1708
- accuracy: 0.9456
Epoch 80/500
12443/12443 [=====] - 2s 133us/sample - loss: 0.1699
- accuracy: 0.9451
Epoch 81/500
12443/12443 [=====] - 1s 109us/sample - loss: 0.1683
- accuracy: 0.9458
Epoch 82/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1671
- accuracy: 0.9463
```



```
Epoch 83/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.1658
- accuracy: 0.9468
Epoch 84/500
12443/12443 [=====] - 2s 124us/sample - loss: 0.1651
- accuracy: 0.9475
Epoch 85/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.1649
- accuracy: 0.9469
Epoch 86/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.1636
- accuracy: 0.9466
Epoch 87/500
12443/12443 [=====] - 2s 121us/sample - loss: 0.1628
- accuracy: 0.9487
Epoch 88/500
12443/12443 [=====] - 2s 126us/sample - loss: 0.1614
- accuracy: 0.9494
Epoch 89/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.1604
- accuracy: 0.9500
Epoch 90/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.1609
- accuracy: 0.9495
Epoch 91/500
```

```
12443/12443 [=====] - 2s 130us/sample - loss: 0.1575
- accuracy: 0.9500
Epoch 92/500
12443/12443 [=====] - 2s 129us/sample - loss: 0.1577
- accuracy: 0.9504
Epoch 93/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.1571
- accuracy: 0.9508
Epoch 94/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.1563
- accuracy: 0.9510
Epoch 95/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.1556
- accuracy: 0.9508
Epoch 96/500
12443/12443 [=====] - 1s 117us/sample - loss: 0.1538
- accuracy: 0.9515
Epoch 97/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.1535
- accuracy: 0.9532
Epoch 98/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1532
- accuracy: 0.9526
Epoch 99/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.1518
```

```
- accuracy: 0.9531
Epoch 100/500
12443/12443 [=====] - 2s 122us/sample - loss: 0.1510
- accuracy: 0.9526
Epoch 101/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.1518
- accuracy: 0.9530
Epoch 102/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.1497
- accuracy: 0.9530
Epoch 103/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.1488
- accuracy: 0.9534
Epoch 104/500
12443/12443 [=====] - 1s 116us/sample - loss: 0.1475
- accuracy: 0.9551
Epoch 105/500
12443/12443 [=====] - 2s 124us/sample - loss: 0.1456
- accuracy: 0.9556
Epoch 106/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.1461
- accuracy: 0.9564
Epoch 107/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.1444
- accuracy: 0.9552
```

```
Epoch 108/500
12443/12443 [=====] - 1s 113us/sample - loss: 0.1432
- accuracy: 0.9573
Epoch 109/500
12443/12443 [=====] - 1s 119us/sample - loss: 0.1452
- accuracy: 0.9562
Epoch 110/500
12443/12443 [=====] - 1s 116us/sample - loss: 0.1432
- accuracy: 0.9553
Epoch 111/500
12443/12443 [=====] - 1s 110us/sample - loss: 0.1421
- accuracy: 0.9566
Epoch 112/500
12443/12443 [=====] - 1s 113us/sample - loss: 0.1401
- accuracy: 0.9575
Epoch 113/500
12443/12443 [=====] - 2s 121us/sample - loss: 0.1406
- accuracy: 0.9586
Epoch 114/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1417
- accuracy: 0.9560
Epoch 115/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.1383
- accuracy: 0.9581
Epoch 116/500
```

```
12443/12443 [=====] - 1s 107us/sample - loss: 0.1384
- accuracy: 0.9593
Epoch 117/500
12443/12443 [=====] - 1s 109us/sample - loss: 0.1378
- accuracy: 0.9593
Epoch 118/500
12443/12443 [=====] - 1s 116us/sample - loss: 0.1362
- accuracy: 0.9603
Epoch 119/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.1353
- accuracy: 0.9597
Epoch 120/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.1346
- accuracy: 0.9610
Epoch 121/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.1354
- accuracy: 0.9601
Epoch 122/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.1333
- accuracy: 0.9602
Epoch 123/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.1340
- accuracy: 0.9608
Epoch 124/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.1318
```

```
- accuracy: 0.9618
Epoch 125/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.1311
- accuracy: 0.9632
Epoch 126/500
12443/12443 [=====] - 2s 127us/sample - loss: 0.1299
- accuracy: 0.9616
Epoch 127/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1295
- accuracy: 0.9621
Epoch 128/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.1305
- accuracy: 0.9619
Epoch 129/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.1287
- accuracy: 0.9634
Epoch 130/500
12443/12443 [=====] - 1s 116us/sample - loss: 0.1275
- accuracy: 0.9639
Epoch 131/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.1262
- accuracy: 0.9644
Epoch 132/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.1256
- accuracy: 0.9642
```

```
Epoch 133/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1251
- accuracy: 0.9651
Epoch 134/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.1239
- accuracy: 0.9632
Epoch 135/500
12443/12443 [=====] - 1s 119us/sample - loss: 0.1248
- accuracy: 0.9632
Epoch 136/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1221
- accuracy: 0.9665
Epoch 137/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.1219
- accuracy: 0.9658
Epoch 138/500
12443/12443 [=====] - 2s 126us/sample - loss: 0.1221
- accuracy: 0.9648
Epoch 139/500
12443/12443 [=====] - 1s 119us/sample - loss: 0.1199
- accuracy: 0.9675
Epoch 140/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1208
- accuracy: 0.9669
Epoch 141/500
```

```
12443/12443 [=====] - 1s 103us/sample - loss: 0.1194
- accuracy: 0.9670
Epoch 142/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.1188
- accuracy: 0.9676
Epoch 143/500
12443/12443 [=====] - 1s 117us/sample - loss: 0.1173
- accuracy: 0.9679
Epoch 144/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.1168
- accuracy: 0.9683
Epoch 145/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.1196
- accuracy: 0.9663
Epoch 146/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.1169
- accuracy: 0.9681
Epoch 147/500
12443/12443 [=====] - 1s 109us/sample - loss: 0.1157
- accuracy: 0.9688
Epoch 148/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.1163
- accuracy: 0.9693
Epoch 149/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.1157
```



```
- accuracy: 0.9690
Epoch 150/500
12443/12443 [=====] - 1s 110us/sample - loss: 0.1143
- accuracy: 0.9691
Epoch 151/500
12443/12443 [=====] - 1s 109us/sample - loss: 0.1122
- accuracy: 0.9695
Epoch 152/500
12443/12443 [=====] - 1s 117us/sample - loss: 0.1118
- accuracy: 0.9687
Epoch 153/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1141
- accuracy: 0.9683
Epoch 154/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.1115
- accuracy: 0.9703
Epoch 155/500
12443/12443 [=====] - 1s 110us/sample - loss: 0.1129
- accuracy: 0.9687
Epoch 156/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.1112
- accuracy: 0.9699
Epoch 157/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.1098
- accuracy: 0.9711
```

```
Epoch 158/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.1100
- accuracy: 0.9706
Epoch 159/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.1087
- accuracy: 0.9711
Epoch 160/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.1074
- accuracy: 0.9716
Epoch 161/500
12443/12443 [=====] - 1s 119us/sample - loss: 0.1062
- accuracy: 0.9726
Epoch 162/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.1066
- accuracy: 0.9717
Epoch 163/500
12443/12443 [=====] - 1s 120us/sample - loss: 0.1073
- accuracy: 0.9711
Epoch 164/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.1067
- accuracy: 0.9719
Epoch 165/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.1051
- accuracy: 0.9731
Epoch 166/500
```

```
12443/12443 [=====] - 1s 102us/sample - loss: 0.1054
- accuracy: 0.9720
Epoch 167/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1033
- accuracy: 0.9729
Epoch 168/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.1041
- accuracy: 0.9735
Epoch 169/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.1052
- accuracy: 0.9733
Epoch 170/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.1023
- accuracy: 0.9729
Epoch 171/500
12443/12443 [=====] - 1s 99us/sample - loss: 0.1021
- accuracy: 0.9738
Epoch 172/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.1011
- accuracy: 0.9742
Epoch 173/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.1013
- accuracy: 0.9732
Epoch 174/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.1038
```

```
- accuracy: 0.9722
Epoch 175/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.1007
- accuracy: 0.9740
Epoch 176/500
12443/12443 [=====] - 1s 116us/sample - loss: 0.1002
- accuracy: 0.9744
Epoch 177/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.0996
- accuracy: 0.9743
Epoch 178/500
12443/12443 [=====] - 1s 117us/sample - loss: 0.0992
- accuracy: 0.9746
Epoch 179/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.0989
- accuracy: 0.9733
Epoch 180/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.0985
- accuracy: 0.9746
Epoch 181/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.0972
- accuracy: 0.9753
Epoch 182/500
12443/12443 [=====] - 1s 113us/sample - loss: 0.0964
- accuracy: 0.9757
```

```
Epoch 183/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0974
- accuracy: 0.9761
Epoch 184/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.0976
- accuracy: 0.9749
Epoch 185/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.0967
- accuracy: 0.9754
Epoch 186/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.0971
- accuracy: 0.9762
Epoch 187/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.0947
- accuracy: 0.9773
Epoch 188/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0977
- accuracy: 0.9748
Epoch 189/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.0954
- accuracy: 0.9764
Epoch 190/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.0945
- accuracy: 0.9754
Epoch 191/500
```

```
12443/12443 [=====] - 1s 120us/sample - loss: 0.0936
- accuracy: 0.9765
Epoch 192/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.0921
- accuracy: 0.9783
Epoch 193/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.0927
- accuracy: 0.9772
Epoch 194/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.0929
- accuracy: 0.9778
Epoch 195/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.0925
- accuracy: 0.9773
Epoch 196/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.0930
- accuracy: 0.9766
Epoch 197/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.0925
- accuracy: 0.9765
Epoch 198/500
12443/12443 [=====] - 1s 110us/sample - loss: 0.0913
- accuracy: 0.9766
Epoch 199/500
12443/12443 [=====] - 1s 99us/sample - loss: 0.0902
```

```
- accuracy: 0.9778
Epoch 200/500
12443/12443 [=====] - 1s 113us/sample - loss: 0.0915
- accuracy: 0.9768
Epoch 201/500
12443/12443 [=====] - 1s 119us/sample - loss: 0.0891
- accuracy: 0.9774
Epoch 202/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.0889
- accuracy: 0.9783
Epoch 203/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.0882
- accuracy: 0.9788
Epoch 204/500
12443/12443 [=====] - 1s 119us/sample - loss: 0.0910
- accuracy: 0.9765
Epoch 205/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0882
- accuracy: 0.9788
Epoch 206/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.0890
- accuracy: 0.9785
Epoch 207/500
12443/12443 [=====] - 1s 109us/sample - loss: 0.0874
- accuracy: 0.9787
```

```
Epoch 208/500
12443/12443 [=====] - 1s 114us/sample - loss: 0.0881
- accuracy: 0.9782
Epoch 209/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0882
- accuracy: 0.9789
Epoch 210/500
12443/12443 [=====] - 1s 110us/sample - loss: 0.0870
- accuracy: 0.9789
Epoch 211/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.0871
- accuracy: 0.9801
Epoch 212/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0879
- accuracy: 0.9786
Epoch 213/500
12443/12443 [=====] - 1s 118us/sample - loss: 0.0850
- accuracy: 0.9798
Epoch 214/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.0873
- accuracy: 0.9796
Epoch 215/500
12443/12443 [=====] - 1s 113us/sample - loss: 0.0846
- accuracy: 0.9790
Epoch 216/500
```



```
12443/12443 [=====] - 1s 107us/sample - loss: 0.0853
- accuracy: 0.9784
Epoch 217/500
12443/12443 [=====] - 1s 116us/sample - loss: 0.0844
- accuracy: 0.9799
Epoch 218/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.0854
- accuracy: 0.9789
Epoch 219/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0842
- accuracy: 0.9804
Epoch 220/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.0845
- accuracy: 0.9810
Epoch 221/500
12443/12443 [=====] - 1s 118us/sample - loss: 0.0837
- accuracy: 0.9795
Epoch 222/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.0840
- accuracy: 0.9793
Epoch 223/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0824
- accuracy: 0.9806
Epoch 224/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.0830
```

```
- accuracy: 0.9801
Epoch 225/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.0817
- accuracy: 0.9803
Epoch 226/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.0825
- accuracy: 0.9807
Epoch 227/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.0816
- accuracy: 0.9808
Epoch 228/500
12443/12443 [=====] - 1s 109us/sample - loss: 0.0818
- accuracy: 0.9803
Epoch 229/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0820
- accuracy: 0.9801
Epoch 230/500
12443/12443 [=====] - 2s 122us/sample - loss: 0.0813
- accuracy: 0.9807
Epoch 231/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.0791
- accuracy: 0.9826
Epoch 232/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.0823
- accuracy: 0.9799
```

```
Epoch 233/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.0810
- accuracy: 0.9805
Epoch 234/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.0795
- accuracy: 0.9814
Epoch 235/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.0790
- accuracy: 0.9823
Epoch 236/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.0790
- accuracy: 0.9820
Epoch 237/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.0804
- accuracy: 0.9822
Epoch 238/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.0786
- accuracy: 0.9814
Epoch 239/500
12443/12443 [=====] - 2s 134us/sample - loss: 0.0781
- accuracy: 0.9817
Epoch 240/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0775
- accuracy: 0.9826
Epoch 241/500
```

```
12443/12443 [=====] - 1s 115us/sample - loss: 0.0774
- accuracy: 0.9826
Epoch 242/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.0799
- accuracy: 0.9811
Epoch 243/500
12443/12443 [=====] - 1s 117us/sample - loss: 0.0769
- accuracy: 0.9822
Epoch 244/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0767
- accuracy: 0.9822
Epoch 245/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.0775
- accuracy: 0.9810
Epoch 246/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.0756
- accuracy: 0.9823
Epoch 247/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.0761
- accuracy: 0.9822
Epoch 248/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.0762
- accuracy: 0.9819
Epoch 249/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0768
```

```
- accuracy: 0.9816
Epoch 250/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.0767
- accuracy: 0.9824
Epoch 251/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.0748
- accuracy: 0.9835
Epoch 252/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.0755
- accuracy: 0.9826
Epoch 253/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.0749
- accuracy: 0.9828
Epoch 254/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.0748
- accuracy: 0.9834
Epoch 255/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.0738
- accuracy: 0.9835
Epoch 256/500
12443/12443 [=====] - 2s 121us/sample - loss: 0.0758
- accuracy: 0.9819
Epoch 257/500
12443/12443 [=====] - 1s 120us/sample - loss: 0.0737
- accuracy: 0.9826
```

```
Epoch 258/500
12443/12443 [=====] - 2s 124us/sample - loss: 0.0760
- accuracy: 0.9826
Epoch 259/500
12443/12443 [=====] - 2s 122us/sample - loss: 0.0734
- accuracy: 0.9838
Epoch 260/500
12443/12443 [=====] - 1s 119us/sample - loss: 0.0727
- accuracy: 0.9846
Epoch 261/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.0724
- accuracy: 0.9838
Epoch 262/500
12443/12443 [=====] - 2s 131us/sample - loss: 0.0744
- accuracy: 0.9826
Epoch 263/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.0720
- accuracy: 0.9836
Epoch 264/500
12443/12443 [=====] - 1s 117us/sample - loss: 0.0722
- accuracy: 0.9830
Epoch 265/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.0723
- accuracy: 0.9847
Epoch 266/500
```

```
12443/12443 [=====] - 2s 126us/sample - loss: 0.0728
- accuracy: 0.9832
Epoch 267/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.0722
- accuracy: 0.9842
Epoch 268/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.0708
- accuracy: 0.9835
Epoch 269/500
12443/12443 [=====] - 1s 116us/sample - loss: 0.0709
- accuracy: 0.9838
Epoch 270/500
12443/12443 [=====] - 1s 112us/sample - loss: 0.0709
- accuracy: 0.9842
Epoch 271/500
12443/12443 [=====] - 1s 99us/sample - loss: 0.0710
- accuracy: 0.9844
Epoch 272/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.0719
- accuracy: 0.9838
Epoch 273/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.0705
- accuracy: 0.9846
Epoch 274/500
12443/12443 [=====] - 1s 98us/sample - loss: 0.0706
```

```
- accuracy: 0.9849
Epoch 275/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.0722
- accuracy: 0.9826
Epoch 276/500
12443/12443 [=====] - 1s 99us/sample - loss: 0.0695
- accuracy: 0.9850
Epoch 277/500
12443/12443 [=====] - 1s 119us/sample - loss: 0.0698
- accuracy: 0.9851
Epoch 278/500
12443/12443 [=====] - 2s 121us/sample - loss: 0.0686
- accuracy: 0.9851
Epoch 279/500
12443/12443 [=====] - 1s 109us/sample - loss: 0.0696
- accuracy: 0.9850
Epoch 280/500
12443/12443 [=====] - 2s 123us/sample - loss: 0.0710
- accuracy: 0.9830
Epoch 281/500
12443/12443 [=====] - 1s 108us/sample - loss: 0.0687
- accuracy: 0.9850
Epoch 282/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0681
- accuracy: 0.9851
```



```
Epoch 283/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0682
- accuracy: 0.9851
Epoch 284/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0683
- accuracy: 0.9847
Epoch 285/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0688
- accuracy: 0.9843
Epoch 286/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0671
- accuracy: 0.9854
Epoch 287/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0674
- accuracy: 0.9855
Epoch 288/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0675
- accuracy: 0.9862
Epoch 289/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0698
- accuracy: 0.9848
Epoch 290/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.0664
- accuracy: 0.9858
Epoch 291/500
```

```
12443/12443 [=====] - 1s 105us/sample - loss: 0.0660
- accuracy: 0.9855
Epoch 292/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.0672
- accuracy: 0.9847
Epoch 293/500
12443/12443 [=====] - 2s 128us/sample - loss: 0.0670
- accuracy: 0.9856
Epoch 294/500
12443/12443 [=====] - 2s 124us/sample - loss: 0.0670
- accuracy: 0.9845
Epoch 295/500
12443/12443 [=====] - 2s 133us/sample - loss: 0.0658
- accuracy: 0.9857
Epoch 296/500
12443/12443 [=====] - 2s 126us/sample - loss: 0.0665
- accuracy: 0.9860
Epoch 297/500
12443/12443 [=====] - 2s 136us/sample - loss: 0.0669
- accuracy: 0.9854
Epoch 298/500
12443/12443 [=====] - 2s 126us/sample - loss: 0.0664
- accuracy: 0.9856
Epoch 299/500
12443/12443 [=====] - 2s 137us/sample - loss: 0.0648
```

```
- accuracy: 0.9855
Epoch 300/500
12443/12443 [=====] - 1s 118us/sample - loss: 0.0653
- accuracy: 0.9864
Epoch 301/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0660
- accuracy: 0.9855
Epoch 302/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0668
- accuracy: 0.9850
Epoch 303/500
12443/12443 [=====] - 2s 129us/sample - loss: 0.0645
- accuracy: 0.9858
Epoch 304/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.0638
- accuracy: 0.9871
Epoch 305/500
12443/12443 [=====] - 1s 99us/sample - loss: 0.0654
- accuracy: 0.9858
Epoch 306/500
12443/12443 [=====] - 1s 102us/sample - loss: 0.0649
- accuracy: 0.9870
Epoch 307/500
12443/12443 [=====] - 2s 122us/sample - loss: 0.0640
- accuracy: 0.9859
```

```
Epoch 308/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0649
- accuracy: 0.9861
Epoch 309/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0644
- accuracy: 0.9863
Epoch 310/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0637
- accuracy: 0.9864
Epoch 311/500
12443/12443 [=====] - 1s 92us/sample - loss: 0.0641
- accuracy: 0.9868
Epoch 312/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0625
- accuracy: 0.9868
Epoch 313/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.0650
- accuracy: 0.9850
Epoch 314/500
12443/12443 [=====] - 1s 93us/sample - loss: 0.0625
- accuracy: 0.9863
Epoch 315/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0654
- accuracy: 0.9848
Epoch 316/500
```

```
12443/12443 [=====] - 1s 85us/sample - loss: 0.0625
- accuracy: 0.9861
Epoch 317/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0635
- accuracy: 0.9871
Epoch 318/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0623
- accuracy: 0.9867
Epoch 319/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0623
- accuracy: 0.9863
Epoch 320/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0628
- accuracy: 0.9857
Epoch 321/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0618
- accuracy: 0.9872
Epoch 322/500
12443/12443 [=====] - 1s 98us/sample - loss: 0.0615
- accuracy: 0.9869
Epoch 323/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0623
- accuracy: 0.9871
Epoch 324/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0622
```

```
- accuracy: 0.9866
Epoch 325/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0619
- accuracy: 0.9865
Epoch 326/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0621
- accuracy: 0.9864
Epoch 327/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0611
- accuracy: 0.9875
Epoch 328/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0607
- accuracy: 0.9879
Epoch 329/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0602
- accuracy: 0.9876
Epoch 330/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0606
- accuracy: 0.9861
Epoch 331/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0604
- accuracy: 0.9878
Epoch 332/500
12443/12443 [=====] - 1s 89us/sample - loss: 0.0601
- accuracy: 0.9879
```

```
Epoch 333/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0621
- accuracy: 0.9861
Epoch 334/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0595
- accuracy: 0.9876
Epoch 335/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0613
- accuracy: 0.9867
Epoch 336/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0610
- accuracy: 0.9867
Epoch 337/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.0612
- accuracy: 0.9867
Epoch 338/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0599
- accuracy: 0.9873
Epoch 339/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.0597
- accuracy: 0.9883
Epoch 340/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0596
- accuracy: 0.9871
Epoch 341/500
```

```
12443/12443 [=====] - 1s 83us/sample - loss: 0.0593
- accuracy: 0.9879
Epoch 342/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0592
- accuracy: 0.9879
Epoch 343/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0599
- accuracy: 0.9875
Epoch 344/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0580
- accuracy: 0.9883
Epoch 345/500
12443/12443 [=====] - 1s 92us/sample - loss: 0.0595
- accuracy: 0.9877
Epoch 346/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.0570
- accuracy: 0.9886
Epoch 347/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.0582
- accuracy: 0.9876
Epoch 348/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0589
- accuracy: 0.9872
Epoch 349/500
12443/12443 [=====] - 1s 89us/sample - loss: 0.0586
```



```
- accuracy: 0.9881
Epoch 350/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0585
- accuracy: 0.9872
Epoch 351/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0582
- accuracy: 0.9868
Epoch 352/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.0574
- accuracy: 0.9890
Epoch 353/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0573
- accuracy: 0.9880
Epoch 354/500
12443/12443 [=====] - 1s 94us/sample - loss: 0.0590
- accuracy: 0.9875
Epoch 355/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0572
- accuracy: 0.9885
Epoch 356/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0573
- accuracy: 0.9875
Epoch 357/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0578
- accuracy: 0.9885
```

```
Epoch 358/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0572
- accuracy: 0.9879
Epoch 359/500
12443/12443 [=====] - 1s 117us/sample - loss: 0.0566
- accuracy: 0.9872
Epoch 360/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0559
- accuracy: 0.9890
Epoch 361/500
12443/12443 [=====] - 1s 111us/sample - loss: 0.0556
- accuracy: 0.9892
Epoch 362/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0564
- accuracy: 0.9882
Epoch 363/500
12443/12443 [=====] - 1s 94us/sample - loss: 0.0561
- accuracy: 0.9889
Epoch 364/500
12443/12443 [=====] - 1s 99us/sample - loss: 0.0559
- accuracy: 0.9877
Epoch 365/500
12443/12443 [=====] - 2s 166us/sample - loss: 0.0576
- accuracy: 0.9884
Epoch 366/500
```

```
12443/12443 [=====] - 1s 101us/sample - loss: 0.0554
- accuracy: 0.9888
Epoch 367/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0559
- accuracy: 0.9884
Epoch 368/500
12443/12443 [=====] - 1s 99us/sample - loss: 0.0552
- accuracy: 0.9889
Epoch 369/500
12443/12443 [=====] - 2s 143us/sample - loss: 0.0547
- accuracy: 0.9896
Epoch 370/500
12443/12443 [=====] - 1s 110us/sample - loss: 0.0571
- accuracy: 0.9887
Epoch 371/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0568
- accuracy: 0.9884
Epoch 372/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.0558
- accuracy: 0.9883
Epoch 373/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0544
- accuracy: 0.9897
Epoch 374/500
12443/12443 [=====] - 1s 92us/sample - loss: 0.0542
```

```
- accuracy: 0.9905
Epoch 375/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0545
- accuracy: 0.9892
Epoch 376/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0552
- accuracy: 0.9883
Epoch 377/500
12443/12443 [=====] - 1s 98us/sample - loss: 0.0553
- accuracy: 0.9885
Epoch 378/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0536
- accuracy: 0.9896
Epoch 379/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0543
- accuracy: 0.9888
Epoch 380/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0547
- accuracy: 0.9890
Epoch 381/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0540
- accuracy: 0.9893
Epoch 382/500
12443/12443 [=====] - 1s 99us/sample - loss: 0.0530
- accuracy: 0.9905
```

```
Epoch 383/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.0542
- accuracy: 0.9887
Epoch 384/500
12443/12443 [=====] - 1s 94us/sample - loss: 0.0530
- accuracy: 0.9906
Epoch 385/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0537
- accuracy: 0.9884
Epoch 386/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0535
- accuracy: 0.9896
Epoch 387/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0539
- accuracy: 0.9885
Epoch 388/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.0530
- accuracy: 0.9895
Epoch 389/500
12443/12443 [=====] - 1s 93us/sample - loss: 0.0535
- accuracy: 0.9892
Epoch 390/500
12443/12443 [=====] - 1s 109us/sample - loss: 0.0533
- accuracy: 0.9898
Epoch 391/500
```

```
12443/12443 [=====] - 1s 94us/sample - loss: 0.0530
- accuracy: 0.9896
Epoch 392/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0525
- accuracy: 0.9898
Epoch 393/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0517
- accuracy: 0.9898
Epoch 394/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.0515
- accuracy: 0.9896
Epoch 395/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0533
- accuracy: 0.9892
Epoch 396/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0525
- accuracy: 0.9901
Epoch 397/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0527
- accuracy: 0.9900
Epoch 398/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0514
- accuracy: 0.9901
Epoch 399/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0525
```

```
- accuracy: 0.9906
Epoch 400/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.0526
- accuracy: 0.9896
Epoch 401/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0514
- accuracy: 0.9906
Epoch 402/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0533
- accuracy: 0.9894
Epoch 403/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0530
- accuracy: 0.9892
Epoch 404/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0527
- accuracy: 0.9895
Epoch 405/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.0515
- accuracy: 0.9902
Epoch 406/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.0503
- accuracy: 0.9898
Epoch 407/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0525
- accuracy: 0.9897
```

```
Epoch 408/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0514
- accuracy: 0.9897
Epoch 409/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.0513
- accuracy: 0.9896
Epoch 410/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0514
- accuracy: 0.9899
Epoch 411/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0512
- accuracy: 0.9903
Epoch 412/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.0501
- accuracy: 0.9904
Epoch 413/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0496
- accuracy: 0.9906
Epoch 414/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0510
- accuracy: 0.9902
Epoch 415/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0501
- accuracy: 0.9901
Epoch 416/500
```



```
12443/12443 [=====] - 1s 89us/sample - loss: 0.0518
- accuracy: 0.9893
Epoch 417/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.0494
- accuracy: 0.9908
Epoch 418/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.0498
- accuracy: 0.9904
Epoch 419/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.0502
- accuracy: 0.9899
Epoch 420/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0490
- accuracy: 0.9910
Epoch 421/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0491
- accuracy: 0.9919
Epoch 422/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0497
- accuracy: 0.9909
Epoch 423/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0493
- accuracy: 0.9908
Epoch 424/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.0494
```

```
- accuracy: 0.9902
Epoch 425/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0483
- accuracy: 0.9909
Epoch 426/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0492
- accuracy: 0.9907
Epoch 427/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0497
- accuracy: 0.9909
Epoch 428/500
12443/12443 [=====] - 1s 92us/sample - loss: 0.0493
- accuracy: 0.9895
Epoch 429/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0483
- accuracy: 0.9914
Epoch 430/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0485
- accuracy: 0.9914
Epoch 431/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0488
- accuracy: 0.9909
Epoch 432/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0480
- accuracy: 0.9914
```

```
Epoch 433/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0482
- accuracy: 0.9914
Epoch 434/500
12443/12443 [=====] - 1s 93us/sample - loss: 0.0482
- accuracy: 0.9912
Epoch 435/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0487
- accuracy: 0.9912
Epoch 436/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0485
- accuracy: 0.9904
Epoch 437/500
12443/12443 [=====] - 1s 82us/sample - loss: 0.0484
- accuracy: 0.9911
Epoch 438/500
12443/12443 [=====] - 1s 98us/sample - loss: 0.0478
- accuracy: 0.9909
Epoch 439/500
12443/12443 [=====] - 1s 92us/sample - loss: 0.0481
- accuracy: 0.9911
Epoch 440/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0470
- accuracy: 0.9907
Epoch 441/500
```

```
12443/12443 [=====] - 1s 88us/sample - loss: 0.0485
- accuracy: 0.9909
Epoch 442/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0474
- accuracy: 0.9917
Epoch 443/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0469
- accuracy: 0.9914
Epoch 444/500
12443/12443 [=====] - 1s 115us/sample - loss: 0.0476
- accuracy: 0.9916
Epoch 445/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0482
- accuracy: 0.9913
Epoch 446/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0474
- accuracy: 0.9914
Epoch 447/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0471
- accuracy: 0.9915
Epoch 448/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.0473
- accuracy: 0.9907
Epoch 449/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0480
```

```
- accuracy: 0.9906
Epoch 450/500
12443/12443 [=====] - 1s 92us/sample - loss: 0.0464
- accuracy: 0.9916
Epoch 451/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0470
- accuracy: 0.9911
Epoch 452/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0462
- accuracy: 0.9913
Epoch 453/500
12443/12443 [=====] - 1s 107us/sample - loss: 0.0462
- accuracy: 0.9912
Epoch 454/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0461
- accuracy: 0.9916
Epoch 455/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0461
- accuracy: 0.9916
Epoch 456/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0460
- accuracy: 0.9915
Epoch 457/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0463
- accuracy: 0.9914
```

```
Epoch 458/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0456
- accuracy: 0.9919
Epoch 459/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0455
- accuracy: 0.9923
Epoch 460/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0458
- accuracy: 0.9924
Epoch 461/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.0453
- accuracy: 0.9925
Epoch 462/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0468
- accuracy: 0.9904
Epoch 463/500
12443/12443 [=====] - 1s 104us/sample - loss: 0.0458
- accuracy: 0.9915
Epoch 464/500
12443/12443 [=====] - 1s 106us/sample - loss: 0.0462
- accuracy: 0.9912
Epoch 465/500
12443/12443 [=====] - 1s 87us/sample - loss: 0.0445
- accuracy: 0.9920
Epoch 466/500
```

```
12443/12443 [=====] - 1s 83us/sample - loss: 0.0443
- accuracy: 0.9924
Epoch 467/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0454
- accuracy: 0.9912
Epoch 468/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0456
- accuracy: 0.9917
Epoch 469/500
12443/12443 [=====] - 1s 91us/sample - loss: 0.0450
- accuracy: 0.9917
Epoch 470/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0444
- accuracy: 0.9922
Epoch 471/500
12443/12443 [=====] - 1s 88us/sample - loss: 0.0467
- accuracy: 0.9905
Epoch 472/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0446
- accuracy: 0.9915
Epoch 473/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0435
- accuracy: 0.9918
Epoch 474/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0445
```

```
- accuracy: 0.9921
Epoch 475/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0454
- accuracy: 0.9912
Epoch 476/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0445
- accuracy: 0.9916
Epoch 477/500
12443/12443 [=====] - 1s 86us/sample - loss: 0.0448
- accuracy: 0.9926
Epoch 478/500
12443/12443 [=====] - 2s 124us/sample - loss: 0.0443
- accuracy: 0.9922
Epoch 479/500
12443/12443 [=====] - 1s 103us/sample - loss: 0.0437
- accuracy: 0.9922
Epoch 480/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0442
- accuracy: 0.9920
Epoch 481/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0437
- accuracy: 0.9914
Epoch 482/500
12443/12443 [=====] - 1s 85us/sample - loss: 0.0450
- accuracy: 0.9912
```



```
Epoch 483/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0436
- accuracy: 0.9924
Epoch 484/500
12443/12443 [=====] - 1s 90us/sample - loss: 0.0432
- accuracy: 0.9924
Epoch 485/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0434
- accuracy: 0.9920
Epoch 486/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0437
- accuracy: 0.9928
Epoch 487/500
12443/12443 [=====] - 1s 94us/sample - loss: 0.0443
- accuracy: 0.9916
Epoch 488/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0437
- accuracy: 0.9919
Epoch 489/500
12443/12443 [=====] - 1s 101us/sample - loss: 0.0436
- accuracy: 0.9926
Epoch 490/500
12443/12443 [=====] - 1s 93us/sample - loss: 0.0451
- accuracy: 0.9917
Epoch 491/500
```

```
12443/12443 [=====] - 1s 88us/sample - loss: 0.0432
- accuracy: 0.9928
Epoch 492/500
12443/12443 [=====] - 1s 96us/sample - loss: 0.0431
- accuracy: 0.9924
Epoch 493/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0434
- accuracy: 0.9922
Epoch 494/500
12443/12443 [=====] - 1s 97us/sample - loss: 0.0426
- accuracy: 0.9924
Epoch 495/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0441
- accuracy: 0.9925
Epoch 496/500
12443/12443 [=====] - 1s 83us/sample - loss: 0.0425
- accuracy: 0.9928
Epoch 497/500
12443/12443 [=====] - 1s 95us/sample - loss: 0.0429
- accuracy: 0.9932
Epoch 498/500
12443/12443 [=====] - 1s 100us/sample - loss: 0.0422
- accuracy: 0.9929
Epoch 499/500
12443/12443 [=====] - 1s 105us/sample - loss: 0.0424
```

```
- accuracy: 0.9926
Epoch 500/500
12443/12443 [=====] - 1s 84us/sample - loss: 0.0435
- accuracy: 0.9920
2880/2880 [=====] - 0s 57us/sample

class_weight_Fold_4: {0: 0.4334407384829749, 1: 7.7768749999999995}

pos_weight: 0.6
thresholdNum: 0.5
```

Average of train loss Fold\_4: 0.1117  
Average of yPredProbability Fold\_4: 0.1308

classification_report_Fold_4:		precision	recall	f1-score	support
Normal	0	0.99	0.87	0.93	2857
Anomaly	1	0.02	0.26	0.03	23
accuracy				0.87	2880
macro avg		0.50	0.57	0.48	2880

weighted avg      0.99      0.87      0.92      2880

confusion\_matrix\_Fold\_4:

True Negatives: 2496

False Positives: 361

False Negatives: 17

True Positives: 6

End running time Fold\_4: 210506\_225226 ,-----.

Start running time Fold\_5: 210506\_225226 ,-----:

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 With DTW Approach\_Fold\_5: 210506\_225226  
,+++++

Data Augmentation MSE Label 1==> mean: 0.021732, min: 0.0, max: 0.154113

Data Augmentation	MSE	Label 1==>	mean: 0.023238,	min: 0.0,	max: 0.158794
Data Augmentation	MSE	Label 1==>	mean: 0.021218,	min: 0.0,	max: 0.139948
Data Augmentation	MSE	Label 1==>	mean: 0.024589,	min: 0.0,	max: 0.159341
Data Augmentation	MSE	Label 1==>	mean: 0.023778,	min: 0.0,	max: 0.159048
Data Augmentation	MSE	Label 1==>	mean: 0.021276,	min: 0.0,	max: 0.131425
Data Augmentation	MSE	Label 1==>	mean: 0.020976,	min: 0.0,	max: 0.240465
Data Augmentation	MSE	Label 1==>	mean: 0.019668,	min: 0.0,	max: 0.122788
Data Augmentation	MSE	Label 1==>	mean: 0.020308,	min: 0.0,	max: 0.105945
Data Augmentation	MSE	Label 1==>	mean: 0.025803,	min: 0.0,	max: 0.152382
Data Augmentation	MSE	Label 1==>	mean: 0.022852,	min: 0.0,	max: 0.154775
Data Augmentation	MSE	Label 1==>	mean: 0.022826,	min: 0.0,	max: 0.145171
Data Augmentation	MSE	Label 1==>	mean: 0.024796,	min: 0.0,	max: 0.1943
Data Augmentation	MSE	Label 1==>	mean: 0.024174,	min: 0.0,	max: 0.192679

Generated this amount: 1078 , Synthetic data With DTW Approach\_Fold\_5

MSE All generated Augmented data Fold\_5:

mean: 0.02266

min: 0.0

max: 0.157941

End running time Data Augmentation With DTW Approach\_Fold\_5: 210506\_225226  
,+++++

Shape of data after Transform ToOneRow to give Cross Validation Model in  
fold\_5:

xtrain: (12612, 118), ytrain: (12612,)

xvalid: (2893, 118), yvalid: (2893,)

Number of final label 0 in yXtrain\_Fold\_5: 11457

Number of final label 1 in yXtrain\_Before\_AddingAugedData\_Fold\_5: 77

Number of final label 1 in yXtrain\_After\_AddingAugedData\_Fold\_5: 1155

Train on 12612 samples

Epoch 1/500

12612/12612 [=====] - 2s 143us/sample - loss: 3.1854  
- accuracy: 0.9077

Epoch 2/500

12612/12612 [=====] - 1s 97us/sample - loss: 1.6007  
- accuracy: 0.9101

Epoch 3/500

12612/12612 [=====] - 1s 83us/sample - loss: 0.8581  
- accuracy: 0.9104

Epoch 4/500

12612/12612 [=====] - 1s 86us/sample - loss: 0.5298  
- accuracy: 0.9112

Epoch 5/500

12612/12612 [=====] - 1s 85us/sample - loss: 0.3901  
- accuracy: 0.9114

Epoch 6/500

12612/12612 [=====] - 1s 100us/sample - loss: 0.3310  
- accuracy: 0.9117

Epoch 7/500

12612/12612 [=====] - 1s 96us/sample - loss: 0.3059  
- accuracy: 0.9113

Epoch 8/500

12612/12612 [=====] - 1s 101us/sample - loss: 0.2929

```
- accuracy: 0.9118
Epoch 9/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.2870
- accuracy: 0.9114
Epoch 10/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.2837
- accuracy: 0.9118
Epoch 11/500
12612/12612 [=====] - 1s 104us/sample - loss: 0.2813
- accuracy: 0.9117
Epoch 12/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.2797
- accuracy: 0.9120
Epoch 13/500
12612/12612 [=====] - 1s 116us/sample - loss: 0.2783
- accuracy: 0.9119
Epoch 14/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.2772
- accuracy: 0.9124
Epoch 15/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.2758
- accuracy: 0.9121
Epoch 16/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.2750
- accuracy: 0.9125
```



```
Epoch 17/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2738
- accuracy: 0.9125
Epoch 18/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2729
- accuracy: 0.9129
Epoch 19/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.2731
- accuracy: 0.9121
Epoch 20/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.2726
- accuracy: 0.9130
Epoch 21/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.2712
- accuracy: 0.9131
Epoch 22/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2701
- accuracy: 0.9133
Epoch 23/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2695
- accuracy: 0.9134
Epoch 24/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2689
- accuracy: 0.9136
Epoch 25/500
```

```
12612/12612 [=====] - 1s 96us/sample - loss: 0.2680
- accuracy: 0.9130
Epoch 26/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.2675
- accuracy: 0.9138
Epoch 27/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2669
- accuracy: 0.9135
Epoch 28/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2664
- accuracy: 0.9145
Epoch 29/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2659
- accuracy: 0.9141
Epoch 30/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.2649
- accuracy: 0.9139
Epoch 31/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.2642
- accuracy: 0.9146
Epoch 32/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2639
- accuracy: 0.9138
Epoch 33/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2635
```

```
- accuracy: 0.9153
Epoch 34/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2629
- accuracy: 0.9142
Epoch 35/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.2626
- accuracy: 0.9148
Epoch 36/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.2615
- accuracy: 0.9154
Epoch 37/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.2606
- accuracy: 0.9156
Epoch 38/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2598
- accuracy: 0.9152
Epoch 39/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2588
- accuracy: 0.9153
Epoch 40/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.2583
- accuracy: 0.9157
Epoch 41/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.2578
- accuracy: 0.9152
```

```
Epoch 42/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2571
- accuracy: 0.9155
Epoch 43/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2556
- accuracy: 0.9165
Epoch 44/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2562
- accuracy: 0.9160
Epoch 45/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.2544
- accuracy: 0.9158
Epoch 46/500
12612/12612 [=====] - 1s 102us/sample - loss: 0.2534
- accuracy: 0.9160
Epoch 47/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.2530
- accuracy: 0.9165
Epoch 48/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2524
- accuracy: 0.9167
Epoch 49/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2516
- accuracy: 0.9172
Epoch 50/500
```

```
12612/12612 [=====] - 1s 86us/sample - loss: 0.2503
- accuracy: 0.9161
Epoch 51/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.2500
- accuracy: 0.9175
Epoch 52/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.2484
- accuracy: 0.9171
Epoch 53/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2475
- accuracy: 0.9177
Epoch 54/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2466
- accuracy: 0.9172
Epoch 55/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2461
- accuracy: 0.9175
Epoch 56/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.2466
- accuracy: 0.9168
Epoch 57/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.2445
- accuracy: 0.9184
Epoch 58/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2428
```

```
- accuracy: 0.9177
Epoch 59/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2425
- accuracy: 0.9186
Epoch 60/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.2416
- accuracy: 0.9188
Epoch 61/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.2402
- accuracy: 0.9187
Epoch 62/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.2393
- accuracy: 0.9189
Epoch 63/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2395
- accuracy: 0.9193
Epoch 64/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2382
- accuracy: 0.9185
Epoch 65/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2373
- accuracy: 0.9188
Epoch 66/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.2351
- accuracy: 0.9200
```

```
Epoch 67/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.2347
- accuracy: 0.9198
Epoch 68/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2339
- accuracy: 0.9210
Epoch 69/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.2333
- accuracy: 0.9211
Epoch 70/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.2315
- accuracy: 0.9217
Epoch 71/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.2304
- accuracy: 0.9221
Epoch 72/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.2301
- accuracy: 0.9210
Epoch 73/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2283
- accuracy: 0.9223
Epoch 74/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2271
- accuracy: 0.9216
Epoch 75/500
```

```
12612/12612 [=====] - 1s 84us/sample - loss: 0.2257
- accuracy: 0.9242
Epoch 76/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.2250
- accuracy: 0.9235
Epoch 77/500
12612/12612 [=====] - 1s 102us/sample - loss: 0.2238
- accuracy: 0.9244
Epoch 78/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2236
- accuracy: 0.9241
Epoch 79/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2214
- accuracy: 0.9240
Epoch 80/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2207
- accuracy: 0.9242
Epoch 81/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2199
- accuracy: 0.9240
Epoch 82/500
12612/12612 [=====] - 1s 104us/sample - loss: 0.2183
- accuracy: 0.9252
Epoch 83/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2171
```



```
- accuracy: 0.9260
Epoch 84/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2161
- accuracy: 0.9277
Epoch 85/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2149
- accuracy: 0.9274
Epoch 86/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.2136
- accuracy: 0.9269
Epoch 87/500
12612/12612 [=====] - 1s 102us/sample - loss: 0.2130
- accuracy: 0.9262
Epoch 88/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.2125
- accuracy: 0.9271
Epoch 89/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2093
- accuracy: 0.9274
Epoch 90/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.2089
- accuracy: 0.9291
Epoch 91/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2075
- accuracy: 0.9306
```

```
Epoch 92/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.2051
- accuracy: 0.9304
Epoch 93/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.2054
- accuracy: 0.9305
Epoch 94/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2045
- accuracy: 0.9305
Epoch 95/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.2023
- accuracy: 0.9311
Epoch 96/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.2012
- accuracy: 0.9332
Epoch 97/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.2001
- accuracy: 0.9330
Epoch 98/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.1984
- accuracy: 0.9325
Epoch 99/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1980
- accuracy: 0.9329
Epoch 100/500
```

```
12612/12612 [=====] - 1s 85us/sample - loss: 0.1969
- accuracy: 0.9345
Epoch 101/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1951
- accuracy: 0.9340
Epoch 102/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1943
- accuracy: 0.9343
Epoch 103/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1936
- accuracy: 0.9348
Epoch 104/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1912
- accuracy: 0.9367
Epoch 105/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.1889
- accuracy: 0.9378
Epoch 106/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.1889
- accuracy: 0.9373
Epoch 107/500
12612/12612 [=====] - 1s 109us/sample - loss: 0.1868
- accuracy: 0.9378
Epoch 108/500
12612/12612 [=====] - 1s 109us/sample - loss: 0.1887
```

```
- accuracy: 0.9375
Epoch 109/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1856
- accuracy: 0.9378
Epoch 110/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1839
- accuracy: 0.9381
Epoch 111/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1829
- accuracy: 0.9403
Epoch 112/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.1842
- accuracy: 0.9380
Epoch 113/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.1806
- accuracy: 0.9393
Epoch 114/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1809
- accuracy: 0.9403
Epoch 115/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1793
- accuracy: 0.9409
Epoch 116/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.1790
- accuracy: 0.9405
```

```
Epoch 117/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.1775
- accuracy: 0.9420
Epoch 118/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1761
- accuracy: 0.9432
Epoch 119/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.1748
- accuracy: 0.9439
Epoch 120/500
12612/12612 [=====] - 1s 105us/sample - loss: 0.1737
- accuracy: 0.9433
Epoch 121/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1722
- accuracy: 0.9455
Epoch 122/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.1711
- accuracy: 0.9441
Epoch 123/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1712
- accuracy: 0.9447
Epoch 124/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1701
- accuracy: 0.9456
Epoch 125/500
```

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12612/12612 [=====] - 1s 84us/sample - loss: 0.1694
- accuracy: 0.9461
Epoch 126/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.1691
- accuracy: 0.9470
Epoch 127/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.1664
- accuracy: 0.9480
Epoch 128/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.1679
- accuracy: 0.9464
Epoch 129/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.1658
- accuracy: 0.9472
Epoch 130/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1650
- accuracy: 0.9479
Epoch 131/500
12612/12612 [=====] - 1s 102us/sample - loss: 0.1652
- accuracy: 0.9472
Epoch 132/500
12612/12612 [=====] - 1s 116us/sample - loss: 0.1633
- accuracy: 0.9482
Epoch 133/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.1619

```

```
- accuracy: 0.9502
Epoch 134/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.1605
- accuracy: 0.9519
Epoch 135/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1608
- accuracy: 0.9504
Epoch 136/500
12612/12612 [=====] - 1s 113us/sample - loss: 0.1608
- accuracy: 0.9497
Epoch 137/500
12612/12612 [=====] - 1s 104us/sample - loss: 0.1594
- accuracy: 0.9521
Epoch 138/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.1574
- accuracy: 0.9516
Epoch 139/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.1586
- accuracy: 0.9522
Epoch 140/500
12612/12612 [=====] - 1s 115us/sample - loss: 0.1572
- accuracy: 0.9513
Epoch 141/500
12612/12612 [=====] - 2s 125us/sample - loss: 0.1561
- accuracy: 0.9531
```

```
Epoch 142/500
12612/12612 [=====] - 1s 109us/sample - loss: 0.1554
- accuracy: 0.9512
Epoch 143/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.1538
- accuracy: 0.9531
Epoch 144/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1536
- accuracy: 0.9543
Epoch 145/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1526
- accuracy: 0.9545
Epoch 146/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.1529
- accuracy: 0.9533
Epoch 147/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1502
- accuracy: 0.9548
Epoch 148/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1506
- accuracy: 0.9556
Epoch 149/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1493
- accuracy: 0.9556
Epoch 150/500
```



```
12612/12612 [=====] - 1s 95us/sample - loss: 0.1487
- accuracy: 0.9553
Epoch 151/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.1497
- accuracy: 0.9549
Epoch 152/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1482
- accuracy: 0.9560
Epoch 153/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1473
- accuracy: 0.9552
Epoch 154/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1468
- accuracy: 0.9566
Epoch 155/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.1459
- accuracy: 0.9562
Epoch 156/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.1451
- accuracy: 0.9581
Epoch 157/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.1461
- accuracy: 0.9571
Epoch 158/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.1434
```

```
- accuracy: 0.9590
Epoch 159/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1430
- accuracy: 0.9581
Epoch 160/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.1430
- accuracy: 0.9573
Epoch 161/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.1424
- accuracy: 0.9587
Epoch 162/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1415
- accuracy: 0.9583
Epoch 163/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1417
- accuracy: 0.9585
Epoch 164/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1398
- accuracy: 0.9590
Epoch 165/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.1400
- accuracy: 0.9586
Epoch 166/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1404
- accuracy: 0.9598
```

```
Epoch 167/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1392
- accuracy: 0.9598
Epoch 168/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1385
- accuracy: 0.9596
Epoch 169/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1372
- accuracy: 0.9607
Epoch 170/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.1366
- accuracy: 0.9604
Epoch 171/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.1360
- accuracy: 0.9609
Epoch 172/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1352
- accuracy: 0.9612
Epoch 173/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1341
- accuracy: 0.9631
Epoch 174/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1345
- accuracy: 0.9627
Epoch 175/500
```

```
12612/12612 [=====] - 1s 88us/sample - loss: 0.1335
- accuracy: 0.9619
Epoch 176/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.1331
- accuracy: 0.9627
Epoch 177/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1326
- accuracy: 0.9618
Epoch 178/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1329
- accuracy: 0.9622
Epoch 179/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1314
- accuracy: 0.9630
Epoch 180/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1310
- accuracy: 0.9635
Epoch 181/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.1312
- accuracy: 0.9619
Epoch 182/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.1296
- accuracy: 0.9631
Epoch 183/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1299
```

```
- accuracy: 0.9646
Epoch 184/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1280
- accuracy: 0.9644
Epoch 185/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1296
- accuracy: 0.9632
Epoch 186/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.1288
- accuracy: 0.9646
Epoch 187/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.1277
- accuracy: 0.9642
Epoch 188/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1274
- accuracy: 0.9647
Epoch 189/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1265
- accuracy: 0.9660
Epoch 190/500
12612/12612 [=====] - 1s 83us/sample - loss: 0.1271
- accuracy: 0.9643
Epoch 191/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1275
- accuracy: 0.9646
```

```
Epoch 192/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.1267
- accuracy: 0.9643
Epoch 193/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1271
- accuracy: 0.9646
Epoch 194/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.1244
- accuracy: 0.9657
Epoch 195/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1238
- accuracy: 0.9668
Epoch 196/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1241
- accuracy: 0.9667
Epoch 197/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.1233
- accuracy: 0.9665
Epoch 198/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1231
- accuracy: 0.9656
Epoch 199/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1229
- accuracy: 0.9663
Epoch 200/500
```

```
12612/12612 [=====] - 1s 84us/sample - loss: 0.1228
- accuracy: 0.9658
Epoch 201/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1231
- accuracy: 0.9654
Epoch 202/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1223
- accuracy: 0.9667
Epoch 203/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.1207
- accuracy: 0.9665
Epoch 204/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.1213
- accuracy: 0.9657
Epoch 205/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.1203
- accuracy: 0.9680
Epoch 206/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.1207
- accuracy: 0.9662
Epoch 207/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.1189
- accuracy: 0.9692
Epoch 208/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.1201
```

```
- accuracy: 0.9674
Epoch 209/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1190
- accuracy: 0.9673
Epoch 210/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1180
- accuracy: 0.9692
Epoch 211/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1191
- accuracy: 0.9667
Epoch 212/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.1185
- accuracy: 0.9673
Epoch 213/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1169
- accuracy: 0.9682
Epoch 214/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1181
- accuracy: 0.9680
Epoch 215/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1163
- accuracy: 0.9690
Epoch 216/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.1166
- accuracy: 0.9686
```



```
Epoch 217/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.1171
- accuracy: 0.9691
Epoch 218/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1159
- accuracy: 0.9678
Epoch 219/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1141
- accuracy: 0.9698
Epoch 220/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1146
- accuracy: 0.9701
Epoch 221/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1172
- accuracy: 0.9675
Epoch 222/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1131
- accuracy: 0.9692
Epoch 223/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.1155
- accuracy: 0.9691
Epoch 224/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.1129
- accuracy: 0.9693
Epoch 225/500
```

```
12612/12612 [=====] - 1s 85us/sample - loss: 0.1146
- accuracy: 0.9691
Epoch 226/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.1136
- accuracy: 0.9686
Epoch 227/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.1126
- accuracy: 0.9718
Epoch 228/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.1118
- accuracy: 0.9703
Epoch 229/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1122
- accuracy: 0.9684
Epoch 230/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.1110
- accuracy: 0.9706
Epoch 231/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1112
- accuracy: 0.9708
Epoch 232/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.1126
- accuracy: 0.9692
Epoch 233/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.1108
```

```
- accuracy: 0.9699
Epoch 234/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.1095
- accuracy: 0.9724
Epoch 235/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1095
- accuracy: 0.9715
Epoch 236/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.1083
- accuracy: 0.9719
Epoch 237/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.1109
- accuracy: 0.9711
Epoch 238/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.1101
- accuracy: 0.9707
Epoch 239/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.1098
- accuracy: 0.9703
Epoch 240/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.1082
- accuracy: 0.9711
Epoch 241/500
12612/12612 [=====] - 1s 109us/sample - loss: 0.1090
- accuracy: 0.9711
```

```
Epoch 242/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.1079
- accuracy: 0.9710
Epoch 243/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.1076
- accuracy: 0.9717
Epoch 244/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1097
- accuracy: 0.9706
Epoch 245/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1062
- accuracy: 0.9721
Epoch 246/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.1067
- accuracy: 0.9726
Epoch 247/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.1069
- accuracy: 0.9713
Epoch 248/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.1056
- accuracy: 0.9720
Epoch 249/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.1047
- accuracy: 0.9743
Epoch 250/500
```

```
12612/12612 [=====] - 1s 95us/sample - loss: 0.1053
- accuracy: 0.9717
Epoch 251/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.1043
- accuracy: 0.9741
Epoch 252/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.1057
- accuracy: 0.9714
Epoch 253/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.1040
- accuracy: 0.9715
Epoch 254/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.1037
- accuracy: 0.9734
Epoch 255/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.1050
- accuracy: 0.9724
Epoch 256/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.1025
- accuracy: 0.9736
Epoch 257/500
12612/12612 [=====] - 1s 105us/sample - loss: 0.1031
- accuracy: 0.9726
Epoch 258/500
12612/12612 [=====] - 1s 113us/sample - loss: 0.1034
```

```
- accuracy: 0.9734
Epoch 259/500
12612/12612 [=====] - 2s 121us/sample - loss: 0.1013
- accuracy: 0.9734
Epoch 260/500
12612/12612 [=====] - 1s 114us/sample - loss: 0.1010
- accuracy: 0.9745
Epoch 261/500
12612/12612 [=====] - 1s 103us/sample - loss: 0.1033
- accuracy: 0.9734
Epoch 262/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.1035
- accuracy: 0.9729
Epoch 263/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.1024
- accuracy: 0.9738
Epoch 264/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.1006
- accuracy: 0.9742
Epoch 265/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.1017
- accuracy: 0.9734
Epoch 266/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.0996
- accuracy: 0.9753
```

```
Epoch 267/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0991
- accuracy: 0.9753
Epoch 268/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0999
- accuracy: 0.9742
Epoch 269/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0995
- accuracy: 0.9747
Epoch 270/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.1008
- accuracy: 0.9737
Epoch 271/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.1004
- accuracy: 0.9734
Epoch 272/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0979
- accuracy: 0.9751
Epoch 273/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0990
- accuracy: 0.9754
Epoch 274/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0974
- accuracy: 0.9749
Epoch 275/500
```

```
12612/12612 [=====] - 1s 101us/sample - loss: 0.0995
- accuracy: 0.9743
Epoch 276/500
12612/12612 [=====] - 1s 110us/sample - loss: 0.0982
- accuracy: 0.9748
Epoch 277/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.0983
- accuracy: 0.9757
Epoch 278/500
12612/12612 [=====] - 1s 103us/sample - loss: 0.0980
- accuracy: 0.9745
Epoch 279/500
12612/12612 [=====] - 1s 107us/sample - loss: 0.0977
- accuracy: 0.9754
Epoch 280/500
12612/12612 [=====] - 1s 117us/sample - loss: 0.0979
- accuracy: 0.9761
Epoch 281/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.0985
- accuracy: 0.9744
Epoch 282/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0979
- accuracy: 0.9752
Epoch 283/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0969
```



```
- accuracy: 0.9749
Epoch 284/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0959
- accuracy: 0.9753
Epoch 285/500
12612/12612 [=====] - 1s 104us/sample - loss: 0.0963
- accuracy: 0.9746
Epoch 286/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0972
- accuracy: 0.9748
Epoch 287/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0964
- accuracy: 0.9757
Epoch 288/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0954
- accuracy: 0.9758
Epoch 289/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0944
- accuracy: 0.9764
Epoch 290/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0940
- accuracy: 0.9766
Epoch 291/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0939
- accuracy: 0.9770
```

```
Epoch 292/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0957
- accuracy: 0.9750
Epoch 293/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0936
- accuracy: 0.9758
Epoch 294/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0960
- accuracy: 0.9757
Epoch 295/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.0963
- accuracy: 0.9746
Epoch 296/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0937
- accuracy: 0.9761
Epoch 297/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0924
- accuracy: 0.9775
Epoch 298/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0925
- accuracy: 0.9779
Epoch 299/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0928
- accuracy: 0.9776
Epoch 300/500
```

```
12612/12612 [=====] - 1s 91us/sample - loss: 0.0925
- accuracy: 0.9768
Epoch 301/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0919
- accuracy: 0.9777
Epoch 302/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.0951
- accuracy: 0.9743
Epoch 303/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0918
- accuracy: 0.9780
Epoch 304/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0930
- accuracy: 0.9772
Epoch 305/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0913
- accuracy: 0.9781
Epoch 306/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0899
- accuracy: 0.9783
Epoch 307/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0911
- accuracy: 0.9767
Epoch 308/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0909
```

```
- accuracy: 0.9784
Epoch 309/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.0909
- accuracy: 0.9772
Epoch 310/500
12612/12612 [=====] - 1s 104us/sample - loss: 0.0912
- accuracy: 0.9780
Epoch 311/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0903
- accuracy: 0.9776
Epoch 312/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0903
- accuracy: 0.9773
Epoch 313/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0919
- accuracy: 0.9765
Epoch 314/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0901
- accuracy: 0.9773
Epoch 315/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0920
- accuracy: 0.9758
Epoch 316/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0887
- accuracy: 0.9783
```

```
Epoch 317/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0900
- accuracy: 0.9777
Epoch 318/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0884
- accuracy: 0.9784
Epoch 319/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0877
- accuracy: 0.9786
Epoch 320/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0890
- accuracy: 0.9785
Epoch 321/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0894
- accuracy: 0.9776
Epoch 322/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0888
- accuracy: 0.9776
Epoch 323/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0869
- accuracy: 0.9797
Epoch 324/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0905
- accuracy: 0.9776
Epoch 325/500
```

```
12612/12612 [=====] - 1s 91us/sample - loss: 0.0885
- accuracy: 0.9784
Epoch 326/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.0860
- accuracy: 0.9798
Epoch 327/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0889
- accuracy: 0.9778
Epoch 328/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.0867
- accuracy: 0.9788
Epoch 329/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0858
- accuracy: 0.9798
Epoch 330/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0871
- accuracy: 0.9784
Epoch 331/500
12612/12612 [=====] - 1s 106us/sample - loss: 0.0865
- accuracy: 0.9793
Epoch 332/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.0849
- accuracy: 0.9801
Epoch 333/500
12612/12612 [=====] - 1s 104us/sample - loss: 0.0862
```

```
- accuracy: 0.9789
Epoch 334/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0842
- accuracy: 0.9800
Epoch 335/500
12612/12612 [=====] - 1s 106us/sample - loss: 0.0859
- accuracy: 0.9784
Epoch 336/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0864
- accuracy: 0.9795
Epoch 337/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0850
- accuracy: 0.9796
Epoch 338/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0835
- accuracy: 0.9796
Epoch 339/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.0853
- accuracy: 0.9797
Epoch 340/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.0839
- accuracy: 0.9799
Epoch 341/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0844
- accuracy: 0.9797
```

```
Epoch 342/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0841
- accuracy: 0.9788
Epoch 343/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0845
- accuracy: 0.9799
Epoch 344/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0842
- accuracy: 0.9814
Epoch 345/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.0845
- accuracy: 0.9798
Epoch 346/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0820
- accuracy: 0.9803
Epoch 347/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0827
- accuracy: 0.9808
Epoch 348/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.0841
- accuracy: 0.9795
Epoch 349/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0838
- accuracy: 0.9788
Epoch 350/500
```



```
12612/12612 [=====] - 1s 105us/sample - loss: 0.0818
- accuracy: 0.9804
Epoch 351/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0825
- accuracy: 0.9804
Epoch 352/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0823
- accuracy: 0.9814
Epoch 353/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.0842
- accuracy: 0.9795
Epoch 354/500
12612/12612 [=====] - 1s 104us/sample - loss: 0.0830
- accuracy: 0.9806
Epoch 355/500
12612/12612 [=====] - 1s 105us/sample - loss: 0.0822
- accuracy: 0.9808
Epoch 356/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0812
- accuracy: 0.9800
Epoch 357/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.0820
- accuracy: 0.9791
Epoch 358/500
12612/12612 [=====] - 1s 116us/sample - loss: 0.0823
```

```
- accuracy: 0.9801
Epoch 359/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.0825
- accuracy: 0.9796
Epoch 360/500
12612/12612 [=====] - 1s 118us/sample - loss: 0.0807
- accuracy: 0.9812
Epoch 361/500
12612/12612 [=====] - 1s 118us/sample - loss: 0.0805
- accuracy: 0.9814
Epoch 362/500
12612/12612 [=====] - 2s 142us/sample - loss: 0.0806
- accuracy: 0.9811
Epoch 363/500
12612/12612 [=====] - 2s 135us/sample - loss: 0.0814
- accuracy: 0.9804
Epoch 364/500
12612/12612 [=====] - 2s 119us/sample - loss: 0.0806
- accuracy: 0.9811
Epoch 365/500
12612/12612 [=====] - 1s 110us/sample - loss: 0.0794
- accuracy: 0.9818
Epoch 366/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0806
- accuracy: 0.9806
```

```
Epoch 367/500
12612/12612 [=====] - 1s 102us/sample - loss: 0.0789
- accuracy: 0.9810
Epoch 368/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0797
- accuracy: 0.9817
Epoch 369/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0807
- accuracy: 0.9807
Epoch 370/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0791
- accuracy: 0.9810
Epoch 371/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0801
- accuracy: 0.9809
Epoch 372/500
12612/12612 [=====] - 1s 102us/sample - loss: 0.0784
- accuracy: 0.9833
Epoch 373/500
12612/12612 [=====] - 1s 114us/sample - loss: 0.0779
- accuracy: 0.9826
Epoch 374/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0788
- accuracy: 0.9827
Epoch 375/500
```

```
12612/12612 [=====] - 1s 92us/sample - loss: 0.0784
- accuracy: 0.9818
Epoch 376/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0788
- accuracy: 0.9818
Epoch 377/500
12612/12612 [=====] - 1s 105us/sample - loss: 0.0792
- accuracy: 0.9814
Epoch 378/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0800
- accuracy: 0.9799
Epoch 379/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.0775
- accuracy: 0.9818
Epoch 380/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.0771
- accuracy: 0.9829
Epoch 381/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0783
- accuracy: 0.9808
Epoch 382/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.0780
- accuracy: 0.9810
Epoch 383/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0785
```

```
- accuracy: 0.9813
Epoch 384/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0775
- accuracy: 0.9828
Epoch 385/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0765
- accuracy: 0.9832
Epoch 386/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0769
- accuracy: 0.9825
Epoch 387/500
12612/12612 [=====] - 1s 103us/sample - loss: 0.0763
- accuracy: 0.9820
Epoch 388/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0781
- accuracy: 0.9822
Epoch 389/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0765
- accuracy: 0.9827
Epoch 390/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0771
- accuracy: 0.9816
Epoch 391/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.0764
- accuracy: 0.9823
```

```
Epoch 392/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0762
- accuracy: 0.9835
Epoch 393/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0761
- accuracy: 0.9839
Epoch 394/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0753
- accuracy: 0.9826
Epoch 395/500
12612/12612 [=====] - 1s 104us/sample - loss: 0.0760
- accuracy: 0.9827
Epoch 396/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0765
- accuracy: 0.9824
Epoch 397/500
12612/12612 [=====] - 2s 120us/sample - loss: 0.0754
- accuracy: 0.9826
Epoch 398/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0755
- accuracy: 0.9830
Epoch 399/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0748
- accuracy: 0.9823
Epoch 400/500
```

```
12612/12612 [=====] - 1s 85us/sample - loss: 0.0769
- accuracy: 0.9814
Epoch 401/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0753
- accuracy: 0.9836
Epoch 402/500
12612/12612 [=====] - 1s 104us/sample - loss: 0.0753
- accuracy: 0.9826
Epoch 403/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0740
- accuracy: 0.9842
Epoch 404/500
12612/12612 [=====] - 1s 113us/sample - loss: 0.0748
- accuracy: 0.9830
Epoch 405/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.0744
- accuracy: 0.9825
Epoch 406/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.0758
- accuracy: 0.9822
Epoch 407/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0736
- accuracy: 0.9839
Epoch 408/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0731
```

```
- accuracy: 0.9838
Epoch 409/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0732
- accuracy: 0.9833
Epoch 410/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0741
- accuracy: 0.9821
Epoch 411/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.0727
- accuracy: 0.9846
Epoch 412/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.0740
- accuracy: 0.9831
Epoch 413/500
12612/12612 [=====] - 2s 126us/sample - loss: 0.0753
- accuracy: 0.9826
Epoch 414/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0734
- accuracy: 0.9826
Epoch 415/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.0723
- accuracy: 0.9834
Epoch 416/500
12612/12612 [=====] - 1s 112us/sample - loss: 0.0731
- accuracy: 0.9843
```



```
Epoch 417/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0735
- accuracy: 0.9830
Epoch 418/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.0707
- accuracy: 0.9860
Epoch 419/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.0723
- accuracy: 0.9840
Epoch 420/500
12612/12612 [=====] - 1s 105us/sample - loss: 0.0725
- accuracy: 0.9835
Epoch 421/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0720
- accuracy: 0.9837
Epoch 422/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0718
- accuracy: 0.9840
Epoch 423/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0721
- accuracy: 0.9837
Epoch 424/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0729
- accuracy: 0.9837
Epoch 425/500
```

```
12612/12612 [=====] - 1s 87us/sample - loss: 0.0713
- accuracy: 0.9838
Epoch 426/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0710
- accuracy: 0.9850
Epoch 427/500
12612/12612 [=====] - 1s 84us/sample - loss: 0.0706
- accuracy: 0.9849
Epoch 428/500
12612/12612 [=====] - 1s 98us/sample - loss: 0.0726
- accuracy: 0.9833
Epoch 429/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0710
- accuracy: 0.9844
Epoch 430/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0700
- accuracy: 0.9853
Epoch 431/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.0715
- accuracy: 0.9837
Epoch 432/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0701
- accuracy: 0.9839
Epoch 433/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0718
```

```
- accuracy: 0.9854
Epoch 434/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.0705
- accuracy: 0.9837
Epoch 435/500
12612/12612 [=====] - 1s 117us/sample - loss: 0.0684
- accuracy: 0.9856
Epoch 436/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0708
- accuracy: 0.9843
Epoch 437/500
12612/12612 [=====] - 1s 115us/sample - loss: 0.0703
- accuracy: 0.9837
Epoch 438/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0694
- accuracy: 0.9853
Epoch 439/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0700
- accuracy: 0.9853
Epoch 440/500
12612/12612 [=====] - 1s 109us/sample - loss: 0.0689
- accuracy: 0.9860
Epoch 441/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0699
- accuracy: 0.9853
```

```
Epoch 442/500
12612/12612 [=====] - 1s 113us/sample - loss: 0.0686
- accuracy: 0.9859
Epoch 443/500
12612/12612 [=====] - 1s 113us/sample - loss: 0.0697
- accuracy: 0.9838
Epoch 444/500
12612/12612 [=====] - 2s 154us/sample - loss: 0.0703
- accuracy: 0.9840
Epoch 445/500
12612/12612 [=====] - 2s 124us/sample - loss: 0.0689
- accuracy: 0.9849
Epoch 446/500
12612/12612 [=====] - 1s 116us/sample - loss: 0.0689
- accuracy: 0.9841
Epoch 447/500
12612/12612 [=====] - 2s 134us/sample - loss: 0.0678
- accuracy: 0.9845
Epoch 448/500
12612/12612 [=====] - 1s 114us/sample - loss: 0.0694
- accuracy: 0.9842
Epoch 449/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0691
- accuracy: 0.9840
Epoch 450/500
```

```
12612/12612 [=====] - 1s 89us/sample - loss: 0.0697
- accuracy: 0.9854
Epoch 451/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0677
- accuracy: 0.9853
Epoch 452/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.0669
- accuracy: 0.9854
Epoch 453/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0669
- accuracy: 0.9868
Epoch 454/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.0699
- accuracy: 0.9843
Epoch 455/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0694
- accuracy: 0.9857
Epoch 456/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0670
- accuracy: 0.9868
Epoch 457/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0684
- accuracy: 0.9840
Epoch 458/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.0678
```

```
- accuracy: 0.9856
Epoch 459/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.0669
- accuracy: 0.9860
Epoch 460/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.0678
- accuracy: 0.9853
Epoch 461/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.0679
- accuracy: 0.9856
Epoch 462/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.0674
- accuracy: 0.9857
Epoch 463/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0673
- accuracy: 0.9856
Epoch 464/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.0681
- accuracy: 0.9855
Epoch 465/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0669
- accuracy: 0.9853
Epoch 466/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0673
- accuracy: 0.9864
```

```
Epoch 467/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.0660
- accuracy: 0.9849
Epoch 468/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0666
- accuracy: 0.9854
Epoch 469/500
12612/12612 [=====] - 1s 103us/sample - loss: 0.0667
- accuracy: 0.9855
Epoch 470/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0673
- accuracy: 0.9860
Epoch 471/500
12612/12612 [=====] - 1s 96us/sample - loss: 0.0660
- accuracy: 0.9871
Epoch 472/500
12612/12612 [=====] - 2s 119us/sample - loss: 0.0655
- accuracy: 0.9878
Epoch 473/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0674
- accuracy: 0.9854
Epoch 474/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0659
- accuracy: 0.9854
Epoch 475/500
```

```
12612/12612 [=====] - 1s 88us/sample - loss: 0.0669
- accuracy: 0.9856
Epoch 476/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0661
- accuracy: 0.9856
Epoch 477/500
12612/12612 [=====] - 1s 99us/sample - loss: 0.0643
- accuracy: 0.9872
Epoch 478/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0649
- accuracy: 0.9861
Epoch 479/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0652
- accuracy: 0.9864
Epoch 480/500
12612/12612 [=====] - 1s 87us/sample - loss: 0.0648
- accuracy: 0.9851
Epoch 481/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0657
- accuracy: 0.9856
Epoch 482/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0653
- accuracy: 0.9860
Epoch 483/500
12612/12612 [=====] - 1s 93us/sample - loss: 0.0656
```



```
- accuracy: 0.9862
Epoch 484/500
12612/12612 [=====] - 1s 91us/sample - loss: 0.0646
- accuracy: 0.9860
Epoch 485/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0654
- accuracy: 0.9860
Epoch 486/500
12612/12612 [=====] - 1s 100us/sample - loss: 0.0645
- accuracy: 0.9861
Epoch 487/500
12612/12612 [=====] - 1s 95us/sample - loss: 0.0647
- accuracy: 0.9861
Epoch 488/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0646
- accuracy: 0.9872
Epoch 489/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0651
- accuracy: 0.9854
Epoch 490/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0631
- accuracy: 0.9874
Epoch 491/500
12612/12612 [=====] - 1s 86us/sample - loss: 0.0642
- accuracy: 0.9867
```

```
Epoch 492/500
12612/12612 [=====] - 1s 101us/sample - loss: 0.0654
- accuracy: 0.9867
Epoch 493/500
12612/12612 [=====] - 1s 94us/sample - loss: 0.0636
- accuracy: 0.9865
Epoch 494/500
12612/12612 [=====] - 1s 85us/sample - loss: 0.0634
- accuracy: 0.9875
Epoch 495/500
12612/12612 [=====] - 1s 90us/sample - loss: 0.0643
- accuracy: 0.9857
Epoch 496/500
12612/12612 [=====] - 1s 88us/sample - loss: 0.0644
- accuracy: 0.9860
Epoch 497/500
12612/12612 [=====] - 1s 97us/sample - loss: 0.0628
- accuracy: 0.9873
Epoch 498/500
12612/12612 [=====] - 1s 92us/sample - loss: 0.0636
- accuracy: 0.9873
Epoch 499/500
12612/12612 [=====] - 1s 89us/sample - loss: 0.0632
- accuracy: 0.9876
Epoch 500/500
```

12612/12612 [=====] - 1s 85us/sample - loss: 0.0640  
- accuracy: 0.9860  
2893/2893 [=====] - 0s 56us/sample

class\_weight\_Fold\_5: {0: 0.44032469232783455, 1: 6.551688311688311}

pos\_weight: 0.6  
thresholdNum: 0.5

Average of train loss Fold\_5: 0.1419  
Average of yPredProbability Fold\_5: 0.1109

classification_report_Fold_5:			
	precision	recall	f1-score support
Normal 0	1.00	0.89	0.94 2883
Anomaly 1	0.00	0.00	0.00 10
accuracy			0.89 2893
macro avg	0.50	0.45	0.47 2893
weighted avg	0.99	0.89	0.94 2893



Normal 0	0.99	0.84	0.91	14337
Anomaly 1	0.01	0.16	0.01	86

accuracy			0.84	14423
macro avg	0.50	0.50	0.46	14423
weighted avg	0.99	0.84	0.91	14423

confusion\_matrix\_AllFolds:

True Negatives: 12057  
False Positives: 2280  
False Negatives: 72  
True Positives: 14

Average threshold\_rt AllFolds: 0.43  
Average precision\_rt AllFolds: 0.01  
Average recall\_rt AllFolds: 0.17

Main End running time: 210506\_230221, \*\*\*\*\*

Process finished with exit code 0