

April 6, 2020

1 11 - Neural Networks

1.1 Part 1 - XOR

1. Using the XOR dataset below, train (400 epochs) a neural network (NN) using 1, 2, 3, 4, and 5 hidden layers (where each layer has only 2 neurons). For each n layers, store the resulting loss score along with n. Plot the results to find what the optimal number of layers is.
2. Repeat the above with 3-neuron and 4-neuron Hidden layers. How do these results compare to the 2 neuron layers?
3. Using the most optimal configuraion (n-layers, k-neurons per layer), compare how tanh, sigmoid,softplus and relu effect the loss after 400 epochs. Try other Activation functions as well (<https://keras.io/activations/>)
4. Instead of SGD try other optimizers and report on the loss score. (<https://keras.io/optimizers/>)

```
In [1]: #!pip3 install tensorflow keras
```

```
In [2]: from keras.models import Sequential
        from keras.layers import Dense
        from keras.optimizers import SGD #Stochastic Gradient Descent

        import numpy as np
        # fix random seed for reproducibility
        np.random.seed(7)

        import matplotlib.pyplot as plt
        import matplotlib.patches as mpatches

        %matplotlib inline
```

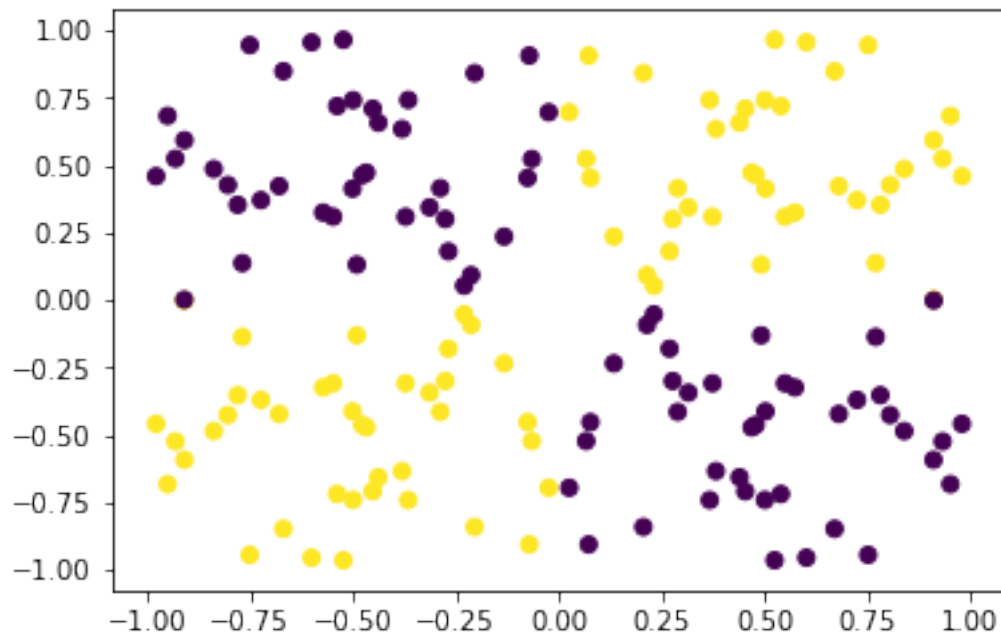
Using TensorFlow backend.

```
In [3]: n = 40
        xx = np.random.random((n,1))
        yy = np.random.random((n,1))
```

```
In [4]: X = np.array([np.array([xx,-xx,-xx,xx]),np.array([yy,-yy,yy,-yy])]).reshape(2,4*n).T
        y = np.array([np.ones([2*n]),np.zeros([2*n])]).reshape(4*n)
```

```
In [5]: plt.scatter(*zip(*X), c=y)
```

```
Out[5]: <matplotlib.collections.PathCollection at 0xb2b007f60>
```



1.1.1 Part 1.1

```
In [6]: model = Sequential()
```

```
model.add(Dense(2, input_dim=2, activation='tanh')) #sigmoid, relu  
# model.add(Dense(2, activation='tanh'))  
model.add(Dense(1, activation='sigmoid'))  
# model.add(Dense(1, input_dim=2, activation='sigmoid'))
```

```
sgd = SGD(lr=0.1)  
model.compile(loss='binary_crossentropy', optimizer='sgd')
```

```
model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch  
#print(model.predict_proba(X).reshape(4*n))
```

```
# evaluate the model  
scores_one = model.evaluate(X, y)
```

WARNING:tensorflow:From /Users/Broth/anaconda3/lib/python3.7/site-packages/tensorflow/python/op
Instructions for updating:
Colocations handled automatically by placer.

WARNING:tensorflow:From /Users/Broth/anaconda3/lib/python3.7/site-packages/tensorflow/python/ops/nn_ops_rnn_cell.py:111: Instructions for updating:
Use tf.cast instead.

```
Epoch 1/400
160/160 [=====] - 0s 1ms/step - loss: 0.7508
Epoch 2/400
160/160 [=====] - 0s 437us/step - loss: 0.7293
Epoch 3/400
160/160 [=====] - 0s 433us/step - loss: 0.7134
Epoch 4/400
160/160 [=====] - 0s 430us/step - loss: 0.7015
Epoch 5/400
160/160 [=====] - 0s 441us/step - loss: 0.6918
Epoch 6/400
160/160 [=====] - 0s 426us/step - loss: 0.6843
Epoch 7/400
160/160 [=====] - 0s 442us/step - loss: 0.6775
Epoch 8/400
160/160 [=====] - 0s 443us/step - loss: 0.6728
Epoch 9/400
160/160 [=====] - 0s 426us/step - loss: 0.6682
Epoch 10/400
160/160 [=====] - 0s 422us/step - loss: 0.6644
Epoch 11/400
160/160 [=====] - 0s 429us/step - loss: 0.6613
Epoch 12/400
160/160 [=====] - 0s 422us/step - loss: 0.6584
Epoch 13/400
160/160 [=====] - 0s 431us/step - loss: 0.6558
Epoch 14/400
160/160 [=====] - 0s 436us/step - loss: 0.6533
Epoch 15/400
160/160 [=====] - 0s 429us/step - loss: 0.6510
Epoch 16/400
160/160 [=====] - 0s 427us/step - loss: 0.6488
Epoch 17/400
160/160 [=====] - 0s 432us/step - loss: 0.6465
Epoch 18/400
160/160 [=====] - 0s 448us/step - loss: 0.6447
Epoch 19/400
160/160 [=====] - 0s 444us/step - loss: 0.6423
Epoch 20/400
160/160 [=====] - 0s 453us/step - loss: 0.6402
Epoch 21/400
160/160 [=====] - 0s 440us/step - loss: 0.6384
Epoch 22/400
160/160 [=====] - 0s 449us/step - loss: 0.6358
Epoch 23/400
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160/160 [=====] - 0s 447us/step - loss: 0.6334
Epoch 24/400
160/160 [=====] - 0s 441us/step - loss: 0.6311
Epoch 25/400
160/160 [=====] - 0s 429us/step - loss: 0.6290
Epoch 26/400
160/160 [=====] - 0s 435us/step - loss: 0.6267
Epoch 27/400
160/160 [=====] - 0s 432us/step - loss: 0.6240
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160/160 [=====] - 0s 431us/step - loss: 0.6215
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160/160 [=====] - 0s 444us/step - loss: 0.6188
Epoch 30/400
160/160 [=====] - 0s 453us/step - loss: 0.6161
Epoch 31/400
160/160 [=====] - 0s 423us/step - loss: 0.6134
Epoch 32/400
160/160 [=====] - 0s 451us/step - loss: 0.6105
Epoch 33/400
160/160 [=====] - 0s 437us/step - loss: 0.6074
Epoch 34/400
160/160 [=====] - 0s 443us/step - loss: 0.6042
Epoch 35/400
160/160 [=====] - 0s 434us/step - loss: 0.6010
Epoch 36/400
160/160 [=====] - 0s 439us/step - loss: 0.5977
Epoch 37/400
160/160 [=====] - 0s 462us/step - loss: 0.5940
Epoch 38/400
160/160 [=====] - 0s 425us/step - loss: 0.5906
Epoch 39/400
160/160 [=====] - 0s 444us/step - loss: 0.5869
Epoch 40/400
160/160 [=====] - 0s 398us/step - loss: 0.5828
Epoch 41/400
160/160 [=====] - 0s 396us/step - loss: 0.5790
Epoch 42/400
160/160 [=====] - 0s 407us/step - loss: 0.5750
Epoch 43/400
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Epoch 44/400
160/160 [=====] - 0s 416us/step - loss: 0.5661
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160/160 [=====] - 0s 409us/step - loss: 0.5615
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Epoch 57/400
160/160 [=====] - 0s 431us/step - loss: 0.5019
Epoch 58/400
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Epoch 59/400
160/160 [=====] - 0s 403us/step - loss: 0.4920
Epoch 60/400
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Epoch 61/400
160/160 [=====] - 0s 422us/step - loss: 0.4822
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160/160 [=====] - 0s 435us/step - loss: 0.4721
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160/160 [=====] - 0s 424us/step - loss: 0.4681
Epoch 65/400
160/160 [=====] - 0s 433us/step - loss: 0.4634
Epoch 66/400
160/160 [=====] - 0s 433us/step - loss: 0.4587
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160/160 [=====] - 0s 431us/step - loss: 0.4544
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160/160 [=====] - 0s 432us/step - loss: 0.4503
Epoch 69/400
160/160 [=====] - 0s 420us/step - loss: 0.4459
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160/160 [=====] - 0s 417us/step - loss: 0.3215
Epoch 239/400

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160/160 [=====] - 0s 424us/step - loss: 0.3219
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160/160 [=====] - 0s 418us/step - loss: 0.3221
Epoch 248/400
160/160 [=====] - 0s 423us/step - loss: 0.3220
Epoch 249/400
160/160 [=====] - 0s 409us/step - loss: 0.3219
Epoch 250/400
160/160 [=====] - 0s 407us/step - loss: 0.3219
Epoch 251/400
160/160 [=====] - 0s 422us/step - loss: 0.3214
Epoch 252/400
160/160 [=====] - 0s 425us/step - loss: 0.3213
Epoch 253/400
160/160 [=====] - 0s 414us/step - loss: 0.3214
Epoch 254/400
160/160 [=====] - 0s 422us/step - loss: 0.3215
Epoch 255/400
160/160 [=====] - 0s 419us/step - loss: 0.3217
Epoch 256/400
160/160 [=====] - 0s 426us/step - loss: 0.3213
Epoch 257/400
160/160 [=====] - 0s 415us/step - loss: 0.3215
Epoch 258/400
160/160 [=====] - 0s 415us/step - loss: 0.3216
Epoch 259/400
160/160 [=====] - 0s 402us/step - loss: 0.3213
Epoch 260/400
160/160 [=====] - 0s 413us/step - loss: 0.3211
Epoch 261/400
160/160 [=====] - 0s 396us/step - loss: 0.3215
Epoch 262/400
160/160 [=====] - 0s 406us/step - loss: 0.3213
Epoch 263/400

160/160 [=====] - 0s 411us/step - loss: 0.3213
 Epoch 264/400
 160/160 [=====] - 0s 418us/step - loss: 0.3212
 Epoch 265/400
 160/160 [=====] - 0s 416us/step - loss: 0.3214
 Epoch 266/400
 160/160 [=====] - 0s 410us/step - loss: 0.3209
 Epoch 267/400
 160/160 [=====] - 0s 437us/step - loss: 0.3214
 Epoch 268/400
 160/160 [=====] - 0s 435us/step - loss: 0.3214
 Epoch 269/400
 160/160 [=====] - 0s 419us/step - loss: 0.3215
 Epoch 270/400
 160/160 [=====] - 0s 417us/step - loss: 0.3213
 Epoch 271/400
 160/160 [=====] - 0s 428us/step - loss: 0.3212
 Epoch 272/400
 160/160 [=====] - 0s 439us/step - loss: 0.3214
 Epoch 273/400
 160/160 [=====] - 0s 439us/step - loss: 0.3212
 Epoch 274/400
 160/160 [=====] - 0s 429us/step - loss: 0.3211
 Epoch 275/400
 160/160 [=====] - 0s 420us/step - loss: 0.3213
 Epoch 276/400
 160/160 [=====] - 0s 434us/step - loss: 0.3212
 Epoch 277/400
 160/160 [=====] - 0s 423us/step - loss: 0.3212
 Epoch 278/400
 160/160 [=====] - 0s 428us/step - loss: 0.3209
 Epoch 279/400
 160/160 [=====] - 0s 424us/step - loss: 0.3215
 Epoch 280/400
 160/160 [=====] - 0s 431us/step - loss: 0.3212
 Epoch 281/400
 160/160 [=====] - 0s 423us/step - loss: 0.3211
 Epoch 282/400
 160/160 [=====] - 0s 419us/step - loss: 0.3214
 Epoch 283/400
 160/160 [=====] - 0s 440us/step - loss: 0.3210
 Epoch 284/400
 160/160 [=====] - 0s 426us/step - loss: 0.3207
 Epoch 285/400
 160/160 [=====] - 0s 421us/step - loss: 0.3211
 Epoch 286/400
 160/160 [=====] - 0s 429us/step - loss: 0.3211
 Epoch 287/400

160/160 [=====] - 0s 424us/step - loss: 0.3213
 Epoch 288/400
 160/160 [=====] - 0s 427us/step - loss: 0.3206
 Epoch 289/400
 160/160 [=====] - 0s 419us/step - loss: 0.3212
 Epoch 290/400
 160/160 [=====] - 0s 419us/step - loss: 0.3209
 Epoch 291/400
 160/160 [=====] - 0s 414us/step - loss: 0.3212
 Epoch 292/400
 160/160 [=====] - 0s 442us/step - loss: 0.3208
 Epoch 293/400
 160/160 [=====] - 0s 415us/step - loss: 0.3211
 Epoch 294/400
 160/160 [=====] - 0s 409us/step - loss: 0.3214
 Epoch 295/400
 160/160 [=====] - 0s 409us/step - loss: 0.3207
 Epoch 296/400
 160/160 [=====] - 0s 431us/step - loss: 0.3210
 Epoch 297/400
 160/160 [=====] - 0s 415us/step - loss: 0.3207
 Epoch 298/400
 160/160 [=====] - 0s 434us/step - loss: 0.3212
 Epoch 299/400
 160/160 [=====] - 0s 422us/step - loss: 0.3209
 Epoch 300/400
 160/160 [=====] - 0s 417us/step - loss: 0.3206
 Epoch 301/400
 160/160 [=====] - 0s 419us/step - loss: 0.3208
 Epoch 302/400
 160/160 [=====] - 0s 415us/step - loss: 0.3203
 Epoch 303/400
 160/160 [=====] - 0s 396us/step - loss: 0.3211
 Epoch 304/400
 160/160 [=====] - 0s 412us/step - loss: 0.3210
 Epoch 305/400
 160/160 [=====] - 0s 425us/step - loss: 0.3208
 Epoch 306/400
 160/160 [=====] - 0s 420us/step - loss: 0.3208
 Epoch 307/400
 160/160 [=====] - 0s 421us/step - loss: 0.3208
 Epoch 308/400
 160/160 [=====] - 0s 417us/step - loss: 0.3207
 Epoch 309/400
 160/160 [=====] - 0s 400us/step - loss: 0.3210
 Epoch 310/400
 160/160 [=====] - 0s 423us/step - loss: 0.3206
 Epoch 311/400

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160/160 [=====] - 0s 412us/step - loss: 0.3207
Epoch 312/400
160/160 [=====] - 0s 426us/step - loss: 0.3204
Epoch 313/400
160/160 [=====] - 0s 420us/step - loss: 0.3203
Epoch 314/400
160/160 [=====] - 0s 429us/step - loss: 0.3209
Epoch 315/400
160/160 [=====] - 0s 409us/step - loss: 0.3204
Epoch 316/400
160/160 [=====] - 0s 418us/step - loss: 0.3204
Epoch 317/400
160/160 [=====] - 0s 422us/step - loss: 0.3208
Epoch 318/400
160/160 [=====] - 0s 417us/step - loss: 0.3209
Epoch 319/400
160/160 [=====] - 0s 418us/step - loss: 0.3207
Epoch 320/400
160/160 [=====] - 0s 416us/step - loss: 0.3208
Epoch 321/400
160/160 [=====] - 0s 420us/step - loss: 0.3207
Epoch 322/400
160/160 [=====] - 0s 405us/step - loss: 0.3207
Epoch 323/400
160/160 [=====] - 0s 412us/step - loss: 0.3208
Epoch 324/400
160/160 [=====] - 0s 421us/step - loss: 0.3208
Epoch 325/400
160/160 [=====] - 0s 415us/step - loss: 0.3205
Epoch 326/400
160/160 [=====] - 0s 418us/step - loss: 0.3205
Epoch 327/400
160/160 [=====] - 0s 409us/step - loss: 0.3211
Epoch 328/400
160/160 [=====] - 0s 421us/step - loss: 0.3204
Epoch 329/400
160/160 [=====] - 0s 415us/step - loss: 0.3206
Epoch 330/400
160/160 [=====] - 0s 397us/step - loss: 0.3203
Epoch 331/400
160/160 [=====] - 0s 409us/step - loss: 0.3207
Epoch 332/400
160/160 [=====] - 0s 412us/step - loss: 0.3207
Epoch 333/400
160/160 [=====] - 0s 417us/step - loss: 0.3208
Epoch 334/400
160/160 [=====] - 0s 405us/step - loss: 0.3207
Epoch 335/400

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160/160 [=====] - 0s 423us/step - loss: 0.3202
Epoch 336/400
160/160 [=====] - 0s 415us/step - loss: 0.3209
Epoch 337/400
160/160 [=====] - 0s 409us/step - loss: 0.3208
Epoch 338/400
160/160 [=====] - 0s 406us/step - loss: 0.3202
Epoch 339/400
160/160 [=====] - 0s 405us/step - loss: 0.3204
Epoch 340/400
160/160 [=====] - 0s 399us/step - loss: 0.3208
Epoch 341/400
160/160 [=====] - 0s 388us/step - loss: 0.3209
Epoch 342/400
160/160 [=====] - 0s 387us/step - loss: 0.3210
Epoch 343/400
160/160 [=====] - 0s 398us/step - loss: 0.3206
Epoch 344/400
160/160 [=====] - 0s 399us/step - loss: 0.3206
Epoch 345/400
160/160 [=====] - 0s 400us/step - loss: 0.3204
Epoch 346/400
160/160 [=====] - 0s 398us/step - loss: 0.3204
Epoch 347/400
160/160 [=====] - 0s 385us/step - loss: 0.3205
Epoch 348/400
160/160 [=====] - 0s 404us/step - loss: 0.3208
Epoch 349/400
160/160 [=====] - 0s 411us/step - loss: 0.3209
Epoch 350/400
160/160 [=====] - 0s 417us/step - loss: 0.3205
Epoch 351/400
160/160 [=====] - 0s 427us/step - loss: 0.3204
Epoch 352/400
160/160 [=====] - 0s 416us/step - loss: 0.3202
Epoch 353/400
160/160 [=====] - 0s 410us/step - loss: 0.3205
Epoch 354/400
160/160 [=====] - 0s 401us/step - loss: 0.3205
Epoch 355/400
160/160 [=====] - 0s 425us/step - loss: 0.3206
Epoch 356/400
160/160 [=====] - 0s 414us/step - loss: 0.3208
Epoch 357/400
160/160 [=====] - 0s 423us/step - loss: 0.3204
Epoch 358/400
160/160 [=====] - 0s 415us/step - loss: 0.3205
Epoch 359/400

160/160 [=====] - 0s 405us/step - loss: 0.3209
 Epoch 360/400
 160/160 [=====] - 0s 422us/step - loss: 0.3206
 Epoch 361/400
 160/160 [=====] - 0s 411us/step - loss: 0.3206
 Epoch 362/400
 160/160 [=====] - 0s 419us/step - loss: 0.3200
 Epoch 363/400
 160/160 [=====] - 0s 417us/step - loss: 0.3200
 Epoch 364/400
 160/160 [=====] - 0s 417us/step - loss: 0.3204
 Epoch 365/400
 160/160 [=====] - 0s 420us/step - loss: 0.3207
 Epoch 366/400
 160/160 [=====] - 0s 420us/step - loss: 0.3205
 Epoch 367/400
 160/160 [=====] - 0s 416us/step - loss: 0.3201
 Epoch 368/400
 160/160 [=====] - 0s 419us/step - loss: 0.3202
 Epoch 369/400
 160/160 [=====] - 0s 425us/step - loss: 0.3203
 Epoch 370/400
 160/160 [=====] - 0s 402us/step - loss: 0.3203
 Epoch 371/400
 160/160 [=====] - 0s 423us/step - loss: 0.3204
 Epoch 372/400
 160/160 [=====] - 0s 415us/step - loss: 0.3208
 Epoch 373/400
 160/160 [=====] - 0s 422us/step - loss: 0.3207
 Epoch 374/400
 160/160 [=====] - 0s 431us/step - loss: 0.3203
 Epoch 375/400
 160/160 [=====] - 0s 414us/step - loss: 0.3202
 Epoch 376/400
 160/160 [=====] - 0s 412us/step - loss: 0.3206
 Epoch 377/400
 160/160 [=====] - 0s 407us/step - loss: 0.3204
 Epoch 378/400
 160/160 [=====] - 0s 414us/step - loss: 0.3200
 Epoch 379/400
 160/160 [=====] - 0s 413us/step - loss: 0.3204
 Epoch 380/400
 160/160 [=====] - 0s 422us/step - loss: 0.3207
 Epoch 381/400
 160/160 [=====] - 0s 412us/step - loss: 0.3201
 Epoch 382/400
 160/160 [=====] - 0s 406us/step - loss: 0.3200
 Epoch 383/400

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160/160 [=====] - 0s 418us/step - loss: 0.3198
Epoch 384/400
160/160 [=====] - 0s 412us/step - loss: 0.3204
Epoch 385/400
160/160 [=====] - 0s 407us/step - loss: 0.3204
Epoch 386/400
160/160 [=====] - 0s 418us/step - loss: 0.3204
Epoch 387/400
160/160 [=====] - 0s 419us/step - loss: 0.3204
Epoch 388/400
160/160 [=====] - ETA: 0s - loss: 0.311 - 0s 411us/step - loss: 0.3204
Epoch 389/400
160/160 [=====] - 0s 412us/step - loss: 0.3203
Epoch 390/400
160/160 [=====] - 0s 411us/step - loss: 0.3204
Epoch 391/400
160/160 [=====] - 0s 428us/step - loss: 0.3200
Epoch 392/400
160/160 [=====] - 0s 415us/step - loss: 0.3200
Epoch 393/400
160/160 [=====] - 0s 420us/step - loss: 0.3202
Epoch 394/400
160/160 [=====] - 0s 412us/step - loss: 0.3203
Epoch 395/400
160/160 [=====] - 0s 413us/step - loss: 0.3204
Epoch 396/400
160/160 [=====] - 0s 418us/step - loss: 0.3201
Epoch 397/400
160/160 [=====] - 0s 413us/step - loss: 0.3208
Epoch 398/400
160/160 [=====] - 0s 417us/step - loss: 0.3207
Epoch 399/400
160/160 [=====] - 0s 404us/step - loss: 0.3200
Epoch 400/400
160/160 [=====] - 0s 433us/step - loss: 0.3199
160/160 [=====] - 0s 189us/step

```

```
In [7]: model = Sequential()
```

```

model.add(Dense(2, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(2, input_dim = 2, activation='relu'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

```

```
model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch  
#print(model.predict_proba(X).reshape(4*n))
```

```
# evaluate the model
```

```
scores_two = model.evaluate(X, y)
```

Epoch 1/400

160/160 [=====] - 0s 1ms/step - loss: 0.6864

Epoch 2/400

160/160 [=====] - 0s 507us/step - loss: 0.6832

Epoch 3/400

160/160 [=====] - 0s 487us/step - loss: 0.6803

Epoch 4/400

160/160 [=====] - 0s 441us/step - loss: 0.6778

Epoch 5/400

160/160 [=====] - 0s 435us/step - loss: 0.6753

Epoch 6/400

160/160 [=====] - 0s 455us/step - loss: 0.6725

Epoch 7/400

160/160 [=====] - 0s 447us/step - loss: 0.6695

Epoch 8/400

160/160 [=====] - 0s 444us/step - loss: 0.6663

Epoch 9/400

160/160 [=====] - 0s 440us/step - loss: 0.6627

Epoch 10/400

160/160 [=====] - 0s 446us/step - loss: 0.6591

Epoch 11/400

160/160 [=====] - 0s 482us/step - loss: 0.6552

Epoch 12/400

160/160 [=====] - 0s 474us/step - loss: 0.6516

Epoch 13/400

160/160 [=====] - 0s 470us/step - loss: 0.6477

Epoch 14/400

160/160 [=====] - 0s 474us/step - loss: 0.6433

Epoch 15/400

160/160 [=====] - 0s 478us/step - loss: 0.6388

Epoch 16/400

160/160 [=====] - 0s 458us/step - loss: 0.6338

Epoch 17/400

160/160 [=====] - 0s 453us/step - loss: 0.6288

Epoch 18/400

160/160 [=====] - 0s 440us/step - loss: 0.6234

Epoch 19/400

160/160 [=====] - 0s 492us/step - loss: 0.6177

Epoch 20/400

160/160 [=====] - 0s 494us/step - loss: 0.6121

Epoch 21/400

160/160 [=====] - 0s 470us/step - loss: 0.6061
Epoch 22/400
160/160 [=====] - 0s 481us/step - loss: 0.6000
Epoch 23/400
160/160 [=====] - 0s 502us/step - loss: 0.5937
Epoch 24/400
160/160 [=====] - 0s 478us/step - loss: 0.5870
Epoch 25/400
160/160 [=====] - 0s 471us/step - loss: 0.5804
Epoch 26/400
160/160 [=====] - 0s 486us/step - loss: 0.5731
Epoch 27/400
160/160 [=====] - 0s 468us/step - loss: 0.5659
Epoch 28/400
160/160 [=====] - 0s 484us/step - loss: 0.5586
Epoch 29/400
160/160 [=====] - 0s 480us/step - loss: 0.5516
Epoch 30/400
160/160 [=====] - 0s 476us/step - loss: 0.5447
Epoch 31/400
160/160 [=====] - 0s 483us/step - loss: 0.5382
Epoch 32/400
160/160 [=====] - 0s 457us/step - loss: 0.5320
Epoch 33/400
160/160 [=====] - 0s 460us/step - loss: 0.5259
Epoch 34/400
160/160 [=====] - 0s 442us/step - loss: 0.5202
Epoch 35/400
160/160 [=====] - 0s 465us/step - loss: 0.5148
Epoch 36/400
160/160 [=====] - 0s 491us/step - loss: 0.5094
Epoch 37/400
160/160 [=====] - 0s 472us/step - loss: 0.5039
Epoch 38/400
160/160 [=====] - 0s 466us/step - loss: 0.4990
Epoch 39/400
160/160 [=====] - 0s 484us/step - loss: 0.4949
Epoch 40/400
160/160 [=====] - 0s 494us/step - loss: 0.4903
Epoch 41/400
160/160 [=====] - 0s 492us/step - loss: 0.4863
Epoch 42/400
160/160 [=====] - 0s 475us/step - loss: 0.4822
Epoch 43/400
160/160 [=====] - 0s 478us/step - loss: 0.4787
Epoch 44/400
160/160 [=====] - 0s 485us/step - loss: 0.4757
Epoch 45/400

160/160 [=====] - 0s 480us/step - loss: 0.4721
Epoch 46/400
160/160 [=====] - 0s 481us/step - loss: 0.4693
Epoch 47/400
160/160 [=====] - 0s 500us/step - loss: 0.4664
Epoch 48/400
160/160 [=====] - 0s 476us/step - loss: 0.4639
Epoch 49/400
160/160 [=====] - 0s 486us/step - loss: 0.4616
Epoch 50/400
160/160 [=====] - 0s 481us/step - loss: 0.4590
Epoch 51/400
160/160 [=====] - 0s 475us/step - loss: 0.4567
Epoch 52/400
160/160 [=====] - 0s 487us/step - loss: 0.4549
Epoch 53/400
160/160 [=====] - 0s 490us/step - loss: 0.4528
Epoch 54/400
160/160 [=====] - 0s 477us/step - loss: 0.4506
Epoch 55/400
160/160 [=====] - 0s 463us/step - loss: 0.4487
Epoch 56/400
160/160 [=====] - 0s 472us/step - loss: 0.4468
Epoch 57/400
160/160 [=====] - 0s 462us/step - loss: 0.4449
Epoch 58/400
160/160 [=====] - 0s 454us/step - loss: 0.4433
Epoch 59/400
160/160 [=====] - 0s 464us/step - loss: 0.4418
Epoch 60/400
160/160 [=====] - 0s 451us/step - loss: 0.4402
Epoch 61/400
160/160 [=====] - 0s 471us/step - loss: 0.4384
Epoch 62/400
160/160 [=====] - 0s 467us/step - loss: 0.4372
Epoch 63/400
160/160 [=====] - 0s 464us/step - loss: 0.4362
Epoch 64/400
160/160 [=====] - 0s 470us/step - loss: 0.4351
Epoch 65/400
160/160 [=====] - 0s 448us/step - loss: 0.4339
Epoch 66/400
160/160 [=====] - 0s 468us/step - loss: 0.4326
Epoch 67/400
160/160 [=====] - 0s 463us/step - loss: 0.4314
Epoch 68/400
160/160 [=====] - 0s 471us/step - loss: 0.4299
Epoch 69/400

160/160 [=====] - 0s 456us/step - loss: 0.4295
Epoch 70/400
160/160 [=====] - 0s 468us/step - loss: 0.4285
Epoch 71/400
160/160 [=====] - 0s 459us/step - loss: 0.4271
Epoch 72/400
160/160 [=====] - 0s 475us/step - loss: 0.4264
Epoch 73/400
160/160 [=====] - 0s 470us/step - loss: 0.4253
Epoch 74/400
160/160 [=====] - 0s 466us/step - loss: 0.4245
Epoch 75/400
160/160 [=====] - 0s 480us/step - loss: 0.4234
Epoch 76/400
160/160 [=====] - 0s 464us/step - loss: 0.4231
Epoch 77/400
160/160 [=====] - 0s 472us/step - loss: 0.4223
Epoch 78/400
160/160 [=====] - 0s 473us/step - loss: 0.4216
Epoch 79/400
160/160 [=====] - 0s 466us/step - loss: 0.4206
Epoch 80/400
160/160 [=====] - 0s 448us/step - loss: 0.4199
Epoch 81/400
160/160 [=====] - 0s 444us/step - loss: 0.4192
Epoch 82/400
160/160 [=====] - 0s 458us/step - loss: 0.4186
Epoch 83/400
160/160 [=====] - 0s 476us/step - loss: 0.4180
Epoch 84/400
160/160 [=====] - 0s 462us/step - loss: 0.4172
Epoch 85/400
160/160 [=====] - 0s 476us/step - loss: 0.4171
Epoch 86/400
160/160 [=====] - 0s 470us/step - loss: 0.4167
Epoch 87/400
160/160 [=====] - 0s 471us/step - loss: 0.4152
Epoch 88/400
160/160 [=====] - 0s 469us/step - loss: 0.4148
Epoch 89/400
160/160 [=====] - 0s 460us/step - loss: 0.4145
Epoch 90/400
160/160 [=====] - 0s 473us/step - loss: 0.4145
Epoch 91/400
160/160 [=====] - 0s 470us/step - loss: 0.4131
Epoch 92/400
160/160 [=====] - 0s 468us/step - loss: 0.4121
Epoch 93/400

160/160 [=====] - 0s 467us/step - loss: 0.4123
Epoch 94/400
160/160 [=====] - 0s 479us/step - loss: 0.4119
Epoch 95/400
160/160 [=====] - 0s 469us/step - loss: 0.4111
Epoch 96/400
160/160 [=====] - 0s 471us/step - loss: 0.4108
Epoch 97/400
160/160 [=====] - 0s 476us/step - loss: 0.4098
Epoch 98/400
160/160 [=====] - 0s 461us/step - loss: 0.4099
Epoch 99/400
160/160 [=====] - 0s 464us/step - loss: 0.4093
Epoch 100/400
160/160 [=====] - 0s 459us/step - loss: 0.4091
Epoch 101/400
160/160 [=====] - 0s 466us/step - loss: 0.4081
Epoch 102/400
160/160 [=====] - 0s 460us/step - loss: 0.4080
Epoch 103/400
160/160 [=====] - 0s 499us/step - loss: 0.4076
Epoch 104/400
160/160 [=====] - 0s 453us/step - loss: 0.4073
Epoch 105/400
160/160 [=====] - 0s 449us/step - loss: 0.4067
Epoch 106/400
160/160 [=====] - 0s 450us/step - loss: 0.4063
Epoch 107/400
160/160 [=====] - 0s 466us/step - loss: 0.4059
Epoch 108/400
160/160 [=====] - 0s 473us/step - loss: 0.4057
Epoch 109/400
160/160 [=====] - 0s 459us/step - loss: 0.4049
Epoch 110/400
160/160 [=====] - 0s 460us/step - loss: 0.4047
Epoch 111/400
160/160 [=====] - 0s 467us/step - loss: 0.4043
Epoch 112/400
160/160 [=====] - 0s 450us/step - loss: 0.4039
Epoch 113/400
160/160 [=====] - 0s 453us/step - loss: 0.4040
Epoch 114/400
160/160 [=====] - 0s 464us/step - loss: 0.4032
Epoch 115/400
160/160 [=====] - 0s 469us/step - loss: 0.4031
Epoch 116/400
160/160 [=====] - 0s 453us/step - loss: 0.4027
Epoch 117/400

160/160 [=====] - 0s 468us/step - loss: 0.4029
 Epoch 118/400
 160/160 [=====] - 0s 454us/step - loss: 0.4022
 Epoch 119/400
 160/160 [=====] - 0s 460us/step - loss: 0.4017
 Epoch 120/400
 160/160 [=====] - 0s 462us/step - loss: 0.4012
 Epoch 121/400
 160/160 [=====] - 0s 448us/step - loss: 0.4011
 Epoch 122/400
 160/160 [=====] - 0s 459us/step - loss: 0.4007
 Epoch 123/400
 160/160 [=====] - 0s 449us/step - loss: 0.4005
 Epoch 124/400
 160/160 [=====] - 0s 464us/step - loss: 0.4002
 Epoch 125/400
 160/160 [=====] - 0s 458us/step - loss: 0.4000
 Epoch 126/400
 160/160 [=====] - 0s 473us/step - loss: 0.3993
 Epoch 127/400
 160/160 [=====] - 0s 468us/step - loss: 0.3993
 Epoch 128/400
 160/160 [=====] - 0s 468us/step - loss: 0.3989
 Epoch 129/400
 160/160 [=====] - 0s 447us/step - loss: 0.3985
 Epoch 130/400
 160/160 [=====] - 0s 461us/step - loss: 0.3985
 Epoch 131/400
 160/160 [=====] - 0s 462us/step - loss: 0.3982
 Epoch 132/400
 160/160 [=====] - 0s 462us/step - loss: 0.3980
 Epoch 133/400
 160/160 [=====] - 0s 470us/step - loss: 0.3976
 Epoch 134/400
 160/160 [=====] - 0s 446us/step - loss: 0.3976
 Epoch 135/400
 160/160 [=====] - 0s 465us/step - loss: 0.3969
 Epoch 136/400
 160/160 [=====] - 0s 522us/step - loss: 0.3970
 Epoch 137/400
 160/160 [=====] - 0s 499us/step - loss: 0.3970
 Epoch 138/400
 160/160 [=====] - 0s 477us/step - loss: 0.3960
 Epoch 139/400
 160/160 [=====] - 0s 486us/step - loss: 0.3964
 Epoch 140/400
 160/160 [=====] - 0s 475us/step - loss: 0.3960
 Epoch 141/400

160/160 [=====] - 0s 477us/step - loss: 0.3956
Epoch 142/400
160/160 [=====] - 0s 474us/step - loss: 0.3953
Epoch 143/400
160/160 [=====] - 0s 502us/step - loss: 0.3952
Epoch 144/400
160/160 [=====] - 0s 517us/step - loss: 0.3951
Epoch 145/400
160/160 [=====] - 0s 518us/step - loss: 0.3947
Epoch 146/400
160/160 [=====] - 0s 504us/step - loss: 0.3945
Epoch 147/400
160/160 [=====] - 0s 490us/step - loss: 0.3943
Epoch 148/400
160/160 [=====] - 0s 472us/step - loss: 0.3942
Epoch 149/400
160/160 [=====] - 0s 598us/step - loss: 0.3938
Epoch 150/400
160/160 [=====] - 0s 545us/step - loss: 0.3935
Epoch 151/400
160/160 [=====] - 0s 521us/step - loss: 0.3938
Epoch 152/400
160/160 [=====] - 0s 463us/step - loss: 0.3934
Epoch 153/400
160/160 [=====] - 0s 455us/step - loss: 0.3930
Epoch 154/400
160/160 [=====] - 0s 475us/step - loss: 0.3924
Epoch 155/400
160/160 [=====] - 0s 480us/step - loss: 0.3928
Epoch 156/400
160/160 [=====] - 0s 483us/step - loss: 0.3925
Epoch 157/400
160/160 [=====] - 0s 473us/step - loss: 0.3925
Epoch 158/400
160/160 [=====] - 0s 507us/step - loss: 0.3921
Epoch 159/400
160/160 [=====] - 0s 476us/step - loss: 0.3922
Epoch 160/400
160/160 [=====] - 0s 483us/step - loss: 0.3920
Epoch 161/400
160/160 [=====] - 0s 484us/step - loss: 0.3917
Epoch 162/400
160/160 [=====] - 0s 465us/step - loss: 0.3915
Epoch 163/400
160/160 [=====] - 0s 499us/step - loss: 0.3914
Epoch 164/400
160/160 [=====] - 0s 485us/step - loss: 0.3911
Epoch 165/400

160/160 [=====] - 0s 471us/step - loss: 0.3911
Epoch 166/400
160/160 [=====] - 0s 478us/step - loss: 0.3909
Epoch 167/400
160/160 [=====] - 0s 484us/step - loss: 0.3908
Epoch 168/400
160/160 [=====] - 0s 489us/step - loss: 0.3899
Epoch 169/400
160/160 [=====] - 0s 463us/step - loss: 0.3905
Epoch 170/400
160/160 [=====] - 0s 468us/step - loss: 0.3908
Epoch 171/400
160/160 [=====] - 0s 460us/step - loss: 0.3905
Epoch 172/400
160/160 [=====] - 0s 488us/step - loss: 0.3902
Epoch 173/400
160/160 [=====] - 0s 535us/step - loss: 0.3900
Epoch 174/400
160/160 [=====] - 0s 493us/step - loss: 0.3897
Epoch 175/400
160/160 [=====] - 0s 473us/step - loss: 0.3894
Epoch 176/400
160/160 [=====] - 0s 462us/step - loss: 0.3892
Epoch 177/400
160/160 [=====] - 0s 474us/step - loss: 0.3895
Epoch 178/400
160/160 [=====] - 0s 474us/step - loss: 0.3892
Epoch 179/400
160/160 [=====] - 0s 504us/step - loss: 0.3892
Epoch 180/400
160/160 [=====] - 0s 515us/step - loss: 0.3891
Epoch 181/400
160/160 [=====] - 0s 477us/step - loss: 0.3888
Epoch 182/400
160/160 [=====] - 0s 467us/step - loss: 0.3885
Epoch 183/400
160/160 [=====] - 0s 464us/step - loss: 0.3884
Epoch 184/400
160/160 [=====] - 0s 472us/step - loss: 0.3884
Epoch 185/400
160/160 [=====] - 0s 450us/step - loss: 0.3882
Epoch 186/400
160/160 [=====] - 0s 450us/step - loss: 0.3883
Epoch 187/400
160/160 [=====] - 0s 481us/step - loss: 0.3881
Epoch 188/400
160/160 [=====] - 0s 476us/step - loss: 0.3878
Epoch 189/400

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160/160 [=====] - 0s 492us/step - loss: 0.3878
Epoch 190/400
160/160 [=====] - 0s 491us/step - loss: 0.3877
Epoch 191/400
160/160 [=====] - 0s 476us/step - loss: 0.3873
Epoch 192/400
160/160 [=====] - 0s 517us/step - loss: 0.3876
Epoch 193/400
160/160 [=====] - 0s 505us/step - loss: 0.3872
Epoch 194/400
160/160 [=====] - 0s 529us/step - loss: 0.3873
Epoch 195/400
160/160 [=====] - 0s 499us/step - loss: 0.3873
Epoch 196/400
160/160 [=====] - 0s 472us/step - loss: 0.3870
Epoch 197/400
160/160 [=====] - 0s 445us/step - loss: 0.3869
Epoch 198/400
160/160 [=====] - 0s 439us/step - loss: 0.3867
Epoch 199/400
160/160 [=====] - 0s 460us/step - loss: 0.3865
Epoch 200/400
160/160 [=====] - 0s 501us/step - loss: 0.3869
Epoch 201/400
160/160 [=====] - 0s 492us/step - loss: 0.3863
Epoch 202/400
160/160 [=====] - 0s 467us/step - loss: 0.3866
Epoch 203/400
160/160 [=====] - 0s 474us/step - loss: 0.3861
Epoch 204/400
160/160 [=====] - 0s 452us/step - loss: 0.3864
Epoch 205/400
160/160 [=====] - 0s 469us/step - loss: 0.3862
Epoch 206/400
160/160 [=====] - 0s 516us/step - loss: 0.3861
Epoch 207/400
160/160 [=====] - 0s 529us/step - loss: 0.3860
Epoch 208/400
160/160 [=====] - 0s 484us/step - loss: 0.3858
Epoch 209/400
160/160 [=====] - 0s 498us/step - loss: 0.3855
Epoch 210/400
160/160 [=====] - 0s 465us/step - loss: 0.3857
Epoch 211/400
160/160 [=====] - 0s 463us/step - loss: 0.3855
Epoch 212/400
160/160 [=====] - 0s 450us/step - loss: 0.3858
Epoch 213/400

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160/160 [=====] - 0s 492us/step - loss: 0.3853
 Epoch 214/400
 160/160 [=====] - 0s 503us/step - loss: 0.3854
 Epoch 215/400
 160/160 [=====] - 0s 480us/step - loss: 0.3851
 Epoch 216/400
 160/160 [=====] - 0s 468us/step - loss: 0.3850
 Epoch 217/400
 160/160 [=====] - 0s 492us/step - loss: 0.3850
 Epoch 218/400
 160/160 [=====] - 0s 520us/step - loss: 0.3849
 Epoch 219/400
 160/160 [=====] - 0s 487us/step - loss: 0.3848
 Epoch 220/400
 160/160 [=====] - 0s 527us/step - loss: 0.3848
 Epoch 221/400
 160/160 [=====] - 0s 474us/step - loss: 0.3844
 Epoch 222/400
 160/160 [=====] - 0s 467us/step - loss: 0.3843
 Epoch 223/400
 160/160 [=====] - 0s 496us/step - loss: 0.3846
 Epoch 224/400
 160/160 [=====] - 0s 493us/step - loss: 0.3841
 Epoch 225/400
 160/160 [=====] - 0s 498us/step - loss: 0.3842
 Epoch 226/400
 160/160 [=====] - 0s 486us/step - loss: 0.3841
 Epoch 227/400
 160/160 [=====] - 0s 488us/step - loss: 0.3840
 Epoch 228/400
 160/160 [=====] - 0s 468us/step - loss: 0.3841
 Epoch 229/400
 160/160 [=====] - 0s 484us/step - loss: 0.3839
 Epoch 230/400
 160/160 [=====] - 0s 499us/step - loss: 0.3837
 Epoch 231/400
 160/160 [=====] - 0s 472us/step - loss: 0.3837
 Epoch 232/400
 160/160 [=====] - 0s 468us/step - loss: 0.3832
 Epoch 233/400
 160/160 [=====] - 0s 488us/step - loss: 0.3835
 Epoch 234/400
 160/160 [=====] - 0s 514us/step - loss: 0.3837
 Epoch 235/400
 160/160 [=====] - 0s 495us/step - loss: 0.3834
 Epoch 236/400
 160/160 [=====] - 0s 476us/step - loss: 0.3833
 Epoch 237/400

160/160 [=====] - 0s 483us/step - loss: 0.3832
 Epoch 238/400
 160/160 [=====] - 0s 482us/step - loss: 0.3832
 Epoch 239/400
 160/160 [=====] - 0s 454us/step - loss: 0.3830
 Epoch 240/400
 160/160 [=====] - 0s 458us/step - loss: 0.3830
 Epoch 241/400
 160/160 [=====] - 0s 492us/step - loss: 0.3828
 Epoch 242/400
 160/160 [=====] - 0s 505us/step - loss: 0.3827
 Epoch 243/400
 160/160 [=====] - 0s 499us/step - loss: 0.3826
 Epoch 244/400
 160/160 [=====] - 0s 485us/step - loss: 0.3828
 Epoch 245/400
 160/160 [=====] - 0s 511us/step - loss: 0.3826
 Epoch 246/400
 160/160 [=====] - 0s 505us/step - loss: 0.3825
 Epoch 247/400
 160/160 [=====] - 0s 475us/step - loss: 0.3822
 Epoch 248/400
 160/160 [=====] - 0s 485us/step - loss: 0.3824
 Epoch 249/400
 160/160 [=====] - 0s 503us/step - loss: 0.3823
 Epoch 250/400
 160/160 [=====] - 0s 514us/step - loss: 0.3823
 Epoch 251/400
 160/160 [=====] - 0s 482us/step - loss: 0.3821
 Epoch 252/400
 160/160 [=====] - 0s 490us/step - loss: 0.3817
 Epoch 253/400
 160/160 [=====] - 0s 479us/step - loss: 0.3819
 Epoch 254/400
 160/160 [=====] - 0s 493us/step - loss: 0.3818
 Epoch 255/400
 160/160 [=====] - 0s 478us/step - loss: 0.3818
 Epoch 256/400
 160/160 [=====] - 0s 482us/step - loss: 0.3817
 Epoch 257/400
 160/160 [=====] - 0s 501us/step - loss: 0.3816
 Epoch 258/400
 160/160 [=====] - 0s 481us/step - loss: 0.3815
 Epoch 259/400
 160/160 [=====] - 0s 502us/step - loss: 0.3813
 Epoch 260/400
 160/160 [=====] - 0s 519us/step - loss: 0.3813
 Epoch 261/400

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160/160 [=====] - 0s 498us/step - loss: 0.3810
Epoch 262/400
160/160 [=====] - 0s 487us/step - loss: 0.3811
Epoch 263/400
160/160 [=====] - 0s 499us/step - loss: 0.3812
Epoch 264/400
160/160 [=====] - 0s 475us/step - loss: 0.3811
Epoch 265/400
160/160 [=====] - 0s 492us/step - loss: 0.3809
Epoch 266/400
160/160 [=====] - 0s 501us/step - loss: 0.3808
Epoch 267/400
160/160 [=====] - 0s 473us/step - loss: 0.3809
Epoch 268/400
160/160 [=====] - 0s 474us/step - loss: 0.3807
Epoch 269/400
160/160 [=====] - 0s 505us/step - loss: 0.3802
Epoch 270/400
160/160 [=====] - 0s 503us/step - loss: 0.3808
Epoch 271/400
160/160 [=====] - 0s 488us/step - loss: 0.3805
Epoch 272/400
160/160 [=====] - 0s 502us/step - loss: 0.3803
Epoch 273/400
160/160 [=====] - 0s 484us/step - loss: 0.3805
Epoch 274/400
160/160 [=====] - 0s 464us/step - loss: 0.3803
Epoch 275/400
160/160 [=====] - 0s 462us/step - loss: 0.3803
Epoch 276/400
160/160 [=====] - 0s 459us/step - loss: 0.3802
Epoch 277/400
160/160 [=====] - 0s 461us/step - loss: 0.3801
Epoch 278/400
160/160 [=====] - 0s 478us/step - loss: 0.3794
Epoch 279/400
160/160 [=====] - 0s 493us/step - loss: 0.3801
Epoch 280/400
160/160 [=====] - 0s 514us/step - loss: 0.3799
Epoch 281/400
160/160 [=====] - 0s 478us/step - loss: 0.3798
Epoch 282/400
160/160 [=====] - 0s 511us/step - loss: 0.3799
Epoch 283/400
160/160 [=====] - 0s 501us/step - loss: 0.3796
Epoch 284/400
160/160 [=====] - 0s 480us/step - loss: 0.3797
Epoch 285/400

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160/160 [=====] - 0s 493us/step - loss: 0.3795
Epoch 286/400
160/160 [=====] - 0s 485us/step - loss: 0.3793
Epoch 287/400
160/160 [=====] - 0s 491us/step - loss: 0.3794
Epoch 288/400
160/160 [=====] - 0s 460us/step - loss: 0.3793
Epoch 289/400
160/160 [=====] - 0s 493us/step - loss: 0.3792
Epoch 290/400
160/160 [=====] - 0s 458us/step - loss: 0.3792
Epoch 291/400
160/160 [=====] - 0s 468us/step - loss: 0.3794
Epoch 292/400
160/160 [=====] - 0s 481us/step - loss: 0.3792
Epoch 293/400
160/160 [=====] - 0s 452us/step - loss: 0.3790
Epoch 294/400
160/160 [=====] - 0s 465us/step - loss: 0.3789
Epoch 295/400
160/160 [=====] - 0s 447us/step - loss: 0.3790
Epoch 296/400
160/160 [=====] - 0s 464us/step - loss: 0.3789
Epoch 297/400
160/160 [=====] - 0s 458us/step - loss: 0.3788
Epoch 298/400
160/160 [=====] - 0s 470us/step - loss: 0.3786
Epoch 299/400
160/160 [=====] - 0s 478us/step - loss: 0.3787
Epoch 300/400
160/160 [=====] - 0s 516us/step - loss: 0.3783
Epoch 301/400
160/160 [=====] - 0s 512us/step - loss: 0.3786
Epoch 302/400
160/160 [=====] - 0s 494us/step - loss: 0.3784
Epoch 303/400
160/160 [=====] - 0s 498us/step - loss: 0.3782
Epoch 304/400
160/160 [=====] - 0s 493us/step - loss: 0.3785
Epoch 305/400
160/160 [=====] - 0s 447us/step - loss: 0.3783
Epoch 306/400
160/160 [=====] - 0s 461us/step - loss: 0.3782
Epoch 307/400
160/160 [=====] - 0s 486us/step - loss: 0.3781
Epoch 308/400
160/160 [=====] - 0s 482us/step - loss: 0.3780
Epoch 309/400


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160/160 [=====] - 0s 486us/step - loss: 0.3781
Epoch 310/400
160/160 [=====] - 0s 477us/step - loss: 0.3779
Epoch 311/400
160/160 [=====] - 0s 484us/step - loss: 0.3778
Epoch 312/400
160/160 [=====] - 0s 491us/step - loss: 0.3778
Epoch 313/400
160/160 [=====] - 0s 489us/step - loss: 0.3778
Epoch 314/400
160/160 [=====] - 0s 470us/step - loss: 0.3778
Epoch 315/400
160/160 [=====] - 0s 492us/step - loss: 0.3777
Epoch 316/400
160/160 [=====] - 0s 489us/step - loss: 0.3774
Epoch 317/400
160/160 [=====] - 0s 467us/step - loss: 0.3776
Epoch 318/400
160/160 [=====] - 0s 492us/step - loss: 0.3775
Epoch 319/400
160/160 [=====] - 0s 650us/step - loss: 0.3774
Epoch 320/400
160/160 [=====] - 0s 505us/step - loss: 0.3774
Epoch 321/400
160/160 [=====] - 0s 476us/step - loss: 0.3770
Epoch 322/400
160/160 [=====] - 0s 514us/step - loss: 0.3772
Epoch 323/400
160/160 [=====] - 0s 490us/step - loss: 0.3773
Epoch 324/400
160/160 [=====] - 0s 476us/step - loss: 0.3773
Epoch 325/400
160/160 [=====] - 0s 491us/step - loss: 0.3771
Epoch 326/400
160/160 [=====] - 0s 491us/step - loss: 0.3769
Epoch 327/400
160/160 [=====] - 0s 469us/step - loss: 0.3768
Epoch 328/400
160/160 [=====] - 0s 468us/step - loss: 0.3768
Epoch 329/400
160/160 [=====] - 0s 492us/step - loss: 0.3767
Epoch 330/400
160/160 [=====] - 0s 498us/step - loss: 0.3768
Epoch 331/400
160/160 [=====] - 0s 494us/step - loss: 0.3767
Epoch 332/400
160/160 [=====] - 0s 482us/step - loss: 0.3768
Epoch 333/400

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160/160 [=====] - 0s 464us/step - loss: 0.3766
Epoch 334/400
160/160 [=====] - 0s 506us/step - loss: 0.3766
Epoch 335/400
160/160 [=====] - 0s 522us/step - loss: 0.3765
Epoch 336/400
160/160 [=====] - 0s 529us/step - loss: 0.3765
Epoch 337/400
160/160 [=====] - 0s 532us/step - loss: 0.3765
Epoch 338/400
160/160 [=====] - 0s 464us/step - loss: 0.3761
Epoch 339/400
160/160 [=====] - 0s 491us/step - loss: 0.3762
Epoch 340/400
160/160 [=====] - 0s 466us/step - loss: 0.3762
Epoch 341/400
160/160 [=====] - 0s 557us/step - loss: 0.3758
Epoch 342/400
160/160 [=====] - 0s 533us/step - loss: 0.3760
Epoch 343/400
160/160 [=====] - 0s 491us/step - loss: 0.3761
Epoch 344/400
160/160 [=====] - 0s 477us/step - loss: 0.3761
Epoch 345/400
160/160 [=====] - 0s 487us/step - loss: 0.3760
Epoch 346/400
160/160 [=====] - 0s 482us/step - loss: 0.3756
Epoch 347/400
160/160 [=====] - 0s 553us/step - loss: 0.3759
Epoch 348/400
160/160 [=====] - 0s 533us/step - loss: 0.3757
Epoch 349/400
160/160 [=====] - 0s 491us/step - loss: 0.3758
Epoch 350/400
160/160 [=====] - 0s 522us/step - loss: 0.3756
Epoch 351/400
160/160 [=====] - 0s 552us/step - loss: 0.3758
Epoch 352/400
160/160 [=====] - 0s 529us/step - loss: 0.3757
Epoch 353/400
160/160 [=====] - 0s 540us/step - loss: 0.3755
Epoch 354/400
160/160 [=====] - 0s 479us/step - loss: 0.3755
Epoch 355/400
160/160 [=====] - 0s 460us/step - loss: 0.3756
Epoch 356/400
160/160 [=====] - 0s 481us/step - loss: 0.3755
Epoch 357/400

160/160 [=====] - 0s 494us/step - loss: 0.3753
Epoch 358/400
160/160 [=====] - 0s 480us/step - loss: 0.3754
Epoch 359/400
160/160 [=====] - 0s 458us/step - loss: 0.3751
Epoch 360/400
160/160 [=====] - 0s 476us/step - loss: 0.3751
Epoch 361/400
160/160 [=====] - 0s 504us/step - loss: 0.3752
Epoch 362/400
160/160 [=====] - 0s 490us/step - loss: 0.3751
Epoch 363/400
160/160 [=====] - 0s 483us/step - loss: 0.3753
Epoch 364/400
160/160 [=====] - 0s 470us/step - loss: 0.3747
Epoch 365/400
160/160 [=====] - 0s 466us/step - loss: 0.3750
Epoch 366/400
160/160 [=====] - 0s 473us/step - loss: 0.3749
Epoch 367/400
160/160 [=====] - 0s 484us/step - loss: 0.3747
Epoch 368/400
160/160 [=====] - 0s 485us/step - loss: 0.3750
Epoch 369/400
160/160 [=====] - 0s 478us/step - loss: 0.3748
Epoch 370/400
160/160 [=====] - 0s 489us/step - loss: 0.3747
Epoch 371/400
160/160 [=====] - 0s 478us/step - loss: 0.3746
Epoch 372/400
160/160 [=====] - 0s 485us/step - loss: 0.3748
Epoch 373/400
160/160 [=====] - 0s 481us/step - loss: 0.3745
Epoch 374/400
160/160 [=====] - 0s 469us/step - loss: 0.3745
Epoch 375/400
160/160 [=====] - 0s 489us/step - loss: 0.3743
Epoch 376/400
160/160 [=====] - 0s 448us/step - loss: 0.3745
Epoch 377/400
160/160 [=====] - 0s 443us/step - loss: 0.3743
Epoch 378/400
160/160 [=====] - 0s 437us/step - loss: 0.3743
Epoch 379/400
160/160 [=====] - 0s 476us/step - loss: 0.3743
Epoch 380/400
160/160 [=====] - 0s 465us/step - loss: 0.3742
Epoch 381/400

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160/160 [=====] - 0s 496us/step - loss: 0.3737
Epoch 382/400
160/160 [=====] - 0s 498us/step - loss: 0.3742
Epoch 383/400
160/160 [=====] - 0s 469us/step - loss: 0.3742
Epoch 384/400
160/160 [=====] - 0s 453us/step - loss: 0.3741
Epoch 385/400
160/160 [=====] - 0s 433us/step - loss: 0.3741
Epoch 386/400
160/160 [=====] - 0s 467us/step - loss: 0.3740
Epoch 387/400
160/160 [=====] - 0s 458us/step - loss: 0.3739
Epoch 388/400
160/160 [=====] - 0s 478us/step - loss: 0.3737
Epoch 389/400
160/160 [=====] - 0s 444us/step - loss: 0.3739
Epoch 390/400
160/160 [=====] - 0s 471us/step - loss: 0.3739
Epoch 391/400
160/160 [=====] - 0s 448us/step - loss: 0.3738
Epoch 392/400
160/160 [=====] - 0s 468us/step - loss: 0.3738
Epoch 393/400
160/160 [=====] - 0s 458us/step - loss: 0.3736
Epoch 394/400
160/160 [=====] - 0s 467us/step - loss: 0.3736
Epoch 395/400
160/160 [=====] - 0s 464us/step - loss: 0.3736
Epoch 396/400
160/160 [=====] - 0s 475us/step - loss: 0.3736
Epoch 397/400
160/160 [=====] - 0s 455us/step - loss: 0.3735
Epoch 398/400
160/160 [=====] - 0s 465us/step - loss: 0.3733
Epoch 399/400
160/160 [=====] - 0s 464us/step - loss: 0.3733
Epoch 400/400
160/160 [=====] - 0s 474us/step - loss: 0.3730
160/160 [=====] - 0s 289us/step

```

```
In [8]: model = Sequential()
```

```

model.add(Dense(2, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(2, input_dim = 2, activation='relu'))
model.add(Dense(2, input_dim = 2, activation='sigmoid'))
model.add(Dense(1, activation='sigmoid'))

```

```

# model.add(Dense(1,input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_three = model.evaluate(X, y)

```

```

Epoch 1/400
160/160 [=====] - 0s 1ms/step - loss: 0.7310
Epoch 2/400
160/160 [=====] - 0s 529us/step - loss: 0.7157
Epoch 3/400
160/160 [=====] - 0s 517us/step - loss: 0.7074
Epoch 4/400
160/160 [=====] - 0s 514us/step - loss: 0.7028
Epoch 5/400
160/160 [=====] - 0s 563us/step - loss: 0.7001
Epoch 6/400
160/160 [=====] - 0s 545us/step - loss: 0.6985
Epoch 7/400
160/160 [=====] - 0s 529us/step - loss: 0.6977
Epoch 8/400
160/160 [=====] - 0s 575us/step - loss: 0.6971
Epoch 9/400
160/160 [=====] - 0s 528us/step - loss: 0.6968
Epoch 10/400
160/160 [=====] - 0s 538us/step - loss: 0.6961
Epoch 11/400
160/160 [=====] - 0s 595us/step - loss: 0.6960
Epoch 12/400
160/160 [=====] - 0s 520us/step - loss: 0.6956
Epoch 13/400
160/160 [=====] - 0s 535us/step - loss: 0.6951
Epoch 14/400
160/160 [=====] - 0s 541us/step - loss: 0.6949
Epoch 15/400
160/160 [=====] - 0s 537us/step - loss: 0.6945
Epoch 16/400
160/160 [=====] - 0s 536us/step - loss: 0.6941
Epoch 17/400
160/160 [=====] - 0s 543us/step - loss: 0.6938
Epoch 18/400
160/160 [=====] - 0s 537us/step - loss: 0.6935

```

Epoch 19/400
160/160 [=====] - 0s 546us/step - loss: 0.6931
Epoch 20/400
160/160 [=====] - 0s 575us/step - loss: 0.6926
Epoch 21/400
160/160 [=====] - 0s 520us/step - loss: 0.6921
Epoch 22/400
160/160 [=====] - 0s 563us/step - loss: 0.6915
Epoch 23/400
160/160 [=====] - 0s 555us/step - loss: 0.6911
Epoch 24/400
160/160 [=====] - 0s 497us/step - loss: 0.6906
Epoch 25/400
160/160 [=====] - 0s 494us/step - loss: 0.6905
Epoch 26/400
160/160 [=====] - 0s 461us/step - loss: 0.6900
Epoch 27/400
160/160 [=====] - 0s 546us/step - loss: 0.6894
Epoch 28/400
160/160 [=====] - 0s 526us/step - loss: 0.6892
Epoch 29/400
160/160 [=====] - 0s 532us/step - loss: 0.6888
Epoch 30/400
160/160 [=====] - 0s 548us/step - loss: 0.6886
Epoch 31/400
160/160 [=====] - 0s 570us/step - loss: 0.6880
Epoch 32/400
160/160 [=====] - 0s 550us/step - loss: 0.6876
Epoch 33/400
160/160 [=====] - 0s 506us/step - loss: 0.6872
Epoch 34/400
160/160 [=====] - 0s 561us/step - loss: 0.6869
Epoch 35/400
160/160 [=====] - 0s 572us/step - loss: 0.6864
Epoch 36/400
160/160 [=====] - 0s 555us/step - loss: 0.6858
Epoch 37/400
160/160 [=====] - 0s 535us/step - loss: 0.6856
Epoch 38/400
160/160 [=====] - 0s 541us/step - loss: 0.6853
Epoch 39/400
160/160 [=====] - 0s 543us/step - loss: 0.6851
Epoch 40/400
160/160 [=====] - 0s 529us/step - loss: 0.6848
Epoch 41/400
160/160 [=====] - 0s 526us/step - loss: 0.6842
Epoch 42/400
160/160 [=====] - 0s 554us/step - loss: 0.6839

Epoch 43/400
160/160 [=====] - 0s 554us/step - loss: 0.6834
Epoch 44/400
160/160 [=====] - 0s 515us/step - loss: 0.6830
Epoch 45/400
160/160 [=====] - 0s 463us/step - loss: 0.6824
Epoch 46/400
160/160 [=====] - 0s 494us/step - loss: 0.6821
Epoch 47/400
160/160 [=====] - 0s 492us/step - loss: 0.6816
Epoch 48/400
160/160 [=====] - 0s 475us/step - loss: 0.6810
Epoch 49/400
160/160 [=====] - 0s 486us/step - loss: 0.6803
Epoch 50/400
160/160 [=====] - 0s 480us/step - loss: 0.6798
Epoch 51/400
160/160 [=====] - 0s 505us/step - loss: 0.6791
Epoch 52/400
160/160 [=====] - 0s 548us/step - loss: 0.6784
Epoch 53/400
160/160 [=====] - 0s 488us/step - loss: 0.6777
Epoch 54/400
160/160 [=====] - 0s 520us/step - loss: 0.6770
Epoch 55/400
160/160 [=====] - 0s 485us/step - loss: 0.6757
Epoch 56/400
160/160 [=====] - 0s 496us/step - loss: 0.6751
Epoch 57/400
160/160 [=====] - 0s 485us/step - loss: 0.6740
Epoch 58/400
160/160 [=====] - 0s 518us/step - loss: 0.6730
Epoch 59/400
160/160 [=====] - 0s 532us/step - loss: 0.6720
Epoch 60/400
160/160 [=====] - 0s 541us/step - loss: 0.6707
Epoch 61/400
160/160 [=====] - 0s 530us/step - loss: 0.6695
Epoch 62/400
160/160 [=====] - 0s 535us/step - loss: 0.6680
Epoch 63/400
160/160 [=====] - 0s 516us/step - loss: 0.6668
Epoch 64/400
160/160 [=====] - 0s 520us/step - loss: 0.6657
Epoch 65/400
160/160 [=====] - 0s 517us/step - loss: 0.6641
Epoch 66/400
160/160 [=====] - 0s 537us/step - loss: 0.6625

Epoch 67/400
160/160 [=====] - 0s 540us/step - loss: 0.6610
Epoch 68/400
160/160 [=====] - 0s 539us/step - loss: 0.6595
Epoch 69/400
160/160 [=====] - 0s 534us/step - loss: 0.6578
Epoch 70/400
160/160 [=====] - 0s 538us/step - loss: 0.6558
Epoch 71/400
160/160 [=====] - 0s 504us/step - loss: 0.6539
Epoch 72/400
160/160 [=====] - 0s 532us/step - loss: 0.6521
Epoch 73/400
160/160 [=====] - 0s 521us/step - loss: 0.6503
Epoch 74/400
160/160 [=====] - 0s 538us/step - loss: 0.6480
Epoch 75/400
160/160 [=====] - 0s 535us/step - loss: 0.6458
Epoch 76/400
160/160 [=====] - 0s 521us/step - loss: 0.6437
Epoch 77/400
160/160 [=====] - 0s 517us/step - loss: 0.6415
Epoch 78/400
160/160 [=====] - 0s 509us/step - loss: 0.6396
Epoch 79/400
160/160 [=====] - 0s 513us/step - loss: 0.6370
Epoch 80/400
160/160 [=====] - 0s 542us/step - loss: 0.6345
Epoch 81/400
160/160 [=====] - 0s 550us/step - loss: 0.6319
Epoch 82/400
160/160 [=====] - 0s 538us/step - loss: 0.6297
Epoch 83/400
160/160 [=====] - 0s 531us/step - loss: 0.6268
Epoch 84/400
160/160 [=====] - 0s 545us/step - loss: 0.6240
Epoch 85/400
160/160 [=====] - 0s 542us/step - loss: 0.6211
Epoch 86/400
160/160 [=====] - 0s 514us/step - loss: 0.6183
Epoch 87/400
160/160 [=====] - 0s 511us/step - loss: 0.6155
Epoch 88/400
160/160 [=====] - 0s 497us/step - loss: 0.6124
Epoch 89/400
160/160 [=====] - 0s 501us/step - loss: 0.6092
Epoch 90/400
160/160 [=====] - 0s 529us/step - loss: 0.6059

Epoch 91/400
160/160 [=====] - 0s 504us/step - loss: 0.6030
Epoch 92/400
160/160 [=====] - 0s 513us/step - loss: 0.5994
Epoch 93/400
160/160 [=====] - 0s 535us/step - loss: 0.5961
Epoch 94/400
160/160 [=====] - 0s 542us/step - loss: 0.5931
Epoch 95/400
160/160 [=====] - 0s 539us/step - loss: 0.5895
Epoch 96/400
160/160 [=====] - 0s 535us/step - loss: 0.5861
Epoch 97/400
160/160 [=====] - 0s 554us/step - loss: 0.5830
Epoch 98/400
160/160 [=====] - 0s 516us/step - loss: 0.5794
Epoch 99/400
160/160 [=====] - 0s 507us/step - loss: 0.5760
Epoch 100/400
160/160 [=====] - 0s 494us/step - loss: 0.5725
Epoch 101/400
160/160 [=====] - 0s 505us/step - loss: 0.5694
Epoch 102/400
160/160 [=====] - 0s 513us/step - loss: 0.5660
Epoch 103/400
160/160 [=====] - 0s 543us/step - loss: 0.5625
Epoch 104/400
160/160 [=====] - 0s 515us/step - loss: 0.5594
Epoch 105/400
160/160 [=====] - 0s 516us/step - loss: 0.5560
Epoch 106/400
160/160 [=====] - 0s 513us/step - loss: 0.5527
Epoch 107/400
160/160 [=====] - 0s 521us/step - loss: 0.5495
Epoch 108/400
160/160 [=====] - 0s 512us/step - loss: 0.5464
Epoch 109/400
160/160 [=====] - 0s 523us/step - loss: 0.5431
Epoch 110/400
160/160 [=====] - 0s 514us/step - loss: 0.5397
Epoch 111/400
160/160 [=====] - 0s 513us/step - loss: 0.5374
Epoch 112/400
160/160 [=====] - 0s 520us/step - loss: 0.5344
Epoch 113/400
160/160 [=====] - 0s 512us/step - loss: 0.5321
Epoch 114/400
160/160 [=====] - 0s 500us/step - loss: 0.5292

Epoch 115/400
160/160 [=====] - 0s 510us/step - loss: 0.5265
Epoch 116/400
160/160 [=====] - 0s 502us/step - loss: 0.5238
Epoch 117/400
160/160 [=====] - 0s 527us/step - loss: 0.5216
Epoch 118/400
160/160 [=====] - 0s 517us/step - loss: 0.5192
Epoch 119/400
160/160 [=====] - 0s 496us/step - loss: 0.5170
Epoch 120/400
160/160 [=====] - 0s 515us/step - loss: 0.5148
Epoch 121/400
160/160 [=====] - 0s 502us/step - loss: 0.5124
Epoch 122/400
160/160 [=====] - 0s 491us/step - loss: 0.5106
Epoch 123/400
160/160 [=====] - 0s 520us/step - loss: 0.5084
Epoch 124/400
160/160 [=====] - 0s 514us/step - loss: 0.5061
Epoch 125/400
160/160 [=====] - 0s 523us/step - loss: 0.5043
Epoch 126/400
160/160 [=====] - 0s 549us/step - loss: 0.5024
Epoch 127/400
160/160 [=====] - 0s 480us/step - loss: 0.5001
Epoch 128/400
160/160 [=====] - 0s 517us/step - loss: 0.4982
Epoch 129/400
160/160 [=====] - 0s 534us/step - loss: 0.4967
Epoch 130/400
160/160 [=====] - 0s 506us/step - loss: 0.4950
Epoch 131/400
160/160 [=====] - 0s 515us/step - loss: 0.4918
Epoch 132/400
160/160 [=====] - 0s 515us/step - loss: 0.4918
Epoch 133/400
160/160 [=====] - 0s 508us/step - loss: 0.4901
Epoch 134/400
160/160 [=====] - 0s 505us/step - loss: 0.4883
Epoch 135/400
160/160 [=====] - 0s 504us/step - loss: 0.4866
Epoch 136/400
160/160 [=====] - 0s 520us/step - loss: 0.4851
Epoch 137/400
160/160 [=====] - 0s 518us/step - loss: 0.4834
Epoch 138/400
160/160 [=====] - 0s 517us/step - loss: 0.4823

Epoch 139/400
160/160 [=====] - 0s 514us/step - loss: 0.4807
Epoch 140/400
160/160 [=====] - 0s 524us/step - loss: 0.4792
Epoch 141/400
160/160 [=====] - 0s 526us/step - loss: 0.4780
Epoch 142/400
160/160 [=====] - 0s 509us/step - loss: 0.4764
Epoch 143/400
160/160 [=====] - 0s 517us/step - loss: 0.4751
Epoch 144/400
160/160 [=====] - 0s 524us/step - loss: 0.4736
Epoch 145/400
160/160 [=====] - 0s 506us/step - loss: 0.4720
Epoch 146/400
160/160 [=====] - 0s 513us/step - loss: 0.4713
Epoch 147/400
160/160 [=====] - 0s 515us/step - loss: 0.4699
Epoch 148/400
160/160 [=====] - 0s 510us/step - loss: 0.4688
Epoch 149/400
160/160 [=====] - 0s 506us/step - loss: 0.4676
Epoch 150/400
160/160 [=====] - 0s 519us/step - loss: 0.4666
Epoch 151/400
160/160 [=====] - 0s 520us/step - loss: 0.4652
Epoch 152/400
160/160 [=====] - 0s 525us/step - loss: 0.4643
Epoch 153/400
160/160 [=====] - 0s 521us/step - loss: 0.4631
Epoch 154/400
160/160 [=====] - 0s 505us/step - loss: 0.4619
Epoch 155/400
160/160 [=====] - 0s 508us/step - loss: 0.4610
Epoch 156/400
160/160 [=====] - 0s 513us/step - loss: 0.4600
Epoch 157/400
160/160 [=====] - 0s 513us/step - loss: 0.4591
Epoch 158/400
160/160 [=====] - 0s 510us/step - loss: 0.4576
Epoch 159/400
160/160 [=====] - 0s 528us/step - loss: 0.4575
Epoch 160/400
160/160 [=====] - 0s 510us/step - loss: 0.4565
Epoch 161/400
160/160 [=====] - 0s 506us/step - loss: 0.4554
Epoch 162/400
160/160 [=====] - 0s 511us/step - loss: 0.4548

Epoch 163/400
160/160 [=====] - 0s 524us/step - loss: 0.4535
Epoch 164/400
160/160 [=====] - 0s 540us/step - loss: 0.4528
Epoch 165/400
160/160 [=====] - 0s 513us/step - loss: 0.4519
Epoch 166/400
160/160 [=====] - 0s 518us/step - loss: 0.4509
Epoch 167/400
160/160 [=====] - 0s 524us/step - loss: 0.4501
Epoch 168/400
160/160 [=====] - 0s 517us/step - loss: 0.4496
Epoch 169/400
160/160 [=====] - 0s 516us/step - loss: 0.4485
Epoch 170/400
160/160 [=====] - 0s 508us/step - loss: 0.4480
Epoch 171/400
160/160 [=====] - 0s 500us/step - loss: 0.4473
Epoch 172/400
160/160 [=====] - 0s 514us/step - loss: 0.4462
Epoch 173/400
160/160 [=====] - 0s 537us/step - loss: 0.4458
Epoch 174/400
160/160 [=====] - 0s 568us/step - loss: 0.4450
Epoch 175/400
160/160 [=====] - 0s 587us/step - loss: 0.4444
Epoch 176/400
160/160 [=====] - 0s 623us/step - loss: 0.4433
Epoch 177/400
160/160 [=====] - 0s 557us/step - loss: 0.4426
Epoch 178/400
160/160 [=====] - 0s 562us/step - loss: 0.4418
Epoch 179/400
160/160 [=====] - 0s 491us/step - loss: 0.4406
Epoch 180/400
160/160 [=====] - 0s 523us/step - loss: 0.4400
Epoch 181/400
160/160 [=====] - 0s 512us/step - loss: 0.4398
Epoch 182/400
160/160 [=====] - 0s 509us/step - loss: 0.4390
Epoch 183/400
160/160 [=====] - 0s 527us/step - loss: 0.4378
Epoch 184/400
160/160 [=====] - 0s 512us/step - loss: 0.4372
Epoch 185/400
160/160 [=====] - 0s 523us/step - loss: 0.4363
Epoch 186/400
160/160 [=====] - 0s 509us/step - loss: 0.4359

Epoch 187/400
160/160 [=====] - 0s 501us/step - loss: 0.4354
Epoch 188/400
160/160 [=====] - 0s 641us/step - loss: 0.4348
Epoch 189/400
160/160 [=====] - 0s 536us/step - loss: 0.4340
Epoch 190/400
160/160 [=====] - 0s 519us/step - loss: 0.4330
Epoch 191/400
160/160 [=====] - 0s 505us/step - loss: 0.4328
Epoch 192/400
160/160 [=====] - 0s 520us/step - loss: 0.4322
Epoch 193/400
160/160 [=====] - 0s 529us/step - loss: 0.4316
Epoch 194/400
160/160 [=====] - 0s 506us/step - loss: 0.4309
Epoch 195/400
160/160 [=====] - 0s 513us/step - loss: 0.4299
Epoch 196/400
160/160 [=====] - 0s 510us/step - loss: 0.4300
Epoch 197/400
160/160 [=====] - 0s 496us/step - loss: 0.4283
Epoch 198/400
160/160 [=====] - 0s 505us/step - loss: 0.4285
Epoch 199/400
160/160 [=====] - 0s 514us/step - loss: 0.4282
Epoch 200/400
160/160 [=====] - 0s 513us/step - loss: 0.4277
Epoch 201/400
160/160 [=====] - 0s 519us/step - loss: 0.4271
Epoch 202/400
160/160 [=====] - 0s 513us/step - loss: 0.4266
Epoch 203/400
160/160 [=====] - 0s 508us/step - loss: 0.4261
Epoch 204/400
160/160 [=====] - 0s 507us/step - loss: 0.4254
Epoch 205/400
160/160 [=====] - 0s 516us/step - loss: 0.4252
Epoch 206/400
160/160 [=====] - 0s 510us/step - loss: 0.4244
Epoch 207/400
160/160 [=====] - 0s 518us/step - loss: 0.4232
Epoch 208/400
160/160 [=====] - 0s 502us/step - loss: 0.4239
Epoch 209/400
160/160 [=====] - 0s 501us/step - loss: 0.4228
Epoch 210/400
160/160 [=====] - 0s 497us/step - loss: 0.4230

Epoch 211/400
160/160 [=====] - 0s 473us/step - loss: 0.4220
Epoch 212/400
160/160 [=====] - 0s 469us/step - loss: 0.4222
Epoch 213/400
160/160 [=====] - 0s 492us/step - loss: 0.4215
Epoch 214/400
160/160 [=====] - 0s 481us/step - loss: 0.4207
Epoch 215/400
160/160 [=====] - 0s 493us/step - loss: 0.4203
Epoch 216/400
160/160 [=====] - 0s 483us/step - loss: 0.4197
Epoch 217/400
160/160 [=====] - 0s 504us/step - loss: 0.4190
Epoch 218/400
160/160 [=====] - 0s 485us/step - loss: 0.4191
Epoch 219/400
160/160 [=====] - 0s 510us/step - loss: 0.4183
Epoch 220/400
160/160 [=====] - 0s 497us/step - loss: 0.4182
Epoch 221/400
160/160 [=====] - 0s 510us/step - loss: 0.4176
Epoch 222/400
160/160 [=====] - 0s 501us/step - loss: 0.4176
Epoch 223/400
160/160 [=====] - 0s 513us/step - loss: 0.4165
Epoch 224/400
160/160 [=====] - 0s 508us/step - loss: 0.4164
Epoch 225/400
160/160 [=====] - 0s 502us/step - loss: 0.4158
Epoch 226/400
160/160 [=====] - 0s 499us/step - loss: 0.4157
Epoch 227/400
160/160 [=====] - 0s 486us/step - loss: 0.4150
Epoch 228/400
160/160 [=====] - 0s 510us/step - loss: 0.4151
Epoch 229/400
160/160 [=====] - 0s 513us/step - loss: 0.4142
Epoch 230/400
160/160 [=====] - 0s 512us/step - loss: 0.4139
Epoch 231/400
160/160 [=====] - 0s 503us/step - loss: 0.4137
Epoch 232/400
160/160 [=====] - 0s 503us/step - loss: 0.4128
Epoch 233/400
160/160 [=====] - 0s 510us/step - loss: 0.4120
Epoch 234/400
160/160 [=====] - 0s 510us/step - loss: 0.4127

Epoch 235/400
160/160 [=====] - 0s 511us/step - loss: 0.4122
Epoch 236/400
160/160 [=====] - 0s 511us/step - loss: 0.4116
Epoch 237/400
160/160 [=====] - 0s 510us/step - loss: 0.4114
Epoch 238/400
160/160 [=====] - 0s 506us/step - loss: 0.4108
Epoch 239/400
160/160 [=====] - 0s 505us/step - loss: 0.4107
Epoch 240/400
160/160 [=====] - 0s 498us/step - loss: 0.4104
Epoch 241/400
160/160 [=====] - 0s 471us/step - loss: 0.4107
Epoch 242/400
160/160 [=====] - 0s 483us/step - loss: 0.4096
Epoch 243/400
160/160 [=====] - 0s 492us/step - loss: 0.4087
Epoch 244/400
160/160 [=====] - 0s 526us/step - loss: 0.4090
Epoch 245/400
160/160 [=====] - 0s 525us/step - loss: 0.4086
Epoch 246/400
160/160 [=====] - 0s 515us/step - loss: 0.4083
Epoch 247/400
160/160 [=====] - 0s 522us/step - loss: 0.4078
Epoch 248/400
160/160 [=====] - 0s 496us/step - loss: 0.4079
Epoch 249/400
160/160 [=====] - 0s 477us/step - loss: 0.4073
Epoch 250/400
160/160 [=====] - 0s 478us/step - loss: 0.4072
Epoch 251/400
160/160 [=====] - 0s 473us/step - loss: 0.4068
Epoch 252/400
160/160 [=====] - 0s 490us/step - loss: 0.4068
Epoch 253/400
160/160 [=====] - 0s 510us/step - loss: 0.4065
Epoch 254/400
160/160 [=====] - 0s 508us/step - loss: 0.4059
Epoch 255/400
160/160 [=====] - 0s 510us/step - loss: 0.4052
Epoch 256/400
160/160 [=====] - 0s 510us/step - loss: 0.4055
Epoch 257/400
160/160 [=====] - 0s 514us/step - loss: 0.4054
Epoch 258/400
160/160 [=====] - 0s 491us/step - loss: 0.4050

Epoch 259/400
160/160 [=====] - 0s 508us/step - loss: 0.4048
Epoch 260/400
160/160 [=====] - 0s 488us/step - loss: 0.4042
Epoch 261/400
160/160 [=====] - 0s 485us/step - loss: 0.4042
Epoch 262/400
160/160 [=====] - 0s 527us/step - loss: 0.4039
Epoch 263/400
160/160 [=====] - 0s 552us/step - loss: 0.4038
Epoch 264/400
160/160 [=====] - 0s 529us/step - loss: 0.4037
Epoch 265/400
160/160 [=====] - 0s 522us/step - loss: 0.4035
Epoch 266/400
160/160 [=====] - 0s 513us/step - loss: 0.4031
Epoch 267/400
160/160 [=====] - 0s 515us/step - loss: 0.4032
Epoch 268/400
160/160 [=====] - 0s 516us/step - loss: 0.4028
Epoch 269/400
160/160 [=====] - 0s 516us/step - loss: 0.4021
Epoch 270/400
160/160 [=====] - 0s 513us/step - loss: 0.4025
Epoch 271/400
160/160 [=====] - 0s 512us/step - loss: 0.4018
Epoch 272/400
160/160 [=====] - 0s 528us/step - loss: 0.4020
Epoch 273/400
160/160 [=====] - 0s 594us/step - loss: 0.4017
Epoch 274/400
160/160 [=====] - 0s 546us/step - loss: 0.4015
Epoch 275/400
160/160 [=====] - 0s 571us/step - loss: 0.4018
Epoch 276/400
160/160 [=====] - 0s 543us/step - loss: 0.4016
Epoch 277/400
160/160 [=====] - 0s 505us/step - loss: 0.4010
Epoch 278/400
160/160 [=====] - 0s 520us/step - loss: 0.4008
Epoch 279/400
160/160 [=====] - 0s 519us/step - loss: 0.4005
Epoch 280/400
160/160 [=====] - 0s 521us/step - loss: 0.4005
Epoch 281/400
160/160 [=====] - 0s 522us/step - loss: 0.4005
Epoch 282/400
160/160 [=====] - 0s 521us/step - loss: 0.3999

Epoch 283/400
160/160 [=====] - 0s 517us/step - loss: 0.4001
Epoch 284/400
160/160 [=====] - 0s 521us/step - loss: 0.3995
Epoch 285/400
160/160 [=====] - 0s 529us/step - loss: 0.3999
Epoch 286/400
160/160 [=====] - 0s 538us/step - loss: 0.3995
Epoch 287/400
160/160 [=====] - 0s 495us/step - loss: 0.3993
Epoch 288/400
160/160 [=====] - 0s 505us/step - loss: 0.3994
Epoch 289/400
160/160 [=====] - 0s 508us/step - loss: 0.3989
Epoch 290/400
160/160 [=====] - 0s 513us/step - loss: 0.3985
Epoch 291/400
160/160 [=====] - 0s 520us/step - loss: 0.3977
Epoch 292/400
160/160 [=====] - 0s 510us/step - loss: 0.3987
Epoch 293/400
160/160 [=====] - 0s 522us/step - loss: 0.3979
Epoch 294/400
160/160 [=====] - 0s 522us/step - loss: 0.3984
Epoch 295/400
160/160 [=====] - 0s 505us/step - loss: 0.3980
Epoch 296/400
160/160 [=====] - 0s 515us/step - loss: 0.3975
Epoch 297/400
160/160 [=====] - 0s 512us/step - loss: 0.3974
Epoch 298/400
160/160 [=====] - 0s 515us/step - loss: 0.3975
Epoch 299/400
160/160 [=====] - 0s 515us/step - loss: 0.3973
Epoch 300/400
160/160 [=====] - 0s 514us/step - loss: 0.3972
Epoch 301/400
160/160 [=====] - 0s 512us/step - loss: 0.3973
Epoch 302/400
160/160 [=====] - 0s 504us/step - loss: 0.3967
Epoch 303/400
160/160 [=====] - 0s 503us/step - loss: 0.3967
Epoch 304/400
160/160 [=====] - 0s 510us/step - loss: 0.3966
Epoch 305/400
160/160 [=====] - 0s 508us/step - loss: 0.3967
Epoch 306/400
160/160 [=====] - 0s 505us/step - loss: 0.3962

Epoch 307/400
160/160 [=====] - 0s 504us/step - loss: 0.3964
Epoch 308/400
160/160 [=====] - 0s 498us/step - loss: 0.3962
Epoch 309/400
160/160 [=====] - 0s 503us/step - loss: 0.3959
Epoch 310/400
160/160 [=====] - 0s 514us/step - loss: 0.3951
Epoch 311/400
160/160 [=====] - 0s 512us/step - loss: 0.3958
Epoch 312/400
160/160 [=====] - 0s 513us/step - loss: 0.3954
Epoch 313/400
160/160 [=====] - 0s 509us/step - loss: 0.3956
Epoch 314/400
160/160 [=====] - 0s 493us/step - loss: 0.3947
Epoch 315/400
160/160 [=====] - 0s 488us/step - loss: 0.3949
Epoch 316/400
160/160 [=====] - 0s 479us/step - loss: 0.3950
Epoch 317/400
160/160 [=====] - 0s 476us/step - loss: 0.3949
Epoch 318/400
160/160 [=====] - 0s 518us/step - loss: 0.3949
Epoch 319/400
160/160 [=====] - 0s 508us/step - loss: 0.3945
Epoch 320/400
160/160 [=====] - 0s 482us/step - loss: 0.3945
Epoch 321/400
160/160 [=====] - 0s 469us/step - loss: 0.3943
Epoch 322/400
160/160 [=====] - 0s 475us/step - loss: 0.3938
Epoch 323/400
160/160 [=====] - 0s 497us/step - loss: 0.3939
Epoch 324/400
160/160 [=====] - 0s 504us/step - loss: 0.3940
Epoch 325/400
160/160 [=====] - 0s 512us/step - loss: 0.3936
Epoch 326/400
160/160 [=====] - 0s 501us/step - loss: 0.3938
Epoch 327/400
160/160 [=====] - 0s 498us/step - loss: 0.3936
Epoch 328/400
160/160 [=====] - 0s 486us/step - loss: 0.3939
Epoch 329/400
160/160 [=====] - 0s 501us/step - loss: 0.3930
Epoch 330/400
160/160 [=====] - 0s 503us/step - loss: 0.3933

Epoch 331/400
160/160 [=====] - 0s 506us/step - loss: 0.3932
Epoch 332/400
160/160 [=====] - 0s 511us/step - loss: 0.3929
Epoch 333/400
160/160 [=====] - 0s 516us/step - loss: 0.3929
Epoch 334/400
160/160 [=====] - 0s 512us/step - loss: 0.3929
Epoch 335/400
160/160 [=====] - 0s 513us/step - loss: 0.3922
Epoch 336/400
160/160 [=====] - 0s 510us/step - loss: 0.3927
Epoch 337/400
160/160 [=====] - 0s 509us/step - loss: 0.3922
Epoch 338/400
160/160 [=====] - 0s 513us/step - loss: 0.3920
Epoch 339/400
160/160 [=====] - 0s 515us/step - loss: 0.3923
Epoch 340/400
160/160 [=====] - 0s 503us/step - loss: 0.3922
Epoch 341/400
160/160 [=====] - 0s 513us/step - loss: 0.3923
Epoch 342/400
160/160 [=====] - 0s 505us/step - loss: 0.3920
Epoch 343/400
160/160 [=====] - 0s 502us/step - loss: 0.3913
Epoch 344/400
160/160 [=====] - 0s 480us/step - loss: 0.3913
Epoch 345/400
160/160 [=====] - 0s 475us/step - loss: 0.3915
Epoch 346/400
160/160 [=====] - 0s 471us/step - loss: 0.3908
Epoch 347/400
160/160 [=====] - 0s 510us/step - loss: 0.3912
Epoch 348/400
160/160 [=====] - 0s 532us/step - loss: 0.3908
Epoch 349/400
160/160 [=====] - 0s 506us/step - loss: 0.3908
Epoch 350/400
160/160 [=====] - 0s 505us/step - loss: 0.3913
Epoch 351/400
160/160 [=====] - 0s 518us/step - loss: 0.3907
Epoch 352/400
160/160 [=====] - 0s 513us/step - loss: 0.3907
Epoch 353/400
160/160 [=====] - 0s 501us/step - loss: 0.3907
Epoch 354/400
160/160 [=====] - 0s 507us/step - loss: 0.3905

Epoch 355/400
160/160 [=====] - 0s 516us/step - loss: 0.3905
Epoch 356/400
160/160 [=====] - 0s 503us/step - loss: 0.3904
Epoch 357/400
160/160 [=====] - 0s 492us/step - loss: 0.3903
Epoch 358/400
160/160 [=====] - 0s 472us/step - loss: 0.3904
Epoch 359/400
160/160 [=====] - 0s 473us/step - loss: 0.3900
Epoch 360/400
160/160 [=====] - 0s 473us/step - loss: 0.3895
Epoch 361/400
160/160 [=====] - 0s 496us/step - loss: 0.3899
Epoch 362/400
160/160 [=====] - 0s 469us/step - loss: 0.3897
Epoch 363/400
160/160 [=====] - 0s 500us/step - loss: 0.3897
Epoch 364/400
160/160 [=====] - 0s 485us/step - loss: 0.3895
Epoch 365/400
160/160 [=====] - 0s 513us/step - loss: 0.3891
Epoch 366/400
160/160 [=====] - 0s 516us/step - loss: 0.3894
Epoch 367/400
160/160 [=====] - 0s 505us/step - loss: 0.3887
Epoch 368/400
160/160 [=====] - 0s 509us/step - loss: 0.3892
Epoch 369/400
160/160 [=====] - 0s 522us/step - loss: 0.3886
Epoch 370/400
160/160 [=====] - 0s 506us/step - loss: 0.3888
Epoch 371/400
160/160 [=====] - 0s 505us/step - loss: 0.3885
Epoch 372/400
160/160 [=====] - 0s 520us/step - loss: 0.3889
Epoch 373/400
160/160 [=====] - 0s 515us/step - loss: 0.3886
Epoch 374/400
160/160 [=====] - 0s 519us/step - loss: 0.3884
Epoch 375/400
160/160 [=====] - 0s 505us/step - loss: 0.3886
Epoch 376/400
160/160 [=====] - 0s 515us/step - loss: 0.3880
Epoch 377/400
160/160 [=====] - 0s 520us/step - loss: 0.3882
Epoch 378/400
160/160 [=====] - 0s 514us/step - loss: 0.3877

```

Epoch 379/400
160/160 [=====] - 0s 516us/step - loss: 0.3880
Epoch 380/400
160/160 [=====] - 0s 520us/step - loss: 0.3882
Epoch 381/400
160/160 [=====] - 0s 521us/step - loss: 0.3875
Epoch 382/400
160/160 [=====] - 0s 504us/step - loss: 0.3872
Epoch 383/400
160/160 [=====] - 0s 512us/step - loss: 0.3869
Epoch 384/400
160/160 [=====] - 0s 514us/step - loss: 0.3875
Epoch 385/400
160/160 [=====] - 0s 509us/step - loss: 0.3878
Epoch 386/400
160/160 [=====] - 0s 511us/step - loss: 0.3873
Epoch 387/400
160/160 [=====] - 0s 508us/step - loss: 0.3871
Epoch 388/400
160/160 [=====] - 0s 497us/step - loss: 0.3868
Epoch 389/400
160/160 [=====] - 0s 497us/step - loss: 0.3875
Epoch 390/400
160/160 [=====] - 0s 491us/step - loss: 0.3866
Epoch 391/400
160/160 [=====] - 0s 487us/step - loss: 0.3862
Epoch 392/400
160/160 [=====] - 0s 506us/step - loss: 0.3870
Epoch 393/400
160/160 [=====] - 0s 504us/step - loss: 0.3870
Epoch 394/400
160/160 [=====] - 0s 509us/step - loss: 0.3862
Epoch 395/400
160/160 [=====] - 0s 494us/step - loss: 0.3865
Epoch 396/400
160/160 [=====] - 0s 513us/step - loss: 0.3864
Epoch 397/400
160/160 [=====] - 0s 512us/step - loss: 0.3862
Epoch 398/400
160/160 [=====] - 0s 513us/step - loss: 0.3861
Epoch 399/400
160/160 [=====] - 0s 509us/step - loss: 0.3865
Epoch 400/400
160/160 [=====] - 0s 505us/step - loss: 0.3859
160/160 [=====] - 0s 332us/step

```

```
In [9]: model = Sequential()
```

```

model.add(Dense(2, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(2, input_dim = 2, activation='relu'))
model.add(Dense(2, input_dim = 2, activation='sigmoid'))
model.add(Dense(2, input_dim = 2, activation='tanh'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_four = model.evaluate(X, y)

```

```

Epoch 1/400
160/160 [=====] - 0s 2ms/step - loss: 0.7273
Epoch 2/400
160/160 [=====] - 0s 565us/step - loss: 0.7059
Epoch 3/400
160/160 [=====] - 0s 572us/step - loss: 0.6992
Epoch 4/400
160/160 [=====] - 0s 564us/step - loss: 0.6969
Epoch 5/400
160/160 [=====] - 0s 573us/step - loss: 0.6963
Epoch 6/400
160/160 [=====] - 0s 578us/step - loss: 0.6958
Epoch 7/400
160/160 [=====] - 0s 576us/step - loss: 0.6958
Epoch 8/400
160/160 [=====] - 0s 571us/step - loss: 0.6950
Epoch 9/400
160/160 [=====] - 0s 591us/step - loss: 0.6948
Epoch 10/400
160/160 [=====] - 0s 577us/step - loss: 0.6948
Epoch 11/400
160/160 [=====] - 0s 564us/step - loss: 0.6946
Epoch 12/400
160/160 [=====] - 0s 577us/step - loss: 0.6941
Epoch 13/400
160/160 [=====] - 0s 573us/step - loss: 0.6942
Epoch 14/400
160/160 [=====] - 0s 591us/step - loss: 0.6943
Epoch 15/400
160/160 [=====] - 0s 574us/step - loss: 0.6939

```

Epoch 16/400
160/160 [=====] - 0s 575us/step - loss: 0.6936
Epoch 17/400
160/160 [=====] - 0s 574us/step - loss: 0.6935
Epoch 18/400
160/160 [=====] - 0s 576us/step - loss: 0.6937
Epoch 19/400
160/160 [=====] - 0s 641us/step - loss: 0.6932
Epoch 20/400
160/160 [=====] - 0s 687us/step - loss: 0.6931
Epoch 21/400
160/160 [=====] - 0s 574us/step - loss: 0.6927
Epoch 22/400
160/160 [=====] - 0s 585us/step - loss: 0.6926
Epoch 23/400
160/160 [=====] - 0s 586us/step - loss: 0.6926
Epoch 24/400
160/160 [=====] - 0s 570us/step - loss: 0.6924
Epoch 25/400
160/160 [=====] - 0s 573us/step - loss: 0.6924
Epoch 26/400
160/160 [=====] - 0s 568us/step - loss: 0.6923
Epoch 27/400
160/160 [=====] - 0s 567us/step - loss: 0.6920
Epoch 28/400
160/160 [=====] - 0s 573us/step - loss: 0.6917
Epoch 29/400
160/160 [=====] - 0s 576us/step - loss: 0.6916
Epoch 30/400
160/160 [=====] - 0s 563us/step - loss: 0.6915
Epoch 31/400
160/160 [=====] - 0s 574us/step - loss: 0.6916
Epoch 32/400
160/160 [=====] - 0s 588us/step - loss: 0.6914
Epoch 33/400
160/160 [=====] - 0s 570us/step - loss: 0.6912
Epoch 34/400
160/160 [=====] - 0s 579us/step - loss: 0.6908
Epoch 35/400
160/160 [=====] - 0s 568us/step - loss: 0.6904
Epoch 36/400
160/160 [=====] - 0s 575us/step - loss: 0.6904
Epoch 37/400
160/160 [=====] - 0s 575us/step - loss: 0.6900
Epoch 38/400
160/160 [=====] - 0s 561us/step - loss: 0.6895
Epoch 39/400
160/160 [=====] - 0s 568us/step - loss: 0.6888

Epoch 40/400
160/160 [=====] - 0s 576us/step - loss: 0.6892
Epoch 41/400
160/160 [=====] - 0s 563us/step - loss: 0.6891
Epoch 42/400
160/160 [=====] - 0s 576us/step - loss: 0.6889
Epoch 43/400
160/160 [=====] - 0s 567us/step - loss: 0.6886
Epoch 44/400
160/160 [=====] - 0s 578us/step - loss: 0.6880
Epoch 45/400
160/160 [=====] - 0s 587us/step - loss: 0.6874
Epoch 46/400
160/160 [=====] - 0s 567us/step - loss: 0.6873
Epoch 47/400
160/160 [=====] - 0s 573us/step - loss: 0.6875
Epoch 48/400
160/160 [=====] - 0s 581us/step - loss: 0.6863
Epoch 49/400
160/160 [=====] - 0s 582us/step - loss: 0.6858
Epoch 50/400
160/160 [=====] - 0s 567us/step - loss: 0.6859
Epoch 51/400
160/160 [=====] - 0s 573us/step - loss: 0.6851
Epoch 52/400
160/160 [=====] - 0s 581us/step - loss: 0.6852
Epoch 53/400
160/160 [=====] - 0s 542us/step - loss: 0.6846
Epoch 54/400
160/160 [=====] - 0s 555us/step - loss: 0.6840
Epoch 55/400
160/160 [=====] - 0s 530us/step - loss: 0.6840
Epoch 56/400
160/160 [=====] - 0s 568us/step - loss: 0.6826
Epoch 57/400
160/160 [=====] - 0s 556us/step - loss: 0.6822
Epoch 58/400
160/160 [=====] - 0s 568us/step - loss: 0.6821
Epoch 59/400
160/160 [=====] - 0s 561us/step - loss: 0.6816
Epoch 60/400
160/160 [=====] - 0s 565us/step - loss: 0.6809
Epoch 61/400
160/160 [=====] - 0s 567us/step - loss: 0.6797
Epoch 62/400
160/160 [=====] - 0s 570us/step - loss: 0.6793
Epoch 63/400
160/160 [=====] - 0s 573us/step - loss: 0.6791

Epoch 64/400
160/160 [=====] - 0s 578us/step - loss: 0.6780
Epoch 65/400
160/160 [=====] - 0s 569us/step - loss: 0.6773
Epoch 66/400
160/160 [=====] - 0s 552us/step - loss: 0.6765
Epoch 67/400
160/160 [=====] - 0s 567us/step - loss: 0.6756
Epoch 68/400
160/160 [=====] - 0s 548us/step - loss: 0.6747
Epoch 69/400
160/160 [=====] - 0s 567us/step - loss: 0.6740
Epoch 70/400
160/160 [=====] - 0s 567us/step - loss: 0.6730
Epoch 71/400
160/160 [=====] - 0s 570us/step - loss: 0.6721
Epoch 72/400
160/160 [=====] - 0s 575us/step - loss: 0.6707
Epoch 73/400
160/160 [=====] - 0s 560us/step - loss: 0.6689
Epoch 74/400
160/160 [=====] - 0s 577us/step - loss: 0.6690
Epoch 75/400
160/160 [=====] - 0s 568us/step - loss: 0.6681
Epoch 76/400
160/160 [=====] - 0s 577us/step - loss: 0.6648
Epoch 77/400
160/160 [=====] - 0s 552us/step - loss: 0.6654
Epoch 78/400
160/160 [=====] - 0s 575us/step - loss: 0.6642
Epoch 79/400
160/160 [=====] - 0s 549us/step - loss: 0.6624
Epoch 80/400
160/160 [=====] - 0s 570us/step - loss: 0.6618
Epoch 81/400
160/160 [=====] - 0s 562us/step - loss: 0.6600
Epoch 82/400
160/160 [=====] - 0s 575us/step - loss: 0.6582
Epoch 83/400
160/160 [=====] - 0s 565us/step - loss: 0.6570
Epoch 84/400
160/160 [=====] - 0s 572us/step - loss: 0.6544
Epoch 85/400
160/160 [=====] - 0s 548us/step - loss: 0.6531
Epoch 86/400
160/160 [=====] - 0s 576us/step - loss: 0.6503
Epoch 87/400
160/160 [=====] - 0s 576us/step - loss: 0.6506

Epoch 88/400
160/160 [=====] - 0s 578us/step - loss: 0.6476
Epoch 89/400
160/160 [=====] - 0s 560us/step - loss: 0.6480
Epoch 90/400
160/160 [=====] - 0s 569us/step - loss: 0.6454
Epoch 91/400
160/160 [=====] - 0s 606us/step - loss: 0.6432
Epoch 92/400
160/160 [=====] - 0s 590us/step - loss: 0.6408
Epoch 93/400
160/160 [=====] - 0s 570us/step - loss: 0.6392
Epoch 94/400
160/160 [=====] - 0s 548us/step - loss: 0.6368
Epoch 95/400
160/160 [=====] - 0s 570us/step - loss: 0.6340
Epoch 96/400
160/160 [=====] - 0s 583us/step - loss: 0.6341
Epoch 97/400
160/160 [=====] - 0s 544us/step - loss: 0.6302
Epoch 98/400
160/160 [=====] - 0s 520us/step - loss: 0.6295
Epoch 99/400
160/160 [=====] - 0s 521us/step - loss: 0.6280
Epoch 100/400
160/160 [=====] - 0s 526us/step - loss: 0.6263
Epoch 101/400
160/160 [=====] - 0s 546us/step - loss: 0.6238
Epoch 102/400
160/160 [=====] - 0s 555us/step - loss: 0.6212
Epoch 103/400
160/160 [=====] - 0s 548us/step - loss: 0.6208
Epoch 104/400
160/160 [=====] - 0s 554us/step - loss: 0.6185
Epoch 105/400
160/160 [=====] - 0s 557us/step - loss: 0.6180
Epoch 106/400
160/160 [=====] - 0s 565us/step - loss: 0.6150
Epoch 107/400
160/160 [=====] - 0s 550us/step - loss: 0.6136
Epoch 108/400
160/160 [=====] - 0s 539us/step - loss: 0.6114
Epoch 109/400
160/160 [=====] - 0s 556us/step - loss: 0.6096
Epoch 110/400
160/160 [=====] - 0s 532us/step - loss: 0.6086
Epoch 111/400
160/160 [=====] - 0s 553us/step - loss: 0.6071

Epoch 112/400
160/160 [=====] - 0s 553us/step - loss: 0.6058
Epoch 113/400
160/160 [=====] - 0s 537us/step - loss: 0.6049
Epoch 114/400
160/160 [=====] - 0s 563us/step - loss: 0.6043
Epoch 115/400
160/160 [=====] - 0s 584us/step - loss: 0.6034
Epoch 116/400
160/160 [=====] - 0s 531us/step - loss: 0.6010
Epoch 117/400
160/160 [=====] - 0s 560us/step - loss: 0.6001
Epoch 118/400
160/160 [=====] - 0s 563us/step - loss: 0.5993
Epoch 119/400
160/160 [=====] - 0s 557us/step - loss: 0.5974
Epoch 120/400
160/160 [=====] - 0s 565us/step - loss: 0.5969
Epoch 121/400
160/160 [=====] - 0s 560us/step - loss: 0.5964
Epoch 122/400
160/160 [=====] - 0s 554us/step - loss: 0.5961
Epoch 123/400
160/160 [=====] - 0s 532us/step - loss: 0.5950
Epoch 124/400
160/160 [=====] - 0s 553us/step - loss: 0.5936
Epoch 125/400
160/160 [=====] - 0s 555us/step - loss: 0.5936
Epoch 126/400
160/160 [=====] - 0s 566us/step - loss: 0.5929
Epoch 127/400
160/160 [=====] - 0s 552us/step - loss: 0.5919
Epoch 128/400
160/160 [=====] - 0s 554us/step - loss: 0.5898
Epoch 129/400
160/160 [=====] - 0s 538us/step - loss: 0.5899
Epoch 130/400
160/160 [=====] - 0s 562us/step - loss: 0.5914
Epoch 131/400
160/160 [=====] - 0s 559us/step - loss: 0.5892
Epoch 132/400
160/160 [=====] - 0s 565us/step - loss: 0.5891
Epoch 133/400
160/160 [=====] - 0s 558us/step - loss: 0.5885
Epoch 134/400
160/160 [=====] - 0s 551us/step - loss: 0.5892
Epoch 135/400
160/160 [=====] - 0s 556us/step - loss: 0.5876

Epoch 136/400
160/160 [=====] - 0s 559us/step - loss: 0.5879
Epoch 137/400
160/160 [=====] - 0s 549us/step - loss: 0.5879
Epoch 138/400
160/160 [=====] - 0s 564us/step - loss: 0.5846
Epoch 139/400
160/160 [=====] - 0s 551us/step - loss: 0.5879
Epoch 140/400
160/160 [=====] - 0s 561us/step - loss: 0.5872
Epoch 141/400
160/160 [=====] - 0s 563us/step - loss: 0.5879
Epoch 142/400
160/160 [=====] - 0s 535us/step - loss: 0.5868
Epoch 143/400
160/160 [=====] - 0s 522us/step - loss: 0.5870
Epoch 144/400
160/160 [=====] - 0s 540us/step - loss: 0.5868
Epoch 145/400
160/160 [=====] - 0s 557us/step - loss: 0.5842
Epoch 146/400
160/160 [=====] - 0s 536us/step - loss: 0.5864
Epoch 147/400
160/160 [=====] - 0s 546us/step - loss: 0.5873
Epoch 148/400
160/160 [=====] - 0s 542us/step - loss: 0.5858
Epoch 149/400
160/160 [=====] - 0s 559us/step - loss: 0.5843
Epoch 150/400
160/160 [=====] - 0s 549us/step - loss: 0.5860
Epoch 151/400
160/160 [=====] - 0s 567us/step - loss: 0.5842
Epoch 152/400
160/160 [=====] - 0s 539us/step - loss: 0.5849
Epoch 153/400
160/160 [=====] - 0s 564us/step - loss: 0.5858
Epoch 154/400
160/160 [=====] - 0s 567us/step - loss: 0.5850
Epoch 155/400
160/160 [=====] - 0s 555us/step - loss: 0.5850
Epoch 156/400
160/160 [=====] - 0s 552us/step - loss: 0.5851
Epoch 157/400
160/160 [=====] - 0s 559us/step - loss: 0.5817
Epoch 158/400
160/160 [=====] - 0s 559us/step - loss: 0.5836
Epoch 159/400
160/160 [=====] - 0s 561us/step - loss: 0.5836

Epoch 160/400
160/160 [=====] - 0s 535us/step - loss: 0.5846
Epoch 161/400
160/160 [=====] - 0s 558us/step - loss: 0.5839
Epoch 162/400
160/160 [=====] - 0s 564us/step - loss: 0.5821
Epoch 163/400
160/160 [=====] - 0s 555us/step - loss: 0.5835
Epoch 164/400
160/160 [=====] - 0s 566us/step - loss: 0.5832
Epoch 165/400
160/160 [=====] - 0s 562us/step - loss: 0.5827
Epoch 166/400
160/160 [=====] - 0s 558us/step - loss: 0.5843
Epoch 167/400
160/160 [=====] - 0s 563us/step - loss: 0.5820
Epoch 168/400
160/160 [=====] - 0s 557us/step - loss: 0.5815
Epoch 169/400
160/160 [=====] - 0s 575us/step - loss: 0.5835
Epoch 170/400
160/160 [=====] - 0s 573us/step - loss: 0.5826
Epoch 171/400
160/160 [=====] - 0s 540us/step - loss: 0.5832
Epoch 172/400
160/160 [=====] - 0s 535us/step - loss: 0.5831
Epoch 173/400
160/160 [=====] - 0s 512us/step - loss: 0.5833
Epoch 174/400
160/160 [=====] - 0s 556us/step - loss: 0.5846
Epoch 175/400
160/160 [=====] - 0s 559us/step - loss: 0.5840
Epoch 176/400
160/160 [=====] - 0s 522us/step - loss: 0.5839
Epoch 177/400
160/160 [=====] - 0s 558us/step - loss: 0.5833
Epoch 178/400
160/160 [=====] - 0s 570us/step - loss: 0.5824
Epoch 179/400
160/160 [=====] - 0s 534us/step - loss: 0.5828
Epoch 180/400
160/160 [=====] - 0s 554us/step - loss: 0.5830
Epoch 181/400
160/160 [=====] - 0s 559us/step - loss: 0.5831
Epoch 182/400
160/160 [=====] - 0s 565us/step - loss: 0.5834
Epoch 183/400
160/160 [=====] - 0s 556us/step - loss: 0.5832

Epoch 184/400
160/160 [=====] - 0s 561us/step - loss: 0.5820
Epoch 185/400
160/160 [=====] - 0s 540us/step - loss: 0.5746
Epoch 186/400
160/160 [=====] - 0s 579us/step - loss: 0.5857
Epoch 187/400
160/160 [=====] - 0s 543us/step - loss: 0.5815
Epoch 188/400
160/160 [=====] - 0s 563us/step - loss: 0.5786
Epoch 189/400
160/160 [=====] - 0s 562us/step - loss: 0.5839
Epoch 190/400
160/160 [=====] - 0s 597us/step - loss: 0.5796
Epoch 191/400
160/160 [=====] - 0s 582us/step - loss: 0.5824
Epoch 192/400
160/160 [=====] - 0s 627us/step - loss: 0.5830
Epoch 193/400
160/160 [=====] - 0s 627us/step - loss: 0.5819
Epoch 194/400
160/160 [=====] - 0s 570us/step - loss: 0.5820
Epoch 195/400
160/160 [=====] - 0s 554us/step - loss: 0.5823
Epoch 196/400
160/160 [=====] - 0s 573us/step - loss: 0.5830
Epoch 197/400
160/160 [=====] - 0s 555us/step - loss: 0.5806
Epoch 198/400
160/160 [=====] - 0s 566us/step - loss: 0.5809
Epoch 199/400
160/160 [=====] - 0s 565us/step - loss: 0.5819
Epoch 200/400
160/160 [=====] - 0s 557us/step - loss: 0.5790
Epoch 201/400
160/160 [=====] - 0s 561us/step - loss: 0.5837
Epoch 202/400
160/160 [=====] - 0s 558us/step - loss: 0.5813
Epoch 203/400
160/160 [=====] - 0s 563us/step - loss: 0.5802
Epoch 204/400
160/160 [=====] - 0s 537us/step - loss: 0.5818
Epoch 205/400
160/160 [=====] - 0s 565us/step - loss: 0.5820
Epoch 206/400
160/160 [=====] - 0s 546us/step - loss: 0.5813
Epoch 207/400
160/160 [=====] - 0s 562us/step - loss: 0.5809

Epoch 208/400
160/160 [=====] - 0s 569us/step - loss: 0.5825
Epoch 209/400
160/160 [=====] - 0s 535us/step - loss: 0.5817
Epoch 210/400
160/160 [=====] - 0s 548us/step - loss: 0.5825
Epoch 211/400
160/160 [=====] - 0s 559us/step - loss: 0.5814
Epoch 212/400
160/160 [=====] - 0s 549us/step - loss: 0.5806
Epoch 213/400
160/160 [=====] - 0s 582us/step - loss: 0.5802
Epoch 214/400
160/160 [=====] - 0s 586us/step - loss: 0.5796
Epoch 215/400
160/160 [=====] - 0s 571us/step - loss: 0.5826
Epoch 216/400
160/160 [=====] - 0s 562us/step - loss: 0.5802
Epoch 217/400
160/160 [=====] - 0s 554us/step - loss: 0.5812
Epoch 218/400
160/160 [=====] - 0s 542us/step - loss: 0.5805
Epoch 219/400
160/160 [=====] - 0s 554us/step - loss: 0.5819
Epoch 220/400
160/160 [=====] - 0s 544us/step - loss: 0.5785
Epoch 221/400
160/160 [=====] - 0s 565us/step - loss: 0.5798
Epoch 222/400
160/160 [=====] - 0s 554us/step - loss: 0.5772
Epoch 223/400
160/160 [=====] - 0s 555us/step - loss: 0.5829
Epoch 224/400
160/160 [=====] - 0s 533us/step - loss: 0.5788
Epoch 225/400
160/160 [=====] - 0s 561us/step - loss: 0.5801
Epoch 226/400
160/160 [=====] - 0s 564us/step - loss: 0.5800
Epoch 227/400
160/160 [=====] - 0s 558us/step - loss: 0.5808
Epoch 228/400
160/160 [=====] - 0s 559us/step - loss: 0.5816
Epoch 229/400
160/160 [=====] - 0s 550us/step - loss: 0.5806
Epoch 230/400
160/160 [=====] - 0s 569us/step - loss: 0.5824
Epoch 231/400
160/160 [=====] - 0s 548us/step - loss: 0.5816

Epoch 232/400
160/160 [=====] - 0s 565us/step - loss: 0.5799
Epoch 233/400
160/160 [=====] - 0s 546us/step - loss: 0.5824
Epoch 234/400
160/160 [=====] - 0s 534us/step - loss: 0.5818
Epoch 235/400
160/160 [=====] - 0s 520us/step - loss: 0.5808
Epoch 236/400
160/160 [=====] - 0s 548us/step - loss: 0.5782
Epoch 237/400
160/160 [=====] - 0s 538us/step - loss: 0.5798
Epoch 238/400
160/160 [=====] - 0s 561us/step - loss: 0.5804
Epoch 239/400
160/160 [=====] - 0s 542us/step - loss: 0.5793
Epoch 240/400
160/160 [=====] - 0s 562us/step - loss: 0.5808
Epoch 241/400
160/160 [=====] - 0s 583us/step - loss: 0.5798
Epoch 242/400
160/160 [=====] - 0s 583us/step - loss: 0.5814
Epoch 243/400
160/160 [=====] - 0s 555us/step - loss: 0.5784
Epoch 244/400
160/160 [=====] - 0s 561us/step - loss: 0.5827
Epoch 245/400
160/160 [=====] - 0s 564us/step - loss: 0.5799
Epoch 246/400
160/160 [=====] - 0s 549us/step - loss: 0.5802
Epoch 247/400
160/160 [=====] - 0s 556us/step - loss: 0.5802
Epoch 248/400
160/160 [=====] - 0s 549us/step - loss: 0.5809
Epoch 249/400
160/160 [=====] - 0s 564us/step - loss: 0.5805
Epoch 250/400
160/160 [=====] - 0s 567us/step - loss: 0.5815
Epoch 251/400
160/160 [=====] - 0s 558us/step - loss: 0.5803
Epoch 252/400
160/160 [=====] - 0s 554us/step - loss: 0.5815
Epoch 253/400
160/160 [=====] - 0s 540us/step - loss: 0.5784
Epoch 254/400
160/160 [=====] - 0s 564us/step - loss: 0.5781
Epoch 255/400
160/160 [=====] - 0s 565us/step - loss: 0.5798

Epoch 256/400
160/160 [=====] - 0s 552us/step - loss: 0.5798
Epoch 257/400
160/160 [=====] - 0s 560us/step - loss: 0.5799
Epoch 258/400
160/160 [=====] - 0s 555us/step - loss: 0.5795
Epoch 259/400
160/160 [=====] - 0s 560us/step - loss: 0.5805
Epoch 260/400
160/160 [=====] - 0s 564us/step - loss: 0.5812
Epoch 261/400
160/160 [=====] - 0s 554us/step - loss: 0.5761
Epoch 262/400
160/160 [=====] - 0s 563us/step - loss: 0.5807
Epoch 263/400
160/160 [=====] - 0s 540us/step - loss: 0.5808
Epoch 264/400
160/160 [=====] - 0s 568us/step - loss: 0.5786
Epoch 265/400
160/160 [=====] - 0s 557us/step - loss: 0.5799
Epoch 266/400
160/160 [=====] - 0s 537us/step - loss: 0.5807
Epoch 267/400
160/160 [=====] - 0s 532us/step - loss: 0.5773
Epoch 268/400
160/160 [=====] - 0s 548us/step - loss: 0.5825
Epoch 269/400
160/160 [=====] - 0s 570us/step - loss: 0.5807
Epoch 270/400
160/160 [=====] - 0s 548us/step - loss: 0.5771
Epoch 271/400
160/160 [=====] - 0s 569us/step - loss: 0.5789
Epoch 272/400
160/160 [=====] - 0s 557us/step - loss: 0.5814
Epoch 273/400
160/160 [=====] - 0s 557us/step - loss: 0.5789
Epoch 274/400
160/160 [=====] - 0s 562us/step - loss: 0.5800
Epoch 275/400
160/160 [=====] - 0s 557us/step - loss: 0.5794
Epoch 276/400
160/160 [=====] - 0s 570us/step - loss: 0.5810
Epoch 277/400
160/160 [=====] - 0s 552us/step - loss: 0.5804
Epoch 278/400
160/160 [=====] - 0s 570us/step - loss: 0.5794
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160/160 [=====] - 0s 552us/step - loss: 0.5787

Epoch 280/400
160/160 [=====] - 0s 569us/step - loss: 0.5807
Epoch 281/400
160/160 [=====] - 0s 561us/step - loss: 0.5790
Epoch 282/400
160/160 [=====] - 0s 560us/step - loss: 0.5805
Epoch 283/400
160/160 [=====] - 0s 564us/step - loss: 0.5799
Epoch 284/400
160/160 [=====] - 0s 554us/step - loss: 0.5794
Epoch 285/400
160/160 [=====] - 0s 564us/step - loss: 0.5788
Epoch 286/400
160/160 [=====] - 0s 545us/step - loss: 0.5791
Epoch 287/400
160/160 [=====] - 0s 566us/step - loss: 0.5796
Epoch 288/400
160/160 [=====] - 0s 585us/step - loss: 0.5781
Epoch 289/400
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Epoch 290/400
160/160 [=====] - 0s 554us/step - loss: 0.5782
Epoch 291/400
160/160 [=====] - 0s 546us/step - loss: 0.5769
Epoch 292/400
160/160 [=====] - 0s 553us/step - loss: 0.5797
Epoch 293/400
160/160 [=====] - 0s 556us/step - loss: 0.5798
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160/160 [=====] - 0s 543us/step - loss: 0.5802
Epoch 295/400
160/160 [=====] - 0s 554us/step - loss: 0.5775
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160/160 [=====] - 0s 550us/step - loss: 0.5812
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160/160 [=====] - 0s 540us/step - loss: 0.5793
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Epoch 299/400
160/160 [=====] - 0s 560us/step - loss: 0.5790
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160/160 [=====] - 0s 539us/step - loss: 0.5802
Epoch 301/400
160/160 [=====] - 0s 562us/step - loss: 0.5766
Epoch 302/400
160/160 [=====] - 0s 565us/step - loss: 0.5786
Epoch 303/400
160/160 [=====] - 0s 553us/step - loss: 0.5783

Epoch 304/400
160/160 [=====] - 0s 557us/step - loss: 0.5770
Epoch 305/400
160/160 [=====] - 0s 553us/step - loss: 0.5789
Epoch 306/400
160/160 [=====] - 0s 545us/step - loss: 0.5794
Epoch 307/400
160/160 [=====] - 0s 555us/step - loss: 0.5790
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160/160 [=====] - 0s 566us/step - loss: 0.5758
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160/160 [=====] - 0s 560us/step - loss: 0.5798
Epoch 310/400
160/160 [=====] - 0s 562us/step - loss: 0.5783
Epoch 311/400
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Epoch 313/400
160/160 [=====] - 0s 553us/step - loss: 0.5785
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160/160 [=====] - 0s 558us/step - loss: 0.5787
Epoch 315/400
160/160 [=====] - 0s 563us/step - loss: 0.5788
Epoch 316/400
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Epoch 317/400
160/160 [=====] - 0s 552us/step - loss: 0.5775
Epoch 318/400
160/160 [=====] - 0s 559us/step - loss: 0.5792
Epoch 319/400
160/160 [=====] - 0s 546us/step - loss: 0.5797
Epoch 320/400
160/160 [=====] - 0s 561us/step - loss: 0.5800
Epoch 321/400
160/160 [=====] - 0s 568us/step - loss: 0.5740
Epoch 322/400
160/160 [=====] - 0s 559us/step - loss: 0.5804
Epoch 323/400
160/160 [=====] - 0s 538us/step - loss: 0.5786
Epoch 324/400
160/160 [=====] - 0s 556us/step - loss: 0.5774
Epoch 325/400
160/160 [=====] - 0s 556us/step - loss: 0.5789
Epoch 326/400
160/160 [=====] - 0s 542us/step - loss: 0.5784
Epoch 327/400
160/160 [=====] - 0s 559us/step - loss: 0.5780

Epoch 328/400
160/160 [=====] - 0s 568us/step - loss: 0.5790
Epoch 329/400
160/160 [=====] - 0s 555us/step - loss: 0.5783
Epoch 330/400
160/160 [=====] - 0s 559us/step - loss: 0.5791
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Epoch 333/400
160/160 [=====] - 0s 546us/step - loss: 0.5803
Epoch 334/400
160/160 [=====] - 0s 529us/step - loss: 0.5782
Epoch 335/400
160/160 [=====] - 0s 554us/step - loss: 0.5778
Epoch 336/400
160/160 [=====] - 0s 552us/step - loss: 0.5782
Epoch 337/400
160/160 [=====] - 0s 554us/step - loss: 0.5778
Epoch 338/400
160/160 [=====] - 0s 560us/step - loss: 0.5776
Epoch 339/400
160/160 [=====] - 0s 564us/step - loss: 0.5779
Epoch 340/400
160/160 [=====] - 0s 544us/step - loss: 0.5772
Epoch 341/400
160/160 [=====] - 0s 562us/step - loss: 0.5784
Epoch 342/400
160/160 [=====] - 0s 572us/step - loss: 0.5780
Epoch 343/400
160/160 [=====] - 0s 552us/step - loss: 0.5786
Epoch 344/400
160/160 [=====] - 0s 531us/step - loss: 0.5769
Epoch 345/400
160/160 [=====] - 0s 530us/step - loss: 0.5779
Epoch 346/400
160/160 [=====] - 0s 529us/step - loss: 0.5787
Epoch 347/400
160/160 [=====] - 0s 535us/step - loss: 0.5777
Epoch 348/400
160/160 [=====] - 0s 565us/step - loss: 0.5781
Epoch 349/400
160/160 [=====] - 0s 561us/step - loss: 0.5769
Epoch 350/400
160/160 [=====] - 0s 559us/step - loss: 0.5753
Epoch 351/400
160/160 [=====] - 0s 553us/step - loss: 0.5792

Epoch 352/400
160/160 [=====] - 0s 564us/step - loss: 0.5780
Epoch 353/400
160/160 [=====] - 0s 547us/step - loss: 0.5794
Epoch 354/400
160/160 [=====] - 0s 564us/step - loss: 0.5779
Epoch 355/400
160/160 [=====] - 0s 562us/step - loss: 0.5778
Epoch 356/400
160/160 [=====] - 0s 553us/step - loss: 0.5786
Epoch 357/400
160/160 [=====] - 0s 557us/step - loss: 0.5775
Epoch 358/400
160/160 [=====] - 0s 568us/step - loss: 0.5769
Epoch 359/400
160/160 [=====] - 0s 566us/step - loss: 0.5757
Epoch 360/400
160/160 [=====] - 0s 562us/step - loss: 0.5771
Epoch 361/400
160/160 [=====] - 0s 561us/step - loss: 0.5780
Epoch 362/400
160/160 [=====] - 0s 547us/step - loss: 0.5788
Epoch 363/400
160/160 [=====] - 0s 558us/step - loss: 0.5784
Epoch 364/400
160/160 [=====] - 0s 565us/step - loss: 0.5780
Epoch 365/400
160/160 [=====] - 0s 542us/step - loss: 0.5747
Epoch 366/400
160/160 [=====] - 0s 559us/step - loss: 0.5789
Epoch 367/400
160/160 [=====] - 0s 564us/step - loss: 0.5765
Epoch 368/400
160/160 [=====] - 0s 534us/step - loss: 0.5784
Epoch 369/400
160/160 [=====] - 0s 558us/step - loss: 0.5781
Epoch 370/400
160/160 [=====] - 0s 565us/step - loss: 0.5790
Epoch 371/400
160/160 [=====] - 0s 563us/step - loss: 0.5784
Epoch 372/400
160/160 [=====] - 0s 562us/step - loss: 0.5762
Epoch 373/400
160/160 [=====] - 0s 545us/step - loss: 0.5764
Epoch 374/400
160/160 [=====] - 0s 562us/step - loss: 0.5782
Epoch 375/400
160/160 [=====] - 0s 563us/step - loss: 0.5777

Epoch 376/400
160/160 [=====] - 0s 570us/step - loss: 0.5782
Epoch 377/400
160/160 [=====] - 0s 551us/step - loss: 0.5786
Epoch 378/400
160/160 [=====] - 0s 554us/step - loss: 0.5767
Epoch 379/400
160/160 [=====] - 0s 554us/step - loss: 0.5768
Epoch 380/400
160/160 [=====] - 0s 547us/step - loss: 0.5784
Epoch 381/400
160/160 [=====] - 0s 570us/step - loss: 0.5747
Epoch 382/400
160/160 [=====] - 0s 568us/step - loss: 0.5772
Epoch 383/400
160/160 [=====] - 0s 560us/step - loss: 0.5770
Epoch 384/400
160/160 [=====] - 0s 562us/step - loss: 0.5768
Epoch 385/400
160/160 [=====] - 0s 533us/step - loss: 0.5735
Epoch 386/400
160/160 [=====] - 0s 531us/step - loss: 0.5782
Epoch 387/400
160/160 [=====] - 0s 516us/step - loss: 0.5782
Epoch 388/400
160/160 [=====] - 0s 540us/step - loss: 0.5775
Epoch 389/400
160/160 [=====] - 0s 536us/step - loss: 0.5767
Epoch 390/400
160/160 [=====] - 0s 534us/step - loss: 0.5774
Epoch 391/400
160/160 [=====] - 0s 544us/step - loss: 0.5765
Epoch 392/400
160/160 [=====] - 0s 533us/step - loss: 0.5782
Epoch 393/400
160/160 [=====] - 0s 559us/step - loss: 0.5773
Epoch 394/400
160/160 [=====] - 0s 555us/step - loss: 0.5770
Epoch 395/400
160/160 [=====] - 0s 534us/step - loss: 0.5773
Epoch 396/400
160/160 [=====] - 0s 548us/step - loss: 0.5762
Epoch 397/400
160/160 [=====] - 0s 558us/step - loss: 0.5787
Epoch 398/400
160/160 [=====] - 0s 550us/step - loss: 0.5777
Epoch 399/400
160/160 [=====] - 0s 570us/step - loss: 0.5763

Epoch 400/400

160/160 [=====] - 0s 553us/step - loss: 0.5763

160/160 [=====] - 0s 438us/step

```
In [10]: model = Sequential()
```

```
model.add(Dense(2, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(2, input_dim = 2, activation='relu'))
model.add(Dense(2, input_dim = 2, activation='sigmoid'))
model.add(Dense(2, input_dim = 2, activation='tanh'))
model.add(Dense(2, input_dim = 2, activation='relu'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))
```

```
sgd = SGD(lr=0.1)
```

```
model.compile(loss='binary_crossentropy', optimizer='sgd')
```

```
model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))
```

```
# evaluate the model
```

```
scores_five = model.evaluate(X, y)
```

Epoch 1/400

160/160 [=====] - 0s 2ms/step - loss: 0.6942

Epoch 2/400

160/160 [=====] - 0s 655us/step - loss: 0.6913

Epoch 3/400

160/160 [=====] - 0s 636us/step - loss: 0.6902

Epoch 4/400

160/160 [=====] - 0s 626us/step - loss: 0.6896

Epoch 5/400

160/160 [=====] - 0s 624us/step - loss: 0.6891

Epoch 6/400

160/160 [=====] - 0s 606us/step - loss: 0.6886

Epoch 7/400

160/160 [=====] - 0s 631us/step - loss: 0.6881

Epoch 8/400

160/160 [=====] - 0s 629us/step - loss: 0.6875

Epoch 9/400

160/160 [=====] - 0s 621us/step - loss: 0.6869

Epoch 10/400

160/160 [=====] - 0s 631us/step - loss: 0.6860

Epoch 11/400

160/160 [=====] - 0s 622us/step - loss: 0.6856

Epoch 12/400

160/160 [=====] - 0s 610us/step - loss: 0.6843
Epoch 13/400
160/160 [=====] - 0s 612us/step - loss: 0.6839
Epoch 14/400
160/160 [=====] - 0s 610us/step - loss: 0.6831
Epoch 15/400
160/160 [=====] - 0s 634us/step - loss: 0.6819
Epoch 16/400
160/160 [=====] - 0s 633us/step - loss: 0.6812
Epoch 17/400
160/160 [=====] - 0s 633us/step - loss: 0.6798
Epoch 18/400
160/160 [=====] - 0s 610us/step - loss: 0.6786
Epoch 19/400
160/160 [=====] - 0s 621us/step - loss: 0.6774
Epoch 20/400
160/160 [=====] - 0s 629us/step - loss: 0.6761
Epoch 21/400
160/160 [=====] - 0s 650us/step - loss: 0.6749
Epoch 22/400
160/160 [=====] - 0s 618us/step - loss: 0.6717
Epoch 23/400
160/160 [=====] - 0s 584us/step - loss: 0.6706
Epoch 24/400
160/160 [=====] - 0s 560us/step - loss: 0.6687
Epoch 25/400
160/160 [=====] - 0s 552us/step - loss: 0.6652
Epoch 26/400
160/160 [=====] - 0s 559us/step - loss: 0.6632
Epoch 27/400
160/160 [=====] - 0s 608us/step - loss: 0.6608
Epoch 28/400
160/160 [=====] - 0s 598us/step - loss: 0.6575
Epoch 29/400
160/160 [=====] - 0s 637us/step - loss: 0.6533
Epoch 30/400
160/160 [=====] - 0s 636us/step - loss: 0.6495
Epoch 31/400
160/160 [=====] - 0s 619us/step - loss: 0.6452
Epoch 32/400
160/160 [=====] - 0s 637us/step - loss: 0.6389
Epoch 33/400
160/160 [=====] - 0s 650us/step - loss: 0.6316
Epoch 34/400
160/160 [=====] - 0s 621us/step - loss: 0.6290
Epoch 35/400
160/160 [=====] - 0s 611us/step - loss: 0.6191
Epoch 36/400


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160/160 [=====] - 0s 625us/step - loss: 0.6120
Epoch 37/400
160/160 [=====] - 0s 629us/step - loss: 0.5986
Epoch 38/400
160/160 [=====] - 0s 615us/step - loss: 0.5903
Epoch 39/400
160/160 [=====] - 0s 557us/step - loss: 0.5741
Epoch 40/400
160/160 [=====] - 0s 540us/step - loss: 0.5592
Epoch 41/400
160/160 [=====] - 0s 565us/step - loss: 0.5414
Epoch 42/400
160/160 [=====] - 0s 572us/step - loss: 0.5229
Epoch 43/400
160/160 [=====] - 0s 540us/step - loss: 0.5003
Epoch 44/400
160/160 [=====] - 0s 578us/step - loss: 0.4789
Epoch 45/400
160/160 [=====] - 0s 559us/step - loss: 0.4588
Epoch 46/400
160/160 [=====] - 0s 575us/step - loss: 0.4394
Epoch 47/400
160/160 [=====] - 0s 606us/step - loss: 0.4199
Epoch 48/400
160/160 [=====] - 0s 606us/step - loss: 0.3985
Epoch 49/400
160/160 [=====] - 0s 636us/step - loss: 0.3885
Epoch 50/400
160/160 [=====] - 0s 646us/step - loss: 0.3771
Epoch 51/400
160/160 [=====] - 0s 633us/step - loss: 0.3599
Epoch 52/400
160/160 [=====] - 0s 626us/step - loss: 0.3682
Epoch 53/400
160/160 [=====] - 0s 636us/step - loss: 0.3578
Epoch 54/400
160/160 [=====] - 0s 617us/step - loss: 0.3504
Epoch 55/400
160/160 [=====] - 0s 603us/step - loss: 0.3518
Epoch 56/400
160/160 [=====] - 0s 589us/step - loss: 0.3491
Epoch 57/400
160/160 [=====] - 0s 584us/step - loss: 0.3400
Epoch 58/400
160/160 [=====] - 0s 605us/step - loss: 0.3406
Epoch 59/400
160/160 [=====] - 0s 605us/step - loss: 0.3396
Epoch 60/400

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160/160 [=====] - 0s 607us/step - loss: 0.3477
Epoch 61/400
160/160 [=====] - 0s 589us/step - loss: 0.3372
Epoch 62/400
160/160 [=====] - 0s 601us/step - loss: 0.3481
Epoch 63/400
160/160 [=====] - 0s 623us/step - loss: 0.3354
Epoch 64/400
160/160 [=====] - 0s 609us/step - loss: 0.3605
Epoch 65/400
160/160 [=====] - 0s 605us/step - loss: 0.3434
Epoch 66/400
160/160 [=====] - 0s 622us/step - loss: 0.3427
Epoch 67/400
160/160 [=====] - 0s 616us/step - loss: 0.3452
Epoch 68/400
160/160 [=====] - 0s 593us/step - loss: 0.3436
Epoch 69/400
160/160 [=====] - 0s 600us/step - loss: 0.3391
Epoch 70/400
160/160 [=====] - 0s 610us/step - loss: 0.3372
Epoch 71/400
160/160 [=====] - 0s 610us/step - loss: 0.3225
Epoch 72/400
160/160 [=====] - 0s 621us/step - loss: 0.3453
Epoch 73/400
160/160 [=====] - 0s 613us/step - loss: 0.3463
Epoch 74/400
160/160 [=====] - 0s 613us/step - loss: 0.3452
Epoch 75/400
160/160 [=====] - 0s 610us/step - loss: 0.3470
Epoch 76/400
160/160 [=====] - 0s 604us/step - loss: 0.3544
Epoch 77/400
160/160 [=====] - 0s 631us/step - loss: 0.3381
Epoch 78/400
160/160 [=====] - 0s 607us/step - loss: 0.3512
Epoch 79/400
160/160 [=====] - 0s 603us/step - loss: 0.3419
Epoch 80/400
160/160 [=====] - 0s 597us/step - loss: 0.3437
Epoch 81/400
160/160 [=====] - 0s 608us/step - loss: 0.3439
Epoch 82/400
160/160 [=====] - 0s 637us/step - loss: 0.3412
Epoch 83/400
160/160 [=====] - 0s 620us/step - loss: 0.3299
Epoch 84/400

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160/160 [=====] - 0s 615us/step - loss: 0.3440
Epoch 85/400
160/160 [=====] - 0s 604us/step - loss: 0.3432
Epoch 86/400
160/160 [=====] - 0s 635us/step - loss: 0.3516
Epoch 87/400
160/160 [=====] - 0s 613us/step - loss: 0.3368
Epoch 88/400
160/160 [=====] - 0s 615us/step - loss: 0.3399
Epoch 89/400
160/160 [=====] - 0s 634us/step - loss: 0.3470
Epoch 90/400
160/160 [=====] - 0s 602us/step - loss: 0.3424
Epoch 91/400
160/160 [=====] - 0s 642us/step - loss: 0.3392
Epoch 92/400
160/160 [=====] - 0s 629us/step - loss: 0.3379
Epoch 93/400
160/160 [=====] - 0s 618us/step - loss: 0.3447
Epoch 94/400
160/160 [=====] - 0s 603us/step - loss: 0.3378
Epoch 95/400
160/160 [=====] - 0s 606us/step - loss: 0.3529
Epoch 96/400
160/160 [=====] - 0s 620us/step - loss: 0.3469
Epoch 97/400
160/160 [=====] - 0s 611us/step - loss: 0.3429
Epoch 98/400
160/160 [=====] - 0s 616us/step - loss: 0.3402
Epoch 99/400
160/160 [=====] - 0s 605us/step - loss: 0.3245
Epoch 100/400
160/160 [=====] - 0s 609us/step - loss: 0.3477
Epoch 101/400
160/160 [=====] - 0s 601us/step - loss: 0.3402
Epoch 102/400
160/160 [=====] - 0s 600us/step - loss: 0.3493
Epoch 103/400
160/160 [=====] - 0s 613us/step - loss: 0.3410
Epoch 104/400
160/160 [=====] - 0s 603us/step - loss: 0.3377
Epoch 105/400
160/160 [=====] - 0s 604us/step - loss: 0.3516
Epoch 106/400
160/160 [=====] - 0s 622us/step - loss: 0.3423
Epoch 107/400
160/160 [=====] - 0s 619us/step - loss: 0.3446
Epoch 108/400

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160/160 [=====] - 0s 598us/step - loss: 0.3345
Epoch 109/400
160/160 [=====] - 0s 636us/step - loss: 0.3365
Epoch 110/400
160/160 [=====] - 0s 579us/step - loss: 0.3461
Epoch 111/400
160/160 [=====] - 0s 599us/step - loss: 0.3448
Epoch 112/400
160/160 [=====] - 0s 587us/step - loss: 0.3367
Epoch 113/400
160/160 [=====] - 0s 613us/step - loss: 0.3284
Epoch 114/400
160/160 [=====] - 0s 614us/step - loss: 0.3466
Epoch 115/400
160/160 [=====] - 0s 599us/step - loss: 0.3473
Epoch 116/400
160/160 [=====] - 0s 591us/step - loss: 0.3326
Epoch 117/400
160/160 [=====] - 0s 606us/step - loss: 0.3462
Epoch 118/400
160/160 [=====] - 0s 592us/step - loss: 0.3464
Epoch 119/400
160/160 [=====] - 0s 610us/step - loss: 0.3354
Epoch 120/400
160/160 [=====] - 0s 603us/step - loss: 0.3461
Epoch 121/400
160/160 [=====] - 0s 582us/step - loss: 0.3352
Epoch 122/400
160/160 [=====] - 0s 590us/step - loss: 0.3516
Epoch 123/400
160/160 [=====] - 0s 599us/step - loss: 0.3413
Epoch 124/400
160/160 [=====] - 0s 608us/step - loss: 0.3399
Epoch 125/400
160/160 [=====] - 0s 598us/step - loss: 0.3361
Epoch 126/400
160/160 [=====] - 0s 606us/step - loss: 0.3406
Epoch 127/400
160/160 [=====] - 0s 588us/step - loss: 0.3440
Epoch 128/400
160/160 [=====] - 0s 598us/step - loss: 0.3345
Epoch 129/400
160/160 [=====] - 0s 594us/step - loss: 0.3282
Epoch 130/400
160/160 [=====] - 0s 598us/step - loss: 0.3365
Epoch 131/400
160/160 [=====] - 0s 593us/step - loss: 0.3351
Epoch 132/400

```

160/160 [=====] - 0s 578us/step - loss: 0.3477
Epoch 133/400
160/160 [=====] - 0s 592us/step - loss: 0.3407
Epoch 134/400
160/160 [=====] - 0s 589us/step - loss: 0.3505
Epoch 135/400
160/160 [=====] - 0s 600us/step - loss: 0.3408
Epoch 136/400
160/160 [=====] - 0s 612us/step - loss: 0.3384
Epoch 137/400
160/160 [=====] - 0s 608us/step - loss: 0.3422
Epoch 138/400
160/160 [=====] - 0s 602us/step - loss: 0.3381
Epoch 139/400
160/160 [=====] - 0s 591us/step - loss: 0.3370
Epoch 140/400
160/160 [=====] - 0s 602us/step - loss: 0.3203
Epoch 141/400
160/160 [=====] - 0s 606us/step - loss: 0.3358
Epoch 142/400
160/160 [=====] - 0s 604us/step - loss: 0.3427
Epoch 143/400
160/160 [=====] - 0s 611us/step - loss: 0.3357
Epoch 144/400
160/160 [=====] - 0s 588us/step - loss: 0.3461
Epoch 145/400
160/160 [=====] - 0s 594us/step - loss: 0.3468
Epoch 146/400
160/160 [=====] - 0s 608us/step - loss: 0.3412
Epoch 147/400
160/160 [=====] - 0s 607us/step - loss: 0.3312
Epoch 148/400
160/160 [=====] - 0s 602us/step - loss: 0.3408
Epoch 149/400
160/160 [=====] - 0s 619us/step - loss: 0.3372
Epoch 150/400
160/160 [=====] - 0s 610us/step - loss: 0.3367
Epoch 151/400
160/160 [=====] - 0s 616us/step - loss: 0.3366
Epoch 152/400
160/160 [=====] - 0s 618us/step - loss: 0.3269
Epoch 153/400
160/160 [=====] - 0s 595us/step - loss: 0.3373
Epoch 154/400
160/160 [=====] - 0s 582us/step - loss: 0.3375
Epoch 155/400
160/160 [=====] - 0s 612us/step - loss: 0.3424
Epoch 156/400

160/160 [=====] - 0s 595us/step - loss: 0.3351
 Epoch 157/400
 160/160 [=====] - 0s 595us/step - loss: 0.3422
 Epoch 158/400
 160/160 [=====] - 0s 608us/step - loss: 0.3385
 Epoch 159/400
 160/160 [=====] - 0s 578us/step - loss: 0.3380
 Epoch 160/400
 160/160 [=====] - 0s 595us/step - loss: 0.3353
 Epoch 161/400
 160/160 [=====] - 0s 576us/step - loss: 0.3422
 Epoch 162/400
 160/160 [=====] - 0s 579us/step - loss: 0.3407
 Epoch 163/400
 160/160 [=====] - 0s 618us/step - loss: 0.3410
 Epoch 164/400
 160/160 [=====] - 0s 597us/step - loss: 0.3352
 Epoch 165/400
 160/160 [=====] - 0s 595us/step - loss: 0.3405
 Epoch 166/400
 160/160 [=====] - 0s 597us/step - loss: 0.3439
 Epoch 167/400
 160/160 [=====] - 0s 597us/step - loss: 0.3458
 Epoch 168/400
 160/160 [=====] - 0s 613us/step - loss: 0.3406
 Epoch 169/400
 160/160 [=====] - 0s 588us/step - loss: 0.3350
 Epoch 170/400
 160/160 [=====] - 0s 582us/step - loss: 0.3256
 Epoch 171/400
 160/160 [=====] - 0s 606us/step - loss: 0.3453
 Epoch 172/400
 160/160 [=====] - 0s 619us/step - loss: 0.3276
 Epoch 173/400
 160/160 [=====] - 0s 613us/step - loss: 0.3415
 Epoch 174/400
 160/160 [=====] - 0s 610us/step - loss: 0.3410
 Epoch 175/400
 160/160 [=====] - 0s 607us/step - loss: 0.3354
 Epoch 176/400
 160/160 [=====] - 0s 620us/step - loss: 0.3359
 Epoch 177/400
 160/160 [=====] - 0s 594us/step - loss: 0.3360
 Epoch 178/400
 160/160 [=====] - 0s 592us/step - loss: 0.3419
 Epoch 179/400
 160/160 [=====] - 0s 596us/step - loss: 0.3401
 Epoch 180/400

160/160 [=====] - 0s 614us/step - loss: 0.3278
 Epoch 181/400
 160/160 [=====] - 0s 606us/step - loss: 0.3413
 Epoch 182/400
 160/160 [=====] - 0s 607us/step - loss: 0.3419
 Epoch 183/400
 160/160 [=====] - 0s 614us/step - loss: 0.3469
 Epoch 184/400
 160/160 [=====] - 0s 628us/step - loss: 0.3409
 Epoch 185/400
 160/160 [=====] - 0s 598us/step - loss: 0.3356
 Epoch 186/400
 160/160 [=====] - 0s 619us/step - loss: 0.3412
 Epoch 187/400
 160/160 [=====] - 0s 605us/step - loss: 0.3355
 Epoch 188/400
 160/160 [=====] - 0s 595us/step - loss: 0.3321
 Epoch 189/400
 160/160 [=====] - 0s 606us/step - loss: 0.3294
 Epoch 190/400
 160/160 [=====] - 0s 610us/step - loss: 0.3391
 Epoch 191/400
 160/160 [=====] - 0s 599us/step - loss: 0.3436
 Epoch 192/400
 160/160 [=====] - 0s 614us/step - loss: 0.3316
 Epoch 193/400
 160/160 [=====] - 0s 598us/step - loss: 0.3391
 Epoch 194/400
 160/160 [=====] - 0s 605us/step - loss: 0.3419
 Epoch 195/400
 160/160 [=====] - 0s 601us/step - loss: 0.3336
 Epoch 196/400
 160/160 [=====] - 0s 701us/step - loss: 0.3401
 Epoch 197/400
 160/160 [=====] - 0s 654us/step - loss: 0.3359
 Epoch 198/400
 160/160 [=====] - 0s 628us/step - loss: 0.3416
 Epoch 199/400
 160/160 [=====] - 0s 607us/step - loss: 0.3367
 Epoch 200/400
 160/160 [=====] - 0s 638us/step - loss: 0.3186
 Epoch 201/400
 160/160 [=====] - 0s 667us/step - loss: 0.3412
 Epoch 202/400
 160/160 [=====] - 0s 622us/step - loss: 0.3302
 Epoch 203/400
 160/160 [=====] - 0s 615us/step - loss: 0.3438
 Epoch 204/400

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160/160 [=====] - 0s 668us/step - loss: 0.3320
Epoch 205/400
160/160 [=====] - 0s 662us/step - loss: 0.3399
Epoch 206/400
160/160 [=====] - 0s 642us/step - loss: 0.3382
Epoch 207/400
160/160 [=====] - 0s 619us/step - loss: 0.3377
Epoch 208/400
160/160 [=====] - 0s 635us/step - loss: 0.3301
Epoch 209/400
160/160 [=====] - 0s 606us/step - loss: 0.3384
Epoch 210/400
160/160 [=====] - 0s 616us/step - loss: 0.3361
Epoch 211/400
160/160 [=====] - 0s 670us/step - loss: 0.3308
Epoch 212/400
160/160 [=====] - 0s 600us/step - loss: 0.3383
Epoch 213/400
160/160 [=====] - 0s 568us/step - loss: 0.3311
Epoch 214/400
160/160 [=====] - 0s 578us/step - loss: 0.3344
Epoch 215/400
160/160 [=====] - 0s 636us/step - loss: 0.3341
Epoch 216/400
160/160 [=====] - 0s 643us/step - loss: 0.3358
Epoch 217/400
160/160 [=====] - 0s 592us/step - loss: 0.3390
Epoch 218/400
160/160 [=====] - 0s 598us/step - loss: 0.3304
Epoch 219/400
160/160 [=====] - 0s 677us/step - loss: 0.3418
Epoch 220/400
160/160 [=====] - 0s 662us/step - loss: 0.3419
Epoch 221/400
160/160 [=====] - 0s 657us/step - loss: 0.3264
Epoch 222/400
160/160 [=====] - 0s 682us/step - loss: 0.3421
Epoch 223/400
160/160 [=====] - 0s 618us/step - loss: 0.3230
Epoch 224/400
160/160 [=====] - 0s 613us/step - loss: 0.3372
Epoch 225/400
160/160 [=====] - 0s 628us/step - loss: 0.3386
Epoch 226/400
160/160 [=====] - 0s 665us/step - loss: 0.3427
Epoch 227/400
160/160 [=====] - 0s 653us/step - loss: 0.3445
Epoch 228/400

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160/160 [=====] - 0s 642us/step - loss: 0.3409
 Epoch 229/400
 160/160 [=====] - 0s 673us/step - loss: 0.3366
 Epoch 230/400
 160/160 [=====] - 0s 628us/step - loss: 0.3376
 Epoch 231/400
 160/160 [=====] - 0s 653us/step - loss: 0.3299
 Epoch 232/400
 160/160 [=====] - 0s 646us/step - loss: 0.3354
 Epoch 233/400
 160/160 [=====] - 0s 671us/step - loss: 0.3370
 Epoch 234/400
 160/160 [=====] - 0s 695us/step - loss: 0.3291
 Epoch 235/400
 160/160 [=====] - 0s 625us/step - loss: 0.3390
 Epoch 236/400
 160/160 [=====] - 0s 606us/step - loss: 0.3308
 Epoch 237/400
 160/160 [=====] - 0s 612us/step - loss: 0.3284
 Epoch 238/400
 160/160 [=====] - 0s 615us/step - loss: 0.3453
 Epoch 239/400
 160/160 [=====] - 0s 684us/step - loss: 0.3360
 Epoch 240/400
 160/160 [=====] - 0s 661us/step - loss: 0.3241
 Epoch 241/400
 160/160 [=====] - 0s 617us/step - loss: 0.3327
 Epoch 242/400
 160/160 [=====] - 0s 599us/step - loss: 0.3386
 Epoch 243/400
 160/160 [=====] - 0s 590us/step - loss: 0.3327
 Epoch 244/400
 160/160 [=====] - 0s 581us/step - loss: 0.3319
 Epoch 245/400
 160/160 [=====] - 0s 697us/step - loss: 0.3449
 Epoch 246/400
 160/160 [=====] - 0s 622us/step - loss: 0.3398
 Epoch 247/400
 160/160 [=====] - 0s 620us/step - loss: 0.3369
 Epoch 248/400
 160/160 [=====] - 0s 651us/step - loss: 0.3370
 Epoch 249/400
 160/160 [=====] - 0s 661us/step - loss: 0.3416
 Epoch 250/400
 160/160 [=====] - 0s 675us/step - loss: 0.3331
 Epoch 251/400
 160/160 [=====] - 0s 672us/step - loss: 0.3391
 Epoch 252/400

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160/160 [=====] - 0s 601us/step - loss: 0.3333
Epoch 253/400
160/160 [=====] - 0s 607us/step - loss: 0.3476
Epoch 254/400
160/160 [=====] - 0s 612us/step - loss: 0.3334
Epoch 255/400
160/160 [=====] - 0s 612us/step - loss: 0.3330
Epoch 256/400
160/160 [=====] - 0s 605us/step - loss: 0.3309
Epoch 257/400
160/160 [=====] - 0s 606us/step - loss: 0.3401
Epoch 258/400
160/160 [=====] - 0s 588us/step - loss: 0.3338
Epoch 259/400
160/160 [=====] - 0s 662us/step - loss: 0.3354
Epoch 260/400
160/160 [=====] - 0s 667us/step - loss: 0.3387
Epoch 261/400
160/160 [=====] - 0s 653us/step - loss: 0.3429
Epoch 262/400
160/160 [=====] - 0s 667us/step - loss: 0.3425
Epoch 263/400
160/160 [=====] - 0s 590us/step - loss: 0.3325
Epoch 264/400
160/160 [=====] - 0s 576us/step - loss: 0.3239
Epoch 265/400
160/160 [=====] - 0s 587us/step - loss: 0.3501
Epoch 266/400
160/160 [=====] - 0s 614us/step - loss: 0.3391
Epoch 267/400
160/160 [=====] - 0s 612us/step - loss: 0.3398
Epoch 268/400
160/160 [=====] - 0s 606us/step - loss: 0.3433
Epoch 269/400
160/160 [=====] - 0s 612us/step - loss: 0.3327
Epoch 270/400
160/160 [=====] - 0s 604us/step - loss: 0.3366
Epoch 271/400
160/160 [=====] - 0s 633us/step - loss: 0.3379
Epoch 272/400
160/160 [=====] - 0s 684us/step - loss: 0.3397
Epoch 273/400
160/160 [=====] - 0s 726us/step - loss: 0.3299
Epoch 274/400
160/160 [=====] - 0s 658us/step - loss: 0.3402
Epoch 275/400
160/160 [=====] - 0s 607us/step - loss: 0.3358
Epoch 276/400

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160/160 [=====] - 0s 552us/step - loss: 0.3321
Epoch 277/400
160/160 [=====] - 0s 570us/step - loss: 0.3352
Epoch 278/400
160/160 [=====] - 0s 584us/step - loss: 0.3364
Epoch 279/400
160/160 [=====] - 0s 620us/step - loss: 0.3346
Epoch 280/400
160/160 [=====] - 0s 641us/step - loss: 0.3373
Epoch 281/400
160/160 [=====] - 0s 635us/step - loss: 0.3331
Epoch 282/400
160/160 [=====] - 0s 637us/step - loss: 0.3388
Epoch 283/400
160/160 [=====] - 0s 643us/step - loss: 0.3412
Epoch 284/400
160/160 [=====] - 0s 642us/step - loss: 0.3413
Epoch 285/400
160/160 [=====] - 0s 702us/step - loss: 0.3402
Epoch 286/400
160/160 [=====] - 0s 665us/step - loss: 0.3401
Epoch 287/400
160/160 [=====] - 0s 625us/step - loss: 0.3426
Epoch 288/400
160/160 [=====] - 0s 580us/step - loss: 0.3365
Epoch 289/400
160/160 [=====] - 0s 614us/step - loss: 0.3376
Epoch 290/400
160/160 [=====] - 0s 602us/step - loss: 0.3372
Epoch 291/400
160/160 [=====] - 0s 616us/step - loss: 0.3379
Epoch 292/400
160/160 [=====] - 0s 679us/step - loss: 0.3317
Epoch 293/400
160/160 [=====] - 0s 659us/step - loss: 0.3400
Epoch 294/400
160/160 [=====] - 0s 616us/step - loss: 0.3343
Epoch 295/400
160/160 [=====] - 0s 592us/step - loss: 0.3412
Epoch 296/400
160/160 [=====] - 0s 630us/step - loss: 0.3339
Epoch 297/400
160/160 [=====] - 0s 589us/step - loss: 0.3301
Epoch 298/400
160/160 [=====] - 0s 614us/step - loss: 0.3352
Epoch 299/400
160/160 [=====] - 0s 679us/step - loss: 0.3383
Epoch 300/400

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160/160 [=====] - 0s 632us/step - loss: 0.3406
Epoch 301/400
160/160 [=====] - 0s 625us/step - loss: 0.3352
Epoch 302/400
160/160 [=====] - 0s 637us/step - loss: 0.3324
Epoch 303/400
160/160 [=====] - 0s 621us/step - loss: 0.3381
Epoch 304/400
160/160 [=====] - 0s 610us/step - loss: 0.3351
Epoch 305/400
160/160 [=====] - 0s 639us/step - loss: 0.3385
Epoch 306/400
160/160 [=====] - 0s 630us/step - loss: 0.3422
Epoch 307/400
160/160 [=====] - 0s 641us/step - loss: 0.3383
Epoch 308/400
160/160 [=====] - 0s 641us/step - loss: 0.3321
Epoch 309/400
160/160 [=====] - 0s 655us/step - loss: 0.3330
Epoch 310/400
160/160 [=====] - 0s 654us/step - loss: 0.3383
Epoch 311/400
160/160 [=====] - 0s 604us/step - loss: 0.3269
Epoch 312/400
160/160 [=====] - 0s 622us/step - loss: 0.3356
Epoch 313/400
160/160 [=====] - 0s 617us/step - loss: 0.3340
Epoch 314/400
160/160 [=====] - 0s 622us/step - loss: 0.3277
Epoch 315/400
160/160 [=====] - 0s 614us/step - loss: 0.3297
Epoch 316/400
160/160 [=====] - 0s 593us/step - loss: 0.3422
Epoch 317/400
160/160 [=====] - 0s 607us/step - loss: 0.3402
Epoch 318/400
160/160 [=====] - 0s 625us/step - loss: 0.3367
Epoch 319/400
160/160 [=====] - 0s 602us/step - loss: 0.3438
Epoch 320/400
160/160 [=====] - 0s 603us/step - loss: 0.3311
Epoch 321/400
160/160 [=====] - 0s 604us/step - loss: 0.3388
Epoch 322/400
160/160 [=====] - 0s 619us/step - loss: 0.3434
Epoch 323/400
160/160 [=====] - 0s 597us/step - loss: 0.3364
Epoch 324/400

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160/160 [=====] - 0s 590us/step - loss: 0.3218
Epoch 325/400
160/160 [=====] - 0s 579us/step - loss: 0.3344
Epoch 326/400
160/160 [=====] - 0s 564us/step - loss: 0.3335
Epoch 327/400
160/160 [=====] - 0s 588us/step - loss: 0.3367
Epoch 328/400
160/160 [=====] - 0s 595us/step - loss: 0.3255
Epoch 329/400
160/160 [=====] - 0s 631us/step - loss: 0.3416
Epoch 330/400
160/160 [=====] - 0s 624us/step - loss: 0.3453
Epoch 331/400
160/160 [=====] - 0s 573us/step - loss: 0.3378
Epoch 332/400
160/160 [=====] - 0s 597us/step - loss: 0.3350
Epoch 333/400
160/160 [=====] - 0s 597us/step - loss: 0.3360
Epoch 334/400
160/160 [=====] - 0s 642us/step - loss: 0.3401
Epoch 335/400
160/160 [=====] - 0s 614us/step - loss: 0.3375
Epoch 336/400
160/160 [=====] - 0s 648us/step - loss: 0.3382
Epoch 337/400
160/160 [=====] - 0s 639us/step - loss: 0.3313
Epoch 338/400
160/160 [=====] - 0s 614us/step - loss: 0.3360
Epoch 339/400
160/160 [=====] - 0s 634us/step - loss: 0.3331
Epoch 340/400
160/160 [=====] - 0s 665us/step - loss: 0.3332
Epoch 341/400
160/160 [=====] - 0s 624us/step - loss: 0.3188
Epoch 342/400
160/160 [=====] - 0s 619us/step - loss: 0.3459
Epoch 343/400
160/160 [=====] - 0s 634us/step - loss: 0.3332
Epoch 344/400
160/160 [=====] - 0s 634us/step - loss: 0.3388
Epoch 345/400
160/160 [=====] - 0s 628us/step - loss: 0.3303
Epoch 346/400
160/160 [=====] - 0s 627us/step - loss: 0.3378
Epoch 347/400
160/160 [=====] - 0s 604us/step - loss: 0.3400
Epoch 348/400

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160/160 [=====] - 0s 635us/step - loss: 0.3402
Epoch 349/400
160/160 [=====] - 0s 610us/step - loss: 0.3356
Epoch 350/400
160/160 [=====] - 0s 638us/step - loss: 0.3374
Epoch 351/400
160/160 [=====] - 0s 633us/step - loss: 0.3414
Epoch 352/400
160/160 [=====] - 0s 656us/step - loss: 0.3326
Epoch 353/400
160/160 [=====] - 0s 674us/step - loss: 0.3329
Epoch 354/400
160/160 [=====] - 0s 636us/step - loss: 0.3421
Epoch 355/400
160/160 [=====] - 0s 637us/step - loss: 0.3426
Epoch 356/400
160/160 [=====] - 0s 637us/step - loss: 0.3296
Epoch 357/400
160/160 [=====] - 0s 619us/step - loss: 0.3211
Epoch 358/400
160/160 [=====] - 0s 622us/step - loss: 0.3352
Epoch 359/400
160/160 [=====] - 0s 643us/step - loss: 0.3411
Epoch 360/400
160/160 [=====] - 0s 638us/step - loss: 0.3418
Epoch 361/400
160/160 [=====] - 0s 628us/step - loss: 0.3293
Epoch 362/400
160/160 [=====] - 0s 645us/step - loss: 0.3316
Epoch 363/400
160/160 [=====] - 0s 630us/step - loss: 0.3382
Epoch 364/400
160/160 [=====] - 0s 659us/step - loss: 0.3359
Epoch 365/400
160/160 [=====] - 0s 636us/step - loss: 0.3327
Epoch 366/400
160/160 [=====] - 0s 634us/step - loss: 0.3282
Epoch 367/400
160/160 [=====] - 0s 632us/step - loss: 0.3365
Epoch 368/400
160/160 [=====] - 0s 638us/step - loss: 0.3378
Epoch 369/400
160/160 [=====] - 0s 630us/step - loss: 0.3287
Epoch 370/400
160/160 [=====] - 0s 621us/step - loss: 0.3354
Epoch 371/400
160/160 [=====] - 0s 611us/step - loss: 0.3311
Epoch 372/400

160/160 [=====] - 0s 644us/step - loss: 0.3289
 Epoch 373/400
 160/160 [=====] - 0s 636us/step - loss: 0.3409
 Epoch 374/400
 160/160 [=====] - 0s 607us/step - loss: 0.3370
 Epoch 375/400
 160/160 [=====] - 0s 595us/step - loss: 0.3372
 Epoch 376/400
 160/160 [=====] - 0s 639us/step - loss: 0.3350
 Epoch 377/400
 160/160 [=====] - 0s 626us/step - loss: 0.3333
 Epoch 378/400
 160/160 [=====] - 0s 641us/step - loss: 0.3349
 Epoch 379/400
 160/160 [=====] - 0s 646us/step - loss: 0.3325
 Epoch 380/400
 160/160 [=====] - 0s 627us/step - loss: 0.3330
 Epoch 381/400
 160/160 [=====] - 0s 632us/step - loss: 0.3284
 Epoch 382/400
 160/160 [=====] - 0s 643us/step - loss: 0.3330
 Epoch 383/400
 160/160 [=====] - 0s 630us/step - loss: 0.3411
 Epoch 384/400
 160/160 [=====] - 0s 635us/step - loss: 0.3357
 Epoch 385/400
 160/160 [=====] - 0s 627us/step - loss: 0.3308
 Epoch 386/400
 160/160 [=====] - 0s 660us/step - loss: 0.3394
 Epoch 387/400
 160/160 [=====] - 0s 643us/step - loss: 0.3380
 Epoch 388/400
 160/160 [=====] - 0s 655us/step - loss: 0.3359
 Epoch 389/400
 160/160 [=====] - 0s 653us/step - loss: 0.3366
 Epoch 390/400
 160/160 [=====] - 0s 613us/step - loss: 0.3401
 Epoch 391/400
 160/160 [=====] - 0s 620us/step - loss: 0.3418
 Epoch 392/400
 160/160 [=====] - 0s 666us/step - loss: 0.3397
 Epoch 393/400
 160/160 [=====] - 0s 691us/step - loss: 0.3375
 Epoch 394/400
 160/160 [=====] - 0s 668us/step - loss: 0.3410
 Epoch 395/400
 160/160 [=====] - 0s 678us/step - loss: 0.3310
 Epoch 396/400

```

160/160 [=====] - 0s 615us/step - loss: 0.3391
Epoch 397/400
160/160 [=====] - 0s 616us/step - loss: 0.3309
Epoch 398/400
160/160 [=====] - 0s 629us/step - loss: 0.3305
Epoch 399/400
160/160 [=====] - 0s 642us/step - loss: 0.3337
Epoch 400/400
160/160 [=====] - 0s 664us/step - loss: 0.3399
160/160 [=====] - 0s 568us/step

```

```

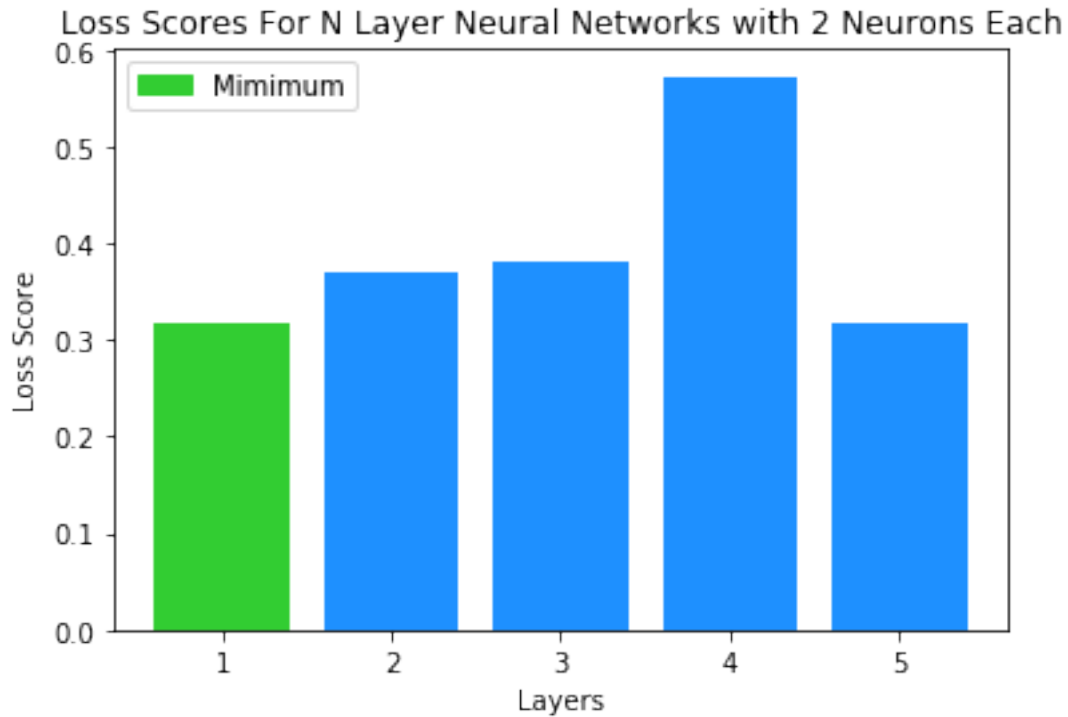
In [20]: color = []
         scores = [scores_one, scores_two, scores_three, scores_four, scores_five]

         for score in scores:
             if score == min(scores):
                 color.append('limegreen')
             else:
                 color.append('dodgerblue')

         patch1 = mpatches.Patch(color='limegreen', label='Mimimum')

         plt.bar(layers, scores, width = .8, color = color)
         plt.legend(handles=[patch1], loc = 'best')
         plt.xlabel('Layers')
         plt.ylabel('Loss Score')
         plt.title('Loss Scores For N Layer Neural Networks with 2 Neurons Each')
         plt.show()

```

Looking at the above graph, the 2-neuron Neural Network with 1 layer performs best

1.1.2 Part 1.2

In [21]: *### Three Layer Neural Networks ###*

```

model = Sequential()

model.add(Dense(3, input_dim=2, activation='tanh')) #sigmoid, relu
# model.add(Dense(2, activation='tanh'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_3one = model.evaluate(X, y)

model = Sequential()

```

```

model.add(Dense(3, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(3, input_dim = 3, activation='relu'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_3two = model.evaluate(X, y)

model = Sequential()

model.add(Dense(3, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(3, input_dim = 3, activation='relu'))
model.add(Dense(3, input_dim = 3, activation='sigmoid'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_3three = model.evaluate(X, y)

model = Sequential()

model.add(Dense(3, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(3, input_dim = 3, activation='relu'))
model.add(Dense(3, input_dim = 3, activation='sigmoid'))
model.add(Dense(3, input_dim = 3, activation='tanh'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch

```

```

# print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_3four = model.evaluate(X, y)

model = Sequential()

model.add(Dense(3, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(3, input_dim = 3, activation='relu'))
model.add(Dense(3, input_dim = 3, activation='sigmoid'))
model.add(Dense(3, input_dim = 3, activation='tanh'))
model.add(Dense(3, input_dim = 3, activation='relu'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
# print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_3five = model.evaluate(X, y)

scores3 = [scores_3one, scores_3two, scores_3three, scores_3four, scores_3five]

```

```

Epoch 1/400
160/160 [=====] - 0s 2ms/step - loss: 0.6955
Epoch 2/400
160/160 [=====] - 0s 478us/step - loss: 0.6953
Epoch 3/400
160/160 [=====] - 0s 453us/step - loss: 0.6951
Epoch 4/400
160/160 [=====] - 0s 468us/step - loss: 0.6949
Epoch 5/400
160/160 [=====] - 0s 461us/step - loss: 0.6946
Epoch 6/400
160/160 [=====] - 0s 462us/step - loss: 0.6946
Epoch 7/400
160/160 [=====] - 0s 466us/step - loss: 0.6942
Epoch 8/400
160/160 [=====] - 0s 508us/step - loss: 0.6941
Epoch 9/400
160/160 [=====] - 0s 519us/step - loss: 0.6940
Epoch 10/400
160/160 [=====] - 0s 529us/step - loss: 0.6940
Epoch 11/400

```

160/160 [=====] - 0s 481us/step - loss: 0.6938
 Epoch 12/400
 160/160 [=====] - 0s 468us/step - loss: 0.6937
 Epoch 13/400
 160/160 [=====] - 0s 442us/step - loss: 0.6937
 Epoch 14/400
 160/160 [=====] - 0s 476us/step - loss: 0.6934
 Epoch 15/400
 160/160 [=====] - 0s 468us/step - loss: 0.6934 0s - loss: 0.693
 Epoch 16/400
 160/160 [=====] - 0s 458us/step - loss: 0.6931
 Epoch 17/400
 160/160 [=====] - 0s 453us/step - loss: 0.6932
 Epoch 18/400
 160/160 [=====] - 0s 461us/step - loss: 0.6931
 Epoch 19/400
 160/160 [=====] - 0s 447us/step - loss: 0.6930
 Epoch 20/400
 160/160 [=====] - 0s 464us/step - loss: 0.6929
 Epoch 21/400
 160/160 [=====] - 0s 478us/step - loss: 0.6929
 Epoch 22/400
 160/160 [=====] - 0s 453us/step - loss: 0.6927
 Epoch 23/400
 160/160 [=====] - 0s 466us/step - loss: 0.6926
 Epoch 24/400
 160/160 [=====] - 0s 441us/step - loss: 0.6924
 Epoch 25/400
 160/160 [=====] - 0s 474us/step - loss: 0.6923
 Epoch 26/400
 160/160 [=====] - 0s 468us/step - loss: 0.6922
 Epoch 27/400
 160/160 [=====] - 0s 481us/step - loss: 0.6920
 Epoch 28/400
 160/160 [=====] - 0s 496us/step - loss: 0.6920
 Epoch 29/400
 160/160 [=====] - 0s 476us/step - loss: 0.6920
 Epoch 30/400
 160/160 [=====] - 0s 485us/step - loss: 0.6917
 Epoch 31/400
 160/160 [=====] - 0s 501us/step - loss: 0.6916
 Epoch 32/400
 160/160 [=====] - 0s 501us/step - loss: 0.6914
 Epoch 33/400
 160/160 [=====] - 0s 486us/step - loss: 0.6913
 Epoch 34/400
 160/160 [=====] - 0s 500us/step - loss: 0.6911
 Epoch 35/400

```

160/160 [=====] - 0s 481us/step - loss: 0.6908
Epoch 36/400
160/160 [=====] - 0s 494us/step - loss: 0.6907
Epoch 37/400
160/160 [=====] - 0s 469us/step - loss: 0.6902
Epoch 38/400
160/160 [=====] - 0s 455us/step - loss: 0.6900
Epoch 39/400
160/160 [=====] - 0s 452us/step - loss: 0.6901
Epoch 40/400
160/160 [=====] - 0s 459us/step - loss: 0.6895
Epoch 41/400
160/160 [=====] - 0s 466us/step - loss: 0.6894
Epoch 42/400
160/160 [=====] - 0s 452us/step - loss: 0.6892
Epoch 43/400
160/160 [=====] - 0s 470us/step - loss: 0.6890
Epoch 44/400
160/160 [=====] - 0s 463us/step - loss: 0.6886
Epoch 45/400
160/160 [=====] - 0s 455us/step - loss: 0.6882
Epoch 46/400
160/160 [=====] - 0s 480us/step - loss: 0.6879
Epoch 47/400
160/160 [=====] - 0s 468us/step - loss: 0.6875
Epoch 48/400
160/160 [=====] - 0s 467us/step - loss: 0.6872
Epoch 49/400
160/160 [=====] - 0s 453us/step - loss: 0.6866
Epoch 50/400
160/160 [=====] - 0s 457us/step - loss: 0.6861
Epoch 51/400
160/160 [=====] - 0s 455us/step - loss: 0.6857
Epoch 52/400
160/160 [=====] - 0s 456us/step - loss: 0.6853
Epoch 53/400
160/160 [=====] - 0s 460us/step - loss: 0.6847
Epoch 54/400
160/160 [=====] - 0s 506us/step - loss: 0.6842
Epoch 55/400
160/160 [=====] - 0s 474us/step - loss: 0.6833
Epoch 56/400
160/160 [=====] - 0s 438us/step - loss: 0.6826
Epoch 57/400
160/160 [=====] - 0s 452us/step - loss: 0.6820
Epoch 58/400
160/160 [=====] - 0s 457us/step - loss: 0.6813
Epoch 59/400

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160/160 [=====] - 0s 456us/step - loss: 0.6804
Epoch 60/400
160/160 [=====] - 0s 487us/step - loss: 0.6796
Epoch 61/400
160/160 [=====] - 0s 483us/step - loss: 0.6788
Epoch 62/400
160/160 [=====] - 0s 479us/step - loss: 0.6780
Epoch 63/400
160/160 [=====] - 0s 496us/step - loss: 0.6771
Epoch 64/400
160/160 [=====] - 0s 483us/step - loss: 0.6758
Epoch 65/400
160/160 [=====] - 0s 453us/step - loss: 0.6748
Epoch 66/400
160/160 [=====] - 0s 463us/step - loss: 0.6735
Epoch 67/400
160/160 [=====] - 0s 446us/step - loss: 0.6725
Epoch 68/400
160/160 [=====] - 0s 463us/step - loss: 0.6713
Epoch 69/400
160/160 [=====] - 0s 453us/step - loss: 0.6701
Epoch 70/400
160/160 [=====] - 0s 460us/step - loss: 0.6685
Epoch 71/400
160/160 [=====] - 0s 445us/step - loss: 0.6670
Epoch 72/400
160/160 [=====] - 0s 472us/step - loss: 0.6653
Epoch 73/400
160/160 [=====] - 0s 465us/step - loss: 0.6639
Epoch 74/400
160/160 [=====] - 0s 461us/step - loss: 0.6623
Epoch 75/400
160/160 [=====] - 0s 454us/step - loss: 0.6605
Epoch 76/400
160/160 [=====] - 0s 449us/step - loss: 0.6586
Epoch 77/400
160/160 [=====] - 0s 461us/step - loss: 0.6567
Epoch 78/400
160/160 [=====] - 0s 447us/step - loss: 0.6542
Epoch 79/400
160/160 [=====] - 0s 472us/step - loss: 0.6526
Epoch 80/400
160/160 [=====] - 0s 457us/step - loss: 0.6505
Epoch 81/400
160/160 [=====] - 0s 457us/step - loss: 0.6482
Epoch 82/400
160/160 [=====] - 0s 471us/step - loss: 0.6460
Epoch 83/400

160/160 [=====] - 0s 471us/step - loss: 0.6435
Epoch 84/400
160/160 [=====] - 0s 440us/step - loss: 0.6409
Epoch 85/400
160/160 [=====] - 0s 439us/step - loss: 0.6383
Epoch 86/400
160/160 [=====] - 0s 446us/step - loss: 0.6357
Epoch 87/400
160/160 [=====] - 0s 437us/step - loss: 0.6329
Epoch 88/400
160/160 [=====] - 0s 471us/step - loss: 0.6302
Epoch 89/400
160/160 [=====] - 0s 469us/step - loss: 0.6275
Epoch 90/400
160/160 [=====] - 0s 466us/step - loss: 0.6246
Epoch 91/400
160/160 [=====] - 0s 468us/step - loss: 0.6210
Epoch 92/400
160/160 [=====] - 0s 466us/step - loss: 0.6181
Epoch 93/400
160/160 [=====] - 0s 455us/step - loss: 0.6149
Epoch 94/400
160/160 [=====] - 0s 448us/step - loss: 0.6115
Epoch 95/400
160/160 [=====] - 0s 452us/step - loss: 0.6077
Epoch 96/400
160/160 [=====] - 0s 429us/step - loss: 0.6043
Epoch 97/400
160/160 [=====] - 0s 436us/step - loss: 0.6008
Epoch 98/400
160/160 [=====] - 0s 456us/step - loss: 0.5974
Epoch 99/400
160/160 [=====] - 0s 449us/step - loss: 0.5934
Epoch 100/400
160/160 [=====] - 0s 462us/step - loss: 0.5897
Epoch 101/400
160/160 [=====] - 0s 447us/step - loss: 0.5854
Epoch 102/400
160/160 [=====] - 0s 448us/step - loss: 0.5813
Epoch 103/400
160/160 [=====] - 0s 450us/step - loss: 0.5775
Epoch 104/400
160/160 [=====] - 0s 449us/step - loss: 0.5732
Epoch 105/400
160/160 [=====] - 0s 444us/step - loss: 0.5688
Epoch 106/400
160/160 [=====] - 0s 445us/step - loss: 0.5643
Epoch 107/400

160/160 [=====] - 0s 439us/step - loss: 0.5598
 Epoch 108/400
 160/160 [=====] - 0s 446us/step - loss: 0.5553
 Epoch 109/400
 160/160 [=====] - 0s 450us/step - loss: 0.5503
 Epoch 110/400
 160/160 [=====] - 0s 452us/step - loss: 0.5458
 Epoch 111/400
 160/160 [=====] - 0s 439us/step - loss: 0.5406
 Epoch 112/400
 160/160 [=====] - 0s 424us/step - loss: 0.5362
 Epoch 113/400
 160/160 [=====] - 0s 421us/step - loss: 0.5307
 Epoch 114/400
 160/160 [=====] - 0s 429us/step - loss: 0.5253
 Epoch 115/400
 160/160 [=====] - 0s 447us/step - loss: 0.5204
 Epoch 116/400
 160/160 [=====] - 0s 446us/step - loss: 0.5153
 Epoch 117/400
 160/160 [=====] - 0s 436us/step - loss: 0.5098
 Epoch 118/400
 160/160 [=====] - 0s 443us/step - loss: 0.5045
 Epoch 119/400
 160/160 [=====] - 0s 451us/step - loss: 0.4992
 Epoch 120/400
 160/160 [=====] - 0s 439us/step - loss: 0.4936
 Epoch 121/400
 160/160 [=====] - 0s 444us/step - loss: 0.4880
 Epoch 122/400
 160/160 [=====] - 0s 445us/step - loss: 0.4825
 Epoch 123/400
 160/160 [=====] - 0s 422us/step - loss: 0.4772
 Epoch 124/400
 160/160 [=====] - 0s 431us/step - loss: 0.4713
 Epoch 125/400
 160/160 [=====] - 0s 421us/step - loss: 0.4659
 Epoch 126/400
 160/160 [=====] - 0s 435us/step - loss: 0.4600
 Epoch 127/400
 160/160 [=====] - 0s 444us/step - loss: 0.4544
 Epoch 128/400
 160/160 [=====] - 0s 453us/step - loss: 0.4488
 Epoch 129/400
 160/160 [=====] - 0s 447us/step - loss: 0.4435
 Epoch 130/400
 160/160 [=====] - 0s 450us/step - loss: 0.4377
 Epoch 131/400

160/160 [=====] - 0s 455us/step - loss: 0.4321
 Epoch 132/400
 160/160 [=====] - 0s 450us/step - loss: 0.4264
 Epoch 133/400
 160/160 [=====] - 0s 442us/step - loss: 0.4210
 Epoch 134/400
 160/160 [=====] - 0s 444us/step - loss: 0.4157
 Epoch 135/400
 160/160 [=====] - 0s 446us/step - loss: 0.4103
 Epoch 136/400
 160/160 [=====] - 0s 446us/step - loss: 0.4050
 Epoch 137/400
 160/160 [=====] - 0s 467us/step - loss: 0.3997
 Epoch 138/400
 160/160 [=====] - 0s 447us/step - loss: 0.3943
 Epoch 139/400
 160/160 [=====] - 0s 450us/step - loss: 0.3892
 Epoch 140/400
 160/160 [=====] - 0s 451us/step - loss: 0.3843
 Epoch 141/400
 160/160 [=====] - 0s 449us/step - loss: 0.3796
 Epoch 142/400
 160/160 [=====] - 0s 450us/step - loss: 0.3743
 Epoch 143/400
 160/160 [=====] - 0s 445us/step - loss: 0.3699
 Epoch 144/400
 160/160 [=====] - 0s 460us/step - loss: 0.3648
 Epoch 145/400
 160/160 [=====] - 0s 446us/step - loss: 0.3602
 Epoch 146/400
 160/160 [=====] - 0s 443us/step - loss: 0.3559
 Epoch 147/400
 160/160 [=====] - 0s 450us/step - loss: 0.3516
 Epoch 148/400
 160/160 [=====] - 0s 440us/step - loss: 0.3470
 Epoch 149/400
 160/160 [=====] - 0s 452us/step - loss: 0.3429
 Epoch 150/400
 160/160 [=====] - 0s 441us/step - loss: 0.3391
 Epoch 151/400
 160/160 [=====] - 0s 448us/step - loss: 0.3351
 Epoch 152/400
 160/160 [=====] - 0s 440us/step - loss: 0.3313
 Epoch 153/400
 160/160 [=====] - 0s 447us/step - loss: 0.3273
 Epoch 154/400
 160/160 [=====] - 0s 451us/step - loss: 0.3237
 Epoch 155/400

160/160 [=====] - 0s 436us/step - loss: 0.3202
 Epoch 156/400
 160/160 [=====] - 0s 452us/step - loss: 0.3167
 Epoch 157/400
 160/160 [=====] - 0s 449us/step - loss: 0.3133
 Epoch 158/400
 160/160 [=====] - 0s 461us/step - loss: 0.3099
 Epoch 159/400
 160/160 [=====] - 0s 456us/step - loss: 0.3066
 Epoch 160/400
 160/160 [=====] - 0s 451us/step - loss: 0.3039
 Epoch 161/400
 160/160 [=====] - 0s 443us/step - loss: 0.3007
 Epoch 162/400
 160/160 [=====] - 0s 452us/step - loss: 0.2981
 Epoch 163/400
 160/160 [=====] - 0s 437us/step - loss: 0.2953
 Epoch 164/400
 160/160 [=====] - 0s 450us/step - loss: 0.2922
 Epoch 165/400
 160/160 [=====] - 0s 448us/step - loss: 0.2899
 Epoch 166/400
 160/160 [=====] - 0s 453us/step - loss: 0.2875
 Epoch 167/400
 160/160 [=====] - 0s 450us/step - loss: 0.2848
 Epoch 168/400
 160/160 [=====] - 0s 445us/step - loss: 0.2825
 Epoch 169/400
 160/160 [=====] - 0s 444us/step - loss: 0.2797
 Epoch 170/400
 160/160 [=====] - 0s 443us/step - loss: 0.2779
 Epoch 171/400
 160/160 [=====] - 0s 445us/step - loss: 0.2755
 Epoch 172/400
 160/160 [=====] - 0s 438us/step - loss: 0.2734
 Epoch 173/400
 160/160 [=====] - 0s 442us/step - loss: 0.2711
 Epoch 174/400
 160/160 [=====] - 0s 457us/step - loss: 0.2690
 Epoch 175/400
 160/160 [=====] - 0s 440us/step - loss: 0.2671
 Epoch 176/400
 160/160 [=====] - 0s 451us/step - loss: 0.2652
 Epoch 177/400
 160/160 [=====] - 0s 453us/step - loss: 0.2633
 Epoch 178/400
 160/160 [=====] - 0s 454us/step - loss: 0.2614
 Epoch 179/400

160/160 [=====] - 0s 456us/step - loss: 0.2597
Epoch 180/400
160/160 [=====] - 0s 446us/step - loss: 0.2579
Epoch 181/400
160/160 [=====] - 0s 463us/step - loss: 0.2561
Epoch 182/400
160/160 [=====] - 0s 449us/step - loss: 0.2543
Epoch 183/400
160/160 [=====] - 0s 442us/step - loss: 0.2529
Epoch 184/400
160/160 [=====] - 0s 443us/step - loss: 0.2514
Epoch 185/400
160/160 [=====] - 0s 449us/step - loss: 0.2501
Epoch 186/400
160/160 [=====] - 0s 441us/step - loss: 0.2487
Epoch 187/400
160/160 [=====] - 0s 452us/step - loss: 0.2472
Epoch 188/400
160/160 [=====] - 0s 463us/step - loss: 0.2455
Epoch 189/400
160/160 [=====] - 0s 445us/step - loss: 0.2441
Epoch 190/400
160/160 [=====] - 0s 442us/step - loss: 0.2426
Epoch 191/400
160/160 [=====] - 0s 441us/step - loss: 0.2416
Epoch 192/400
160/160 [=====] - 0s 450us/step - loss: 0.2403
Epoch 193/400
160/160 [=====] - 0s 451us/step - loss: 0.2391
Epoch 194/400
160/160 [=====] - 0s 446us/step - loss: 0.2376
Epoch 195/400
160/160 [=====] - 0s 453us/step - loss: 0.2365
Epoch 196/400
160/160 [=====] - 0s 451us/step - loss: 0.2356
Epoch 197/400
160/160 [=====] - 0s 437us/step - loss: 0.2345
Epoch 198/400
160/160 [=====] - 0s 456us/step - loss: 0.2332
Epoch 199/400
160/160 [=====] - 0s 447us/step - loss: 0.2323
Epoch 200/400
160/160 [=====] - 0s 441us/step - loss: 0.2311
Epoch 201/400
160/160 [=====] - 0s 442us/step - loss: 0.2299
Epoch 202/400
160/160 [=====] - 0s 442us/step - loss: 0.2287
Epoch 203/400

160/160 [=====] - 0s 439us/step - loss: 0.2279
Epoch 204/400
160/160 [=====] - 0s 442us/step - loss: 0.2271
Epoch 205/400
160/160 [=====] - 0s 421us/step - loss: 0.2263
Epoch 206/400
160/160 [=====] - 0s 435us/step - loss: 0.2254
Epoch 207/400
160/160 [=====] - 0s 442us/step - loss: 0.2242
Epoch 208/400
160/160 [=====] - 0s 446us/step - loss: 0.2230
Epoch 209/400
160/160 [=====] - 0s 446us/step - loss: 0.2225
Epoch 210/400
160/160 [=====] - 0s 495us/step - loss: 0.2213
Epoch 211/400
160/160 [=====] - 0s 437us/step - loss: 0.2209
Epoch 212/400
160/160 [=====] - 0s 432us/step - loss: 0.2201
Epoch 213/400
160/160 [=====] - 0s 417us/step - loss: 0.2191
Epoch 214/400
160/160 [=====] - 0s 413us/step - loss: 0.2187
Epoch 215/400
160/160 [=====] - 0s 416us/step - loss: 0.2175
Epoch 216/400
160/160 [=====] - 0s 439us/step - loss: 0.2169
Epoch 217/400
160/160 [=====] - 0s 445us/step - loss: 0.2162
Epoch 218/400
160/160 [=====] - 0s 478us/step - loss: 0.2154
Epoch 219/400
160/160 [=====] - 0s 444us/step - loss: 0.2145
Epoch 220/400
160/160 [=====] - 0s 443us/step - loss: 0.2140
Epoch 221/400
160/160 [=====] - 0s 448us/step - loss: 0.2132
Epoch 222/400
160/160 [=====] - 0s 449us/step - loss: 0.2127
Epoch 223/400
160/160 [=====] - 0s 452us/step - loss: 0.2119
Epoch 224/400
160/160 [=====] - 0s 444us/step - loss: 0.2115
Epoch 225/400
160/160 [=====] - 0s 461us/step - loss: 0.2107
Epoch 226/400
160/160 [=====] - 0s 442us/step - loss: 0.2100
Epoch 227/400

160/160 [=====] - 0s 439us/step - loss: 0.2096
 Epoch 228/400
 160/160 [=====] - 0s 445us/step - loss: 0.2089
 Epoch 229/400
 160/160 [=====] - 0s 443us/step - loss: 0.2083
 Epoch 230/400
 160/160 [=====] - 0s 441us/step - loss: 0.2075
 Epoch 231/400
 160/160 [=====] - 0s 443us/step - loss: 0.2070
 Epoch 232/400
 160/160 [=====] - 0s 455us/step - loss: 0.2063
 Epoch 233/400
 160/160 [=====] - 0s 442us/step - loss: 0.2061
 Epoch 234/400
 160/160 [=====] - 0s 434us/step - loss: 0.2055
 Epoch 235/400
 160/160 [=====] - 0s 451us/step - loss: 0.2047
 Epoch 236/400
 160/160 [=====] - 0s 434us/step - loss: 0.2048
 Epoch 237/400
 160/160 [=====] - 0s 441us/step - loss: 0.2041
 Epoch 238/400
 160/160 [=====] - 0s 430us/step - loss: 0.2032
 Epoch 239/400
 160/160 [=====] - 0s 420us/step - loss: 0.2029
 Epoch 240/400
 160/160 [=====] - 0s 417us/step - loss: 0.2021
 Epoch 241/400
 160/160 [=====] - 0s 412us/step - loss: 0.2017
 Epoch 242/400
 160/160 [=====] - 0s 428us/step - loss: 0.2012
 Epoch 243/400
 160/160 [=====] - 0s 419us/step - loss: 0.2007
 Epoch 244/400
 160/160 [=====] - 0s 427us/step - loss: 0.2005
 Epoch 245/400
 160/160 [=====] - 0s 434us/step - loss: 0.2001
 Epoch 246/400
 160/160 [=====] - 0s 446us/step - loss: 0.1995
 Epoch 247/400
 160/160 [=====] - 0s 449us/step - loss: 0.1991
 Epoch 248/400
 160/160 [=====] - 0s 452us/step - loss: 0.1990
 Epoch 249/400
 160/160 [=====] - 0s 447us/step - loss: 0.1984
 Epoch 250/400
 160/160 [=====] - 0s 437us/step - loss: 0.1980
 Epoch 251/400

160/160 [=====] - 0s 450us/step - loss: 0.1974
 Epoch 252/400
 160/160 [=====] - 0s 442us/step - loss: 0.1974
 Epoch 253/400
 160/160 [=====] - 0s 445us/step - loss: 0.1970
 Epoch 254/400
 160/160 [=====] - 0s 444us/step - loss: 0.1963
 Epoch 255/400
 160/160 [=====] - 0s 447us/step - loss: 0.1959
 Epoch 256/400
 160/160 [=====] - 0s 453us/step - loss: 0.1955
 Epoch 257/400
 160/160 [=====] - 0s 449us/step - loss: 0.1951
 Epoch 258/400
 160/160 [=====] - 0s 461us/step - loss: 0.1946
 Epoch 259/400
 160/160 [=====] - 0s 437us/step - loss: 0.1949
 Epoch 260/400
 160/160 [=====] - 0s 443us/step - loss: 0.1944
 Epoch 261/400
 160/160 [=====] - 0s 449us/step - loss: 0.1935
 Epoch 262/400
 160/160 [=====] - 0s 454us/step - loss: 0.1931
 Epoch 263/400
 160/160 [=====] - 0s 432us/step - loss: 0.1928
 Epoch 264/400
 160/160 [=====] - 0s 423us/step - loss: 0.1927
 Epoch 265/400
 160/160 [=====] - 0s 438us/step - loss: 0.1924
 Epoch 266/400
 160/160 [=====] - 0s 428us/step - loss: 0.1919
 Epoch 267/400
 160/160 [=====] - 0s 422us/step - loss: 0.1916
 Epoch 268/400
 160/160 [=====] - 0s 424us/step - loss: 0.1914
 Epoch 269/400
 160/160 [=====] - 0s 419us/step - loss: 0.1913
 Epoch 270/400
 160/160 [=====] - 0s 448us/step - loss: 0.1909
 Epoch 271/400
 160/160 [=====] - 0s 448us/step - loss: 0.1906
 Epoch 272/400
 160/160 [=====] - 0s 434us/step - loss: 0.1902
 Epoch 273/400
 160/160 [=====] - 0s 445us/step - loss: 0.1901
 Epoch 274/400
 160/160 [=====] - 0s 443us/step - loss: 0.1896
 Epoch 275/400

160/160 [=====] - 0s 434us/step - loss: 0.1895
 Epoch 276/400
 160/160 [=====] - 0s 444us/step - loss: 0.1891
 Epoch 277/400
 160/160 [=====] - 0s 454us/step - loss: 0.1889
 Epoch 278/400
 160/160 [=====] - 0s 442us/step - loss: 0.1883
 Epoch 279/400
 160/160 [=====] - 0s 438us/step - loss: 0.1882
 Epoch 280/400
 160/160 [=====] - 0s 444us/step - loss: 0.1877
 Epoch 281/400
 160/160 [=====] - 0s 452us/step - loss: 0.1876
 Epoch 282/400
 160/160 [=====] - 0s 444us/step - loss: 0.1874
 Epoch 283/400
 160/160 [=====] - 0s 445us/step - loss: 0.1868
 Epoch 284/400
 160/160 [=====] - 0s 434us/step - loss: 0.1868
 Epoch 285/400
 160/160 [=====] - 0s 448us/step - loss: 0.1867
 Epoch 286/400
 160/160 [=====] - 0s 448us/step - loss: 0.1864
 Epoch 287/400
 160/160 [=====] - 0s 432us/step - loss: 0.1863
 Epoch 288/400
 160/160 [=====] - 0s 441us/step - loss: 0.1860
 Epoch 289/400
 160/160 [=====] - 0s 445us/step - loss: 0.1856
 Epoch 290/400
 160/160 [=====] - 0s 451us/step - loss: 0.1857
 Epoch 291/400
 160/160 [=====] - 0s 440us/step - loss: 0.1850
 Epoch 292/400
 160/160 [=====] - 0s 452us/step - loss: 0.1849
 Epoch 293/400
 160/160 [=====] - 0s 445us/step - loss: 0.1848
 Epoch 294/400
 160/160 [=====] - 0s 442us/step - loss: 0.1842
 Epoch 295/400
 160/160 [=====] - 0s 433us/step - loss: 0.1843
 Epoch 296/400
 160/160 [=====] - 0s 446us/step - loss: 0.1841
 Epoch 297/400
 160/160 [=====] - 0s 439us/step - loss: 0.1837
 Epoch 298/400
 160/160 [=====] - 0s 438us/step - loss: 0.1840
 Epoch 299/400

160/160 [=====] - 0s 458us/step - loss: 0.1835
Epoch 300/400
160/160 [=====] - 0s 448us/step - loss: 0.1831
Epoch 301/400
160/160 [=====] - 0s 441us/step - loss: 0.1829
Epoch 302/400
160/160 [=====] - 0s 439us/step - loss: 0.1828
Epoch 303/400
160/160 [=====] - 0s 448us/step - loss: 0.1824
Epoch 304/400
160/160 [=====] - 0s 442us/step - loss: 0.1823
Epoch 305/400
160/160 [=====] - 0s 439us/step - loss: 0.1822
Epoch 306/400
160/160 [=====] - 0s 444us/step - loss: 0.1820
Epoch 307/400
160/160 [=====] - 0s 446us/step - loss: 0.1816
Epoch 308/400
160/160 [=====] - 0s 439us/step - loss: 0.1814
Epoch 309/400
160/160 [=====] - 0s 433us/step - loss: 0.1813
Epoch 310/400
160/160 [=====] - 0s 443us/step - loss: 0.1810
Epoch 311/400
160/160 [=====] - 0s 436us/step - loss: 0.1811
Epoch 312/400
160/160 [=====] - 0s 439us/step - loss: 0.1809
Epoch 313/400
160/160 [=====] - 0s 440us/step - loss: 0.1806
Epoch 314/400
160/160 [=====] - 0s 454us/step - loss: 0.1804
Epoch 315/400
160/160 [=====] - 0s 449us/step - loss: 0.1803
Epoch 316/400
160/160 [=====] - 0s 443us/step - loss: 0.1801
Epoch 317/400
160/160 [=====] - 0s 432us/step - loss: 0.1797
Epoch 318/400
160/160 [=====] - 0s 451us/step - loss: 0.1798
Epoch 319/400
160/160 [=====] - 0s 441us/step - loss: 0.1797
Epoch 320/400
160/160 [=====] - 0s 426us/step - loss: 0.1797
Epoch 321/400
160/160 [=====] - 0s 420us/step - loss: 0.1790
Epoch 322/400
160/160 [=====] - 0s 436us/step - loss: 0.1789
Epoch 323/400

160/160 [=====] - 0s 438us/step - loss: 0.1789
Epoch 324/400
160/160 [=====] - 0s 443us/step - loss: 0.1786
Epoch 325/400
160/160 [=====] - 0s 436us/step - loss: 0.1788
Epoch 326/400
160/160 [=====] - 0s 442us/step - loss: 0.1784
Epoch 327/400
160/160 [=====] - 0s 457us/step - loss: 0.1779
Epoch 328/400
160/160 [=====] - 0s 441us/step - loss: 0.1781
Epoch 329/400
160/160 [=====] - 0s 446us/step - loss: 0.1784
Epoch 330/400
160/160 [=====] - 0s 449us/step - loss: 0.1779
Epoch 331/400
160/160 [=====] - 0s 442us/step - loss: 0.1776
Epoch 332/400
160/160 [=====] - 0s 445us/step - loss: 0.1775
Epoch 333/400
160/160 [=====] - 0s 448us/step - loss: 0.1774
Epoch 334/400
160/160 [=====] - 0s 434us/step - loss: 0.1772
Epoch 335/400
160/160 [=====] - 0s 439us/step - loss: 0.1768
Epoch 336/400
160/160 [=====] - 0s 441us/step - loss: 0.1770
Epoch 337/400
160/160 [=====] - 0s 441us/step - loss: 0.1767
Epoch 338/400
160/160 [=====] - 0s 439us/step - loss: 0.1765
Epoch 339/400
160/160 [=====] - 0s 434us/step - loss: 0.1762
Epoch 340/400
160/160 [=====] - 0s 432us/step - loss: 0.1765
Epoch 341/400
160/160 [=====] - 0s 450us/step - loss: 0.1763
Epoch 342/400
160/160 [=====] - 0s 432us/step - loss: 0.1760
Epoch 343/400
160/160 [=====] - 0s 425us/step - loss: 0.1761
Epoch 344/400
160/160 [=====] - 0s 436us/step - loss: 0.1760
Epoch 345/400
160/160 [=====] - 0s 443us/step - loss: 0.1757
Epoch 346/400
160/160 [=====] - 0s 443us/step - loss: 0.1755
Epoch 347/400

160/160 [=====] - 0s 446us/step - loss: 0.1756
Epoch 348/400
160/160 [=====] - 0s 439us/step - loss: 0.1759
Epoch 349/400
160/160 [=====] - 0s 440us/step - loss: 0.1753
Epoch 350/400
160/160 [=====] - 0s 437us/step - loss: 0.1754
Epoch 351/400
160/160 [=====] - 0s 449us/step - loss: 0.1751
Epoch 352/400
160/160 [=====] - 0s 442us/step - loss: 0.1747
Epoch 353/400
160/160 [=====] - 0s 438us/step - loss: 0.1748
Epoch 354/400
160/160 [=====] - 0s 434us/step - loss: 0.1744
Epoch 355/400
160/160 [=====] - 0s 439us/step - loss: 0.1743
Epoch 356/400
160/160 [=====] - 0s 436us/step - loss: 0.1744
Epoch 357/400
160/160 [=====] - 0s 439us/step - loss: 0.1742
Epoch 358/400
160/160 [=====] - 0s 445us/step - loss: 0.1742
Epoch 359/400
160/160 [=====] - 0s 451us/step - loss: 0.1738
Epoch 360/400
160/160 [=====] - 0s 454us/step - loss: 0.1739
Epoch 361/400
160/160 [=====] - 0s 434us/step - loss: 0.1738
Epoch 362/400
160/160 [=====] - 0s 436us/step - loss: 0.1733
Epoch 363/400
160/160 [=====] - 0s 445us/step - loss: 0.1735
Epoch 364/400
160/160 [=====] - 0s 442us/step - loss: 0.1735
Epoch 365/400
160/160 [=====] - 0s 442us/step - loss: 0.1733
Epoch 366/400
160/160 [=====] - 0s 467us/step - loss: 0.1732
Epoch 367/400
160/160 [=====] - 0s 450us/step - loss: 0.1733
Epoch 368/400
160/160 [=====] - 0s 442us/step - loss: 0.1731
Epoch 369/400
160/160 [=====] - 0s 448us/step - loss: 0.1728
Epoch 370/400
160/160 [=====] - 0s 442us/step - loss: 0.1728
Epoch 371/400

160/160 [=====] - 0s 436us/step - loss: 0.1725
 Epoch 372/400
 160/160 [=====] - 0s 438us/step - loss: 0.1725
 Epoch 373/400
 160/160 [=====] - 0s 447us/step - loss: 0.1718
 Epoch 374/400
 160/160 [=====] - 0s 446us/step - loss: 0.1723
 Epoch 375/400
 160/160 [=====] - 0s 433us/step - loss: 0.1723
 Epoch 376/400
 160/160 [=====] - 0s 430us/step - loss: 0.1718
 Epoch 377/400
 160/160 [=====] - 0s 440us/step - loss: 0.1721
 Epoch 378/400
 160/160 [=====] - 0s 440us/step - loss: 0.1719
 Epoch 379/400
 160/160 [=====] - 0s 447us/step - loss: 0.1719
 Epoch 380/400
 160/160 [=====] - 0s 433us/step - loss: 0.1717
 Epoch 381/400
 160/160 [=====] - 0s 450us/step - loss: 0.1717
 Epoch 382/400
 160/160 [=====] - 0s 437us/step - loss: 0.1715
 Epoch 383/400
 160/160 [=====] - 0s 431us/step - loss: 0.1716
 Epoch 384/400
 160/160 [=====] - 0s 441us/step - loss: 0.1713
 Epoch 385/400
 160/160 [=====] - 0s 428us/step - loss: 0.1712
 Epoch 386/400
 160/160 [=====] - 0s 432us/step - loss: 0.1710
 Epoch 387/400
 160/160 [=====] - 0s 439us/step - loss: 0.1709
 Epoch 388/400
 160/160 [=====] - 0s 447us/step - loss: 0.1711
 Epoch 389/400
 160/160 [=====] - 0s 439us/step - loss: 0.1707
 Epoch 390/400
 160/160 [=====] - 0s 432us/step - loss: 0.1708
 Epoch 391/400
 160/160 [=====] - 0s 438us/step - loss: 0.1707
 Epoch 392/400
 160/160 [=====] - 0s 440us/step - loss: 0.1708
 Epoch 393/400
 160/160 [=====] - 0s 444us/step - loss: 0.1707
 Epoch 394/400
 160/160 [=====] - 0s 435us/step - loss: 0.1705
 Epoch 395/400

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160/160 [=====] - 0s 437us/step - loss: 0.1702
Epoch 396/400
160/160 [=====] - 0s 452us/step - loss: 0.1705
Epoch 397/400
160/160 [=====] - 0s 445us/step - loss: 0.1698
Epoch 398/400
160/160 [=====] - 0s 438us/step - loss: 0.1699
Epoch 399/400
160/160 [=====] - 0s 445us/step - loss: 0.1700
Epoch 400/400
160/160 [=====] - 0s 439us/step - loss: 0.1699
160/160 [=====] - 0s 571us/step
Epoch 1/400
160/160 [=====] - 0s 2ms/step - loss: 0.7109
Epoch 2/400
160/160 [=====] - 0s 496us/step - loss: 0.7052
Epoch 3/400
160/160 [=====] - 0s 475us/step - loss: 0.7002
Epoch 4/400
160/160 [=====] - 0s 497us/step - loss: 0.6963
Epoch 5/400
160/160 [=====] - 0s 503us/step - loss: 0.6921
Epoch 6/400
160/160 [=====] - 0s 478us/step - loss: 0.6880
Epoch 7/400
160/160 [=====] - 0s 496us/step - loss: 0.6849
Epoch 8/400
160/160 [=====] - 0s 487us/step - loss: 0.6819
Epoch 9/400
160/160 [=====] - 0s 487us/step - loss: 0.6788
Epoch 10/400
160/160 [=====] - 0s 479us/step - loss: 0.6753
Epoch 11/400
160/160 [=====] - 0s 497us/step - loss: 0.6720
Epoch 12/400
160/160 [=====] - 0s 498us/step - loss: 0.6691
Epoch 13/400
160/160 [=====] - 0s 483us/step - loss: 0.6658
Epoch 14/400
160/160 [=====] - 0s 477us/step - loss: 0.6627
Epoch 15/400
160/160 [=====] - 0s 488us/step - loss: 0.6596
Epoch 16/400
160/160 [=====] - 0s 493us/step - loss: 0.6562
Epoch 17/400
160/160 [=====] - 0s 487us/step - loss: 0.6534
Epoch 18/400
160/160 [=====] - 0s 493us/step - loss: 0.6499

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Epoch 19/400
160/160 [=====] - 0s 489us/step - loss: 0.6468
Epoch 20/400
160/160 [=====] - 0s 487us/step - loss: 0.6437
Epoch 21/400
160/160 [=====] - 0s 490us/step - loss: 0.6407
Epoch 22/400
160/160 [=====] - 0s 481us/step - loss: 0.6372
Epoch 23/400
160/160 [=====] - 0s 483us/step - loss: 0.6339
Epoch 24/400
160/160 [=====] - 0s 481us/step - loss: 0.6305
Epoch 25/400
160/160 [=====] - 0s 484us/step - loss: 0.6277
Epoch 26/400
160/160 [=====] - 0s 487us/step - loss: 0.6245
Epoch 27/400
160/160 [=====] - 0s 495us/step - loss: 0.6205
Epoch 28/400
160/160 [=====] - 0s 471us/step - loss: 0.6177
Epoch 29/400
160/160 [=====] - 0s 485us/step - loss: 0.6146
Epoch 30/400
160/160 [=====] - 0s 486us/step - loss: 0.6114
Epoch 31/400
160/160 [=====] - 0s 491us/step - loss: 0.6083
Epoch 32/400
160/160 [=====] - 0s 476us/step - loss: 0.6054
Epoch 33/400
160/160 [=====] - 0s 490us/step - loss: 0.6026
Epoch 34/400
160/160 [=====] - 0s 479us/step - loss: 0.5995
Epoch 35/400
160/160 [=====] - 0s 486us/step - loss: 0.5962
Epoch 36/400
160/160 [=====] - 0s 484us/step - loss: 0.5940
Epoch 37/400
160/160 [=====] - 0s 491us/step - loss: 0.5906
Epoch 38/400
160/160 [=====] - 0s 484us/step - loss: 0.5885
Epoch 39/400
160/160 [=====] - 0s 487us/step - loss: 0.5854
Epoch 40/400
160/160 [=====] - 0s 492us/step - loss: 0.5823
Epoch 41/400
160/160 [=====] - 0s 489us/step - loss: 0.5795
Epoch 42/400
160/160 [=====] - 0s 489us/step - loss: 0.5763

Epoch 43/400
160/160 [=====] - 0s 482us/step - loss: 0.5732
Epoch 44/400
160/160 [=====] - 0s 503us/step - loss: 0.5700
Epoch 45/400
160/160 [=====] - 0s 487us/step - loss: 0.5667
Epoch 46/400
160/160 [=====] - 0s 490us/step - loss: 0.5634
Epoch 47/400
160/160 [=====] - 0s 487us/step - loss: 0.5590
Epoch 48/400
160/160 [=====] - 0s 491us/step - loss: 0.5553
Epoch 49/400
160/160 [=====] - 0s 493us/step - loss: 0.5503
Epoch 50/400
160/160 [=====] - 0s 498us/step - loss: 0.5460
Epoch 51/400
160/160 [=====] - 0s 498us/step - loss: 0.5407
Epoch 52/400
160/160 [=====] - 0s 482us/step - loss: 0.5360
Epoch 53/400
160/160 [=====] - 0s 486us/step - loss: 0.5298
Epoch 54/400
160/160 [=====] - 0s 498us/step - loss: 0.5233
Epoch 55/400
160/160 [=====] - 0s 494us/step - loss: 0.5162
Epoch 56/400
160/160 [=====] - 0s 493us/step - loss: 0.5104
Epoch 57/400
160/160 [=====] - 0s 497us/step - loss: 0.5028
Epoch 58/400
160/160 [=====] - 0s 479us/step - loss: 0.4958
Epoch 59/400
160/160 [=====] - 0s 492us/step - loss: 0.4869
Epoch 60/400
160/160 [=====] - 0s 483us/step - loss: 0.4784
Epoch 61/400
160/160 [=====] - 0s 497us/step - loss: 0.4687
Epoch 62/400
160/160 [=====] - 0s 498us/step - loss: 0.4616
Epoch 63/400
160/160 [=====] - 0s 495us/step - loss: 0.4527
Epoch 64/400
160/160 [=====] - 0s 484us/step - loss: 0.4443
Epoch 65/400
160/160 [=====] - 0s 485us/step - loss: 0.4346
Epoch 66/400
160/160 [=====] - 0s 483us/step - loss: 0.4257

Epoch 67/400
160/160 [=====] - 0s 485us/step - loss: 0.4165
Epoch 68/400
160/160 [=====] - 0s 491us/step - loss: 0.4085
Epoch 69/400
160/160 [=====] - 0s 508us/step - loss: 0.4006
Epoch 70/400
160/160 [=====] - 0s 497us/step - loss: 0.3921
Epoch 71/400
160/160 [=====] - 0s 488us/step - loss: 0.3837
Epoch 72/400
160/160 [=====] - 0s 491us/step - loss: 0.3776
Epoch 73/400
160/160 [=====] - 0s 494us/step - loss: 0.3695
Epoch 74/400
160/160 [=====] - 0s 508us/step - loss: 0.3619
Epoch 75/400
160/160 [=====] - 0s 493us/step - loss: 0.3554
Epoch 76/400
160/160 [=====] - 0s 491us/step - loss: 0.3492
Epoch 77/400
160/160 [=====] - 0s 490us/step - loss: 0.3424
Epoch 78/400
160/160 [=====] - 0s 487us/step - loss: 0.3367
Epoch 79/400
160/160 [=====] - 0s 483us/step - loss: 0.3288
Epoch 80/400
160/160 [=====] - 0s 486us/step - loss: 0.3268
Epoch 81/400
160/160 [=====] - 0s 497us/step - loss: 0.3195
Epoch 82/400
160/160 [=====] - 0s 481us/step - loss: 0.3126
Epoch 83/400
160/160 [=====] - 0s 491us/step - loss: 0.3107
Epoch 84/400
160/160 [=====] - 0s 459us/step - loss: 0.3045
Epoch 85/400
160/160 [=====] - 0s 499us/step - loss: 0.2996
Epoch 86/400
160/160 [=====] - 0s 476us/step - loss: 0.2930
Epoch 87/400
160/160 [=====] - 0s 484us/step - loss: 0.2897
Epoch 88/400
160/160 [=====] - 0s 496us/step - loss: 0.2848
Epoch 89/400
160/160 [=====] - 0s 488us/step - loss: 0.2795
Epoch 90/400
160/160 [=====] - 0s 485us/step - loss: 0.2752

Epoch 91/400
160/160 [=====] - 0s 480us/step - loss: 0.2708
Epoch 92/400
160/160 [=====] - 0s 494us/step - loss: 0.2664
Epoch 93/400
160/160 [=====] - 0s 488us/step - loss: 0.2624
Epoch 94/400
160/160 [=====] - 0s 509us/step - loss: 0.2578
Epoch 95/400
160/160 [=====] - 0s 472us/step - loss: 0.2536
Epoch 96/400
160/160 [=====] - 0s 485us/step - loss: 0.2495
Epoch 97/400
160/160 [=====] - 0s 470us/step - loss: 0.2446
Epoch 98/400
160/160 [=====] - 0s 486us/step - loss: 0.2418
Epoch 99/400
160/160 [=====] - 0s 488us/step - loss: 0.2365
Epoch 100/400
160/160 [=====] - 0s 495us/step - loss: 0.2326
Epoch 101/400
160/160 [=====] - 0s 507us/step - loss: 0.2284
Epoch 102/400
160/160 [=====] - 0s 493us/step - loss: 0.2238
Epoch 103/400
160/160 [=====] - 0s 502us/step - loss: 0.2211
Epoch 104/400
160/160 [=====] - 0s 499us/step - loss: 0.2165
Epoch 105/400
160/160 [=====] - 0s 507us/step - loss: 0.2123
Epoch 106/400
160/160 [=====] - 0s 507us/step - loss: 0.2095
Epoch 107/400
160/160 [=====] - 0s 512us/step - loss: 0.2066
Epoch 108/400
160/160 [=====] - 0s 496us/step - loss: 0.2028
Epoch 109/400
160/160 [=====] - 0s 515us/step - loss: 0.1988
Epoch 110/400
160/160 [=====] - 0s 509us/step - loss: 0.1955
Epoch 111/400
160/160 [=====] - 0s 503us/step - loss: 0.1918
Epoch 112/400
160/160 [=====] - 0s 489us/step - loss: 0.1889
Epoch 113/400
160/160 [=====] - 0s 502us/step - loss: 0.1857
Epoch 114/400
160/160 [=====] - 0s 488us/step - loss: 0.1826

Epoch 115/400
160/160 [=====] - 0s 491us/step - loss: 0.1796
Epoch 116/400
160/160 [=====] - 0s 489us/step - loss: 0.1761
Epoch 117/400
160/160 [=====] - 0s 494us/step - loss: 0.1745
Epoch 118/400
160/160 [=====] - 0s 498us/step - loss: 0.1718
Epoch 119/400
160/160 [=====] - 0s 485us/step - loss: 0.1694
Epoch 120/400
160/160 [=====] - 0s 485us/step - loss: 0.1658
Epoch 121/400
160/160 [=====] - 0s 489us/step - loss: 0.1635
Epoch 122/400
160/160 [=====] - 0s 493us/step - loss: 0.1614
Epoch 123/400
160/160 [=====] - 0s 492us/step - loss: 0.1586
Epoch 124/400
160/160 [=====] - 0s 493us/step - loss: 0.1575
Epoch 125/400
160/160 [=====] - 0s 486us/step - loss: 0.1541
Epoch 126/400
160/160 [=====] - 0s 502us/step - loss: 0.1523
Epoch 127/400
160/160 [=====] - 0s 492us/step - loss: 0.1506
Epoch 128/400
160/160 [=====] - 0s 492us/step - loss: 0.1474
Epoch 129/400
160/160 [=====] - 0s 487us/step - loss: 0.1472
Epoch 130/400
160/160 [=====] - 0s 494us/step - loss: 0.1448
Epoch 131/400
160/160 [=====] - 0s 498us/step - loss: 0.1433
Epoch 132/400
160/160 [=====] - 0s 485us/step - loss: 0.1390
Epoch 133/400
160/160 [=====] - 0s 482us/step - loss: 0.1390
Epoch 134/400
160/160 [=====] - 0s 497us/step - loss: 0.1374
Epoch 135/400
160/160 [=====] - 0s 494us/step - loss: 0.1358
Epoch 136/400
160/160 [=====] - 0s 485us/step - loss: 0.1335
Epoch 137/400
160/160 [=====] - 0s 487us/step - loss: 0.1324
Epoch 138/400
160/160 [=====] - 0s 493us/step - loss: 0.1310

Epoch 139/400
160/160 [=====] - 0s 482us/step - loss: 0.1290
Epoch 140/400
160/160 [=====] - 0s 479us/step - loss: 0.1273
Epoch 141/400
160/160 [=====] - 0s 484us/step - loss: 0.1259
Epoch 142/400
160/160 [=====] - 0s 494us/step - loss: 0.1252
Epoch 143/400
160/160 [=====] - 0s 487us/step - loss: 0.1235
Epoch 144/400
160/160 [=====] - 0s 476us/step - loss: 0.1214
Epoch 145/400
160/160 [=====] - 0s 481us/step - loss: 0.1204
Epoch 146/400
160/160 [=====] - 0s 473us/step - loss: 0.1193
Epoch 147/400
160/160 [=====] - 0s 488us/step - loss: 0.1186
Epoch 148/400
160/160 [=====] - 0s 492us/step - loss: 0.1165
Epoch 149/400
160/160 [=====] - 0s 495us/step - loss: 0.1148
Epoch 150/400
160/160 [=====] - 0s 483us/step - loss: 0.1148
Epoch 151/400
160/160 [=====] - 0s 494us/step - loss: 0.1132
Epoch 152/400
160/160 [=====] - 0s 483us/step - loss: 0.1123
Epoch 153/400
160/160 [=====] - 0s 487us/step - loss: 0.1113
Epoch 154/400
160/160 [=====] - 0s 491us/step - loss: 0.1097
Epoch 155/400
160/160 [=====] - 0s 481us/step - loss: 0.1088
Epoch 156/400
160/160 [=====] - 0s 490us/step - loss: 0.1074
Epoch 157/400
160/160 [=====] - 0s 496us/step - loss: 0.1068
Epoch 158/400
160/160 [=====] - 0s 490us/step - loss: 0.1056
Epoch 159/400
160/160 [=====] - 0s 483us/step - loss: 0.1043
Epoch 160/400
160/160 [=====] - 0s 488us/step - loss: 0.1034
Epoch 161/400
160/160 [=====] - 0s 496us/step - loss: 0.1024
Epoch 162/400
160/160 [=====] - 0s 490us/step - loss: 0.1017

Epoch 163/400
160/160 [=====] - 0s 487us/step - loss: 0.1006
Epoch 164/400
160/160 [=====] - 0s 484us/step - loss: 0.0992
Epoch 165/400
160/160 [=====] - 0s 484us/step - loss: 0.0986
Epoch 166/400
160/160 [=====] - 0s 499us/step - loss: 0.0975
Epoch 167/400
160/160 [=====] - 0s 487us/step - loss: 0.0972
Epoch 168/400
160/160 [=====] - 0s 494us/step - loss: 0.0962
Epoch 169/400
160/160 [=====] - 0s 488us/step - loss: 0.0956
Epoch 170/400
160/160 [=====] - 0s 504us/step - loss: 0.0944
Epoch 171/400
160/160 [=====] - 0s 497us/step - loss: 0.0938
Epoch 172/400
160/160 [=====] - 0s 488us/step - loss: 0.0926
Epoch 173/400
160/160 [=====] - 0s 487us/step - loss: 0.0924
Epoch 174/400
160/160 [=====] - 0s 477us/step - loss: 0.0909
Epoch 175/400
160/160 [=====] - 0s 477us/step - loss: 0.0905
Epoch 176/400
160/160 [=====] - 0s 491us/step - loss: 0.0898
Epoch 177/400
160/160 [=====] - 0s 481us/step - loss: 0.0891
Epoch 178/400
160/160 [=====] - 0s 488us/step - loss: 0.0879
Epoch 179/400
160/160 [=====] - 0s 479us/step - loss: 0.0872
Epoch 180/400
160/160 [=====] - 0s 484us/step - loss: 0.0870
Epoch 181/400
160/160 [=====] - 0s 502us/step - loss: 0.0862
Epoch 182/400
160/160 [=====] - 0s 481us/step - loss: 0.0857
Epoch 183/400
160/160 [=====] - 0s 494us/step - loss: 0.0845
Epoch 184/400
160/160 [=====] - 0s 480us/step - loss: 0.0840
Epoch 185/400
160/160 [=====] - 0s 479us/step - loss: 0.0835
Epoch 186/400
160/160 [=====] - 0s 491us/step - loss: 0.0828

Epoch 187/400
160/160 [=====] - 0s 488us/step - loss: 0.0821
Epoch 188/400
160/160 [=====] - 0s 490us/step - loss: 0.0810
Epoch 189/400
160/160 [=====] - 0s 492us/step - loss: 0.0805
Epoch 190/400
160/160 [=====] - 0s 489us/step - loss: 0.0807
Epoch 191/400
160/160 [=====] - 0s 485us/step - loss: 0.0791
Epoch 192/400
160/160 [=====] - 0s 487us/step - loss: 0.0785
Epoch 193/400
160/160 [=====] - 0s 484us/step - loss: 0.0786
Epoch 194/400
160/160 [=====] - 0s 492us/step - loss: 0.0781
Epoch 195/400
160/160 [=====] - 0s 492us/step - loss: 0.0776
Epoch 196/400
160/160 [=====] - 0s 483us/step - loss: 0.0769
Epoch 197/400
160/160 [=====] - 0s 478us/step - loss: 0.0758
Epoch 198/400
160/160 [=====] - 0s 474us/step - loss: 0.0763
Epoch 199/400
160/160 [=====] - 0s 483us/step - loss: 0.0762
Epoch 200/400
160/160 [=====] - 0s 489us/step - loss: 0.0746
Epoch 201/400
160/160 [=====] - 0s 478us/step - loss: 0.0746
Epoch 202/400
160/160 [=====] - 0s 483us/step - loss: 0.0742
Epoch 203/400
160/160 [=====] - 0s 492us/step - loss: 0.0735
Epoch 204/400
160/160 [=====] - 0s 487us/step - loss: 0.0729
Epoch 205/400
160/160 [=====] - 0s 471us/step - loss: 0.0728
Epoch 206/400
160/160 [=====] - 0s 454us/step - loss: 0.0720
Epoch 207/400
160/160 [=====] - 0s 461us/step - loss: 0.0718
Epoch 208/400
160/160 [=====] - 0s 500us/step - loss: 0.0712
Epoch 209/400
160/160 [=====] - 0s 499us/step - loss: 0.0705
Epoch 210/400
160/160 [=====] - 0s 477us/step - loss: 0.0701

Epoch 211/400
160/160 [=====] - 0s 489us/step - loss: 0.0694
Epoch 212/400
160/160 [=====] - 0s 488us/step - loss: 0.0694
Epoch 213/400
160/160 [=====] - 0s 487us/step - loss: 0.0689
Epoch 214/400
160/160 [=====] - 0s 480us/step - loss: 0.0688
Epoch 215/400
160/160 [=====] - 0s 500us/step - loss: 0.0682
Epoch 216/400
160/160 [=====] - 0s 486us/step - loss: 0.0673
Epoch 217/400
160/160 [=====] - 0s 478us/step - loss: 0.0674
Epoch 218/400
160/160 [=====] - 0s 494us/step - loss: 0.0669
Epoch 219/400
160/160 [=====] - 0s 491us/step - loss: 0.0666
Epoch 220/400
160/160 [=====] - 0s 488us/step - loss: 0.0663
Epoch 221/400
160/160 [=====] - 0s 495us/step - loss: 0.0654
Epoch 222/400
160/160 [=====] - 0s 488us/step - loss: 0.0655
Epoch 223/400
160/160 [=====] - 0s 481us/step - loss: 0.0650
Epoch 224/400
160/160 [=====] - 0s 482us/step - loss: 0.0648
Epoch 225/400
160/160 [=====] - 0s 484us/step - loss: 0.0644
Epoch 226/400
160/160 [=====] - 0s 481us/step - loss: 0.0638
Epoch 227/400
160/160 [=====] - 0s 476us/step - loss: 0.0637
Epoch 228/400
160/160 [=====] - 0s 499us/step - loss: 0.0634
Epoch 229/400
160/160 [=====] - 0s 483us/step - loss: 0.0628
Epoch 230/400
160/160 [=====] - 0s 490us/step - loss: 0.0623
Epoch 231/400
160/160 [=====] - 0s 485us/step - loss: 0.0621
Epoch 232/400
160/160 [=====] - 0s 492us/step - loss: 0.0621
Epoch 233/400
160/160 [=====] - 0s 490us/step - loss: 0.0615
Epoch 234/400
160/160 [=====] - 0s 487us/step - loss: 0.0613

Epoch 235/400
160/160 [=====] - 0s 488us/step - loss: 0.0613
Epoch 236/400
160/160 [=====] - 0s 482us/step - loss: 0.0607
Epoch 237/400
160/160 [=====] - 0s 490us/step - loss: 0.0605
Epoch 238/400
160/160 [=====] - 0s 489us/step - loss: 0.0598
Epoch 239/400
160/160 [=====] - 0s 485us/step - loss: 0.0599
Epoch 240/400
160/160 [=====] - 0s 482us/step - loss: 0.0598
Epoch 241/400
160/160 [=====] - 0s 483us/step - loss: 0.0592
Epoch 242/400
160/160 [=====] - 0s 498us/step - loss: 0.0589
Epoch 243/400
160/160 [=====] - 0s 516us/step - loss: 0.0587
Epoch 244/400
160/160 [=====] - 0s 500us/step - loss: 0.0583
Epoch 245/400
160/160 [=====] - 0s 484us/step - loss: 0.0584
Epoch 246/400
160/160 [=====] - 0s 497us/step - loss: 0.0580
Epoch 247/400
160/160 [=====] - 0s 499us/step - loss: 0.0577
Epoch 248/400
160/160 [=====] - 0s 483us/step - loss: 0.0574
Epoch 249/400
160/160 [=====] - 0s 496us/step - loss: 0.0572
Epoch 250/400
160/160 [=====] - 0s 485us/step - loss: 0.0568
Epoch 251/400
160/160 [=====] - 0s 482us/step - loss: 0.0565
Epoch 252/400
160/160 [=====] - 0s 486us/step - loss: 0.0563
Epoch 253/400
160/160 [=====] - 0s 479us/step - loss: 0.0561
Epoch 254/400
160/160 [=====] - 0s 493us/step - loss: 0.0557
Epoch 255/400
160/160 [=====] - 0s 484us/step - loss: 0.0557
Epoch 256/400
160/160 [=====] - 0s 478us/step - loss: 0.0552
Epoch 257/400
160/160 [=====] - 0s 496us/step - loss: 0.0548
Epoch 258/400
160/160 [=====] - 0s 491us/step - loss: 0.0551

Epoch 259/400
160/160 [=====] - 0s 493us/step - loss: 0.0546
Epoch 260/400
160/160 [=====] - 0s 491us/step - loss: 0.0544
Epoch 261/400
160/160 [=====] - 0s 486us/step - loss: 0.0543
Epoch 262/400
160/160 [=====] - 0s 505us/step - loss: 0.0538
Epoch 263/400
160/160 [=====] - 0s 498us/step - loss: 0.0535
Epoch 264/400
160/160 [=====] - 0s 489us/step - loss: 0.0532
Epoch 265/400
160/160 [=====] - 0s 497us/step - loss: 0.0534
Epoch 266/400
160/160 [=====] - 0s 492us/step - loss: 0.0532
Epoch 267/400
160/160 [=====] - 0s 481us/step - loss: 0.0529
Epoch 268/400
160/160 [=====] - 0s 494us/step - loss: 0.0524
Epoch 269/400
160/160 [=====] - 0s 496us/step - loss: 0.0524
Epoch 270/400
160/160 [=====] - 0s 481us/step - loss: 0.0519
Epoch 271/400
160/160 [=====] - 0s 497us/step - loss: 0.0516
Epoch 272/400
160/160 [=====] - 0s 492us/step - loss: 0.0512
Epoch 273/400
160/160 [=====] - 0s 484us/step - loss: 0.0514
Epoch 274/400
160/160 [=====] - 0s 466us/step - loss: 0.0516
Epoch 275/400
160/160 [=====] - 0s 473us/step - loss: 0.0514
Epoch 276/400
160/160 [=====] - 0s 474us/step - loss: 0.0509
Epoch 277/400
160/160 [=====] - 0s 495us/step - loss: 0.0502
Epoch 278/400
160/160 [=====] - 0s 495us/step - loss: 0.0508
Epoch 279/400
160/160 [=====] - 0s 494us/step - loss: 0.0506
Epoch 280/400
160/160 [=====] - 0s 482us/step - loss: 0.0505
Epoch 281/400
160/160 [=====] - 0s 492us/step - loss: 0.0499
Epoch 282/400
160/160 [=====] - 0s 490us/step - loss: 0.0499

Epoch 283/400
160/160 [=====] - 0s 484us/step - loss: 0.0497
Epoch 284/400
160/160 [=====] - 0s 504us/step - loss: 0.0492
Epoch 285/400
160/160 [=====] - 0s 482us/step - loss: 0.0494
Epoch 286/400
160/160 [=====] - 0s 489us/step - loss: 0.0492
Epoch 287/400
160/160 [=====] - 0s 490us/step - loss: 0.0490
Epoch 288/400
160/160 [=====] - 0s 481us/step - loss: 0.0489
Epoch 289/400
160/160 [=====] - 0s 504us/step - loss: 0.0489
Epoch 290/400
160/160 [=====] - 0s 482us/step - loss: 0.0481
Epoch 291/400
160/160 [=====] - 0s 489us/step - loss: 0.0484
Epoch 292/400
160/160 [=====] - 0s 471us/step - loss: 0.0483
Epoch 293/400
160/160 [=====] - 0s 496us/step - loss: 0.0480
Epoch 294/400
160/160 [=====] - 0s 480us/step - loss: 0.0481
Epoch 295/400
160/160 [=====] - 0s 483us/step - loss: 0.0478
Epoch 296/400
160/160 [=====] - 0s 491us/step - loss: 0.0475
Epoch 297/400
160/160 [=====] - 0s 467us/step - loss: 0.0475
Epoch 298/400
160/160 [=====] - 0s 499us/step - loss: 0.0475
Epoch 299/400
160/160 [=====] - 0s 469us/step - loss: 0.0473
Epoch 300/400
160/160 [=====] - 0s 473us/step - loss: 0.0472
Epoch 301/400
160/160 [=====] - 0s 490us/step - loss: 0.0474
Epoch 302/400
160/160 [=====] - 0s 505us/step - loss: 0.0470
Epoch 303/400
160/160 [=====] - 0s 486us/step - loss: 0.0466
Epoch 304/400
160/160 [=====] - 0s 478us/step - loss: 0.0465
Epoch 305/400
160/160 [=====] - 0s 476us/step - loss: 0.0463
Epoch 306/400
160/160 [=====] - 0s 492us/step - loss: 0.0463

Epoch 307/400
160/160 [=====] - 0s 479us/step - loss: 0.0448
Epoch 308/400
160/160 [=====] - 0s 486us/step - loss: 0.0458
Epoch 309/400
160/160 [=====] - 0s 501us/step - loss: 0.0457
Epoch 310/400
160/160 [=====] - 0s 464us/step - loss: 0.0457
Epoch 311/400
160/160 [=====] - 0s 480us/step - loss: 0.0453
Epoch 312/400
160/160 [=====] - 0s 463us/step - loss: 0.0455
Epoch 313/400
160/160 [=====] - 0s 483us/step - loss: 0.0448
Epoch 314/400
160/160 [=====] - 0s 481us/step - loss: 0.0447
Epoch 315/400
160/160 [=====] - 0s 488us/step - loss: 0.0447
Epoch 316/400
160/160 [=====] - 0s 501us/step - loss: 0.0449
Epoch 317/400
160/160 [=====] - 0s 497us/step - loss: 0.0449
Epoch 318/400
160/160 [=====] - 0s 487us/step - loss: 0.0447
Epoch 319/400
160/160 [=====] - 0s 484us/step - loss: 0.0446
Epoch 320/400
160/160 [=====] - 0s 466us/step - loss: 0.0443
Epoch 321/400
160/160 [=====] - 0s 456us/step - loss: 0.0443
Epoch 322/400
160/160 [=====] - 0s 472us/step - loss: 0.0442
Epoch 323/400
160/160 [=====] - 0s 472us/step - loss: 0.0440
Epoch 324/400
160/160 [=====] - 0s 488us/step - loss: 0.0438
Epoch 325/400
160/160 [=====] - 0s 507us/step - loss: 0.0437
Epoch 326/400
160/160 [=====] - 0s 494us/step - loss: 0.0437
Epoch 327/400
160/160 [=====] - 0s 488us/step - loss: 0.0435
Epoch 328/400
160/160 [=====] - 0s 484us/step - loss: 0.0434
Epoch 329/400
160/160 [=====] - 0s 463us/step - loss: 0.0436
Epoch 330/400
160/160 [=====] - 0s 489us/step - loss: 0.0433

Epoch 331/400
160/160 [=====] - 0s 474us/step - loss: 0.0430
Epoch 332/400
160/160 [=====] - 0s 488us/step - loss: 0.0430
Epoch 333/400
160/160 [=====] - 0s 515us/step - loss: 0.0432
Epoch 334/400
160/160 [=====] - 0s 492us/step - loss: 0.0427
Epoch 335/400
160/160 [=====] - 0s 493us/step - loss: 0.0424
Epoch 336/400
160/160 [=====] - 0s 502us/step - loss: 0.0426
Epoch 337/400
160/160 [=====] - 0s 479us/step - loss: 0.0426
Epoch 338/400
160/160 [=====] - 0s 484us/step - loss: 0.0424
Epoch 339/400
160/160 [=====] - 0s 488us/step - loss: 0.0421
Epoch 340/400
160/160 [=====] - 0s 495us/step - loss: 0.0422
Epoch 341/400
160/160 [=====] - 0s 498us/step - loss: 0.0419
Epoch 342/400
160/160 [=====] - 0s 492us/step - loss: 0.0421
Epoch 343/400
160/160 [=====] - 0s 506us/step - loss: 0.0419
Epoch 344/400
160/160 [=====] - 0s 487us/step - loss: 0.0419
Epoch 345/400
160/160 [=====] - 0s 507us/step - loss: 0.0417
Epoch 346/400
160/160 [=====] - 0s 479us/step - loss: 0.0418
Epoch 347/400
160/160 [=====] - 0s 497us/step - loss: 0.0414
Epoch 348/400
160/160 [=====] - 0s 489us/step - loss: 0.0414
Epoch 349/400
160/160 [=====] - 0s 497us/step - loss: 0.0413
Epoch 350/400
160/160 [=====] - 0s 488us/step - loss: 0.0412
Epoch 351/400
160/160 [=====] - 0s 493us/step - loss: 0.0410
Epoch 352/400
160/160 [=====] - 0s 490us/step - loss: 0.0412
Epoch 353/400
160/160 [=====] - 0s 492us/step - loss: 0.0409
Epoch 354/400
160/160 [=====] - 0s 502us/step - loss: 0.0408

Epoch 355/400
160/160 [=====] - 0s 496us/step - loss: 0.0406
Epoch 356/400
160/160 [=====] - 0s 518us/step - loss: 0.0408
Epoch 357/400
160/160 [=====] - 0s 494us/step - loss: 0.0407
Epoch 358/400
160/160 [=====] - 0s 502us/step - loss: 0.0406
Epoch 359/400
160/160 [=====] - 0s 493us/step - loss: 0.0407
Epoch 360/400
160/160 [=====] - 0s 513us/step - loss: 0.0398
Epoch 361/400
160/160 [=====] - 0s 498us/step - loss: 0.0406
Epoch 362/400
160/160 [=====] - 0s 502us/step - loss: 0.0403
Epoch 363/400
160/160 [=====] - 0s 496us/step - loss: 0.0400
Epoch 364/400
160/160 [=====] - 0s 492us/step - loss: 0.0401
Epoch 365/400
160/160 [=====] - 0s 481us/step - loss: 0.0394
Epoch 366/400
160/160 [=====] - 0s 486us/step - loss: 0.0397
Epoch 367/400
160/160 [=====] - 0s 487us/step - loss: 0.0392
Epoch 368/400
160/160 [=====] - 0s 482us/step - loss: 0.0399
Epoch 369/400
160/160 [=====] - 0s 503us/step - loss: 0.0397
Epoch 370/400
160/160 [=====] - 0s 472us/step - loss: 0.0396
Epoch 371/400
160/160 [=====] - 0s 478us/step - loss: 0.0396
Epoch 372/400
160/160 [=====] - 0s 487us/step - loss: 0.0395
Epoch 373/400
160/160 [=====] - 0s 507us/step - loss: 0.0387
Epoch 374/400
160/160 [=====] - 0s 474us/step - loss: 0.0394
Epoch 375/400
160/160 [=====] - 0s 478us/step - loss: 0.0393
Epoch 376/400
160/160 [=====] - 0s 510us/step - loss: 0.0391
Epoch 377/400
160/160 [=====] - 0s 500us/step - loss: 0.0391
Epoch 378/400
160/160 [=====] - 0s 565us/step - loss: 0.0391

Epoch 379/400
 160/160 [=====] - 0s 551us/step - loss: 0.0388
 Epoch 380/400
 160/160 [=====] - 0s 497us/step - loss: 0.0386
 Epoch 381/400
 160/160 [=====] - 0s 490us/step - loss: 0.0389
 Epoch 382/400
 160/160 [=====] - 0s 514us/step - loss: 0.0389
 Epoch 383/400
 160/160 [=====] - 0s 483us/step - loss: 0.0388
 Epoch 384/400
 160/160 [=====] - 0s 491us/step - loss: 0.0385
 Epoch 385/400
 160/160 [=====] - 0s 511us/step - loss: 0.0382
 Epoch 386/400
 160/160 [=====] - 0s 490us/step - loss: 0.0384
 Epoch 387/400
 160/160 [=====] - 0s 489us/step - loss: 0.0384
 Epoch 388/400
 160/160 [=====] - 0s 477us/step - loss: 0.0382
 Epoch 389/400
 160/160 [=====] - 0s 492us/step - loss: 0.0381
 Epoch 390/400
 160/160 [=====] - 0s 481us/step - loss: 0.0370
 Epoch 391/400
 160/160 [=====] - 0s 481us/step - loss: 0.0384
 Epoch 392/400
 160/160 [=====] - 0s 501us/step - loss: 0.0380
 Epoch 393/400
 160/160 [=====] - 0s 485us/step - loss: 0.0381
 Epoch 394/400
 160/160 [=====] - 0s 498us/step - loss: 0.0382
 Epoch 395/400
 160/160 [=====] - 0s 483us/step - loss: 0.0375
 Epoch 396/400
 160/160 [=====] - 0s 514us/step - loss: 0.0375
 Epoch 397/400
 160/160 [=====] - 0s 467us/step - loss: 0.0378
 Epoch 398/400
 160/160 [=====] - 0s 503us/step - loss: 0.0372
 Epoch 399/400
 160/160 [=====] - 0s 482us/step - loss: 0.0374
 Epoch 400/400
 160/160 [=====] - 0s 501us/step - loss: 0.0375
 160/160 [=====] - 0s 701us/step
 Epoch 1/400
 160/160 [=====] - 0s 2ms/step - loss: 0.6916
 Epoch 2/400

160/160 [=====] - 0s 532us/step - loss: 0.6901
Epoch 3/400
160/160 [=====] - 0s 545us/step - loss: 0.6896
Epoch 4/400
160/160 [=====] - 0s 530us/step - loss: 0.6887
Epoch 5/400
160/160 [=====] - 0s 546us/step - loss: 0.6879
Epoch 6/400
160/160 [=====] - 0s 522us/step - loss: 0.6868
Epoch 7/400
160/160 [=====] - 0s 523us/step - loss: 0.6857
Epoch 8/400
160/160 [=====] - 0s 509us/step - loss: 0.6853
Epoch 9/400
160/160 [=====] - 0s 521us/step - loss: 0.6846
Epoch 10/400
160/160 [=====] - 0s 525us/step - loss: 0.6841
Epoch 11/400
160/160 [=====] - 0s 554us/step - loss: 0.6833
Epoch 12/400
160/160 [=====] - 0s 545us/step - loss: 0.6823
Epoch 13/400
160/160 [=====] - 0s 540us/step - loss: 0.6816
Epoch 14/400
160/160 [=====] - 0s 541us/step - loss: 0.6807
Epoch 15/400
160/160 [=====] - 0s 533us/step - loss: 0.6800
Epoch 16/400
160/160 [=====] - 0s 534us/step - loss: 0.6790
Epoch 17/400
160/160 [=====] - 0s 550us/step - loss: 0.6782
Epoch 18/400
160/160 [=====] - 0s 542us/step - loss: 0.6772
Epoch 19/400
160/160 [=====] - 0s 532us/step - loss: 0.6762
Epoch 20/400
160/160 [=====] - 0s 558us/step - loss: 0.6750
Epoch 21/400
160/160 [=====] - 0s 536us/step - loss: 0.6742
Epoch 22/400
160/160 [=====] - 0s 541us/step - loss: 0.6731
Epoch 23/400
160/160 [=====] - 0s 555us/step - loss: 0.6723
Epoch 24/400
160/160 [=====] - 0s 550us/step - loss: 0.6712
Epoch 25/400
160/160 [=====] - 0s 537us/step - loss: 0.6700
Epoch 26/400

160/160 [=====] - 0s 546us/step - loss: 0.6684
Epoch 27/400
160/160 [=====] - 0s 513us/step - loss: 0.6675
Epoch 28/400
160/160 [=====] - 0s 538us/step - loss: 0.6663
Epoch 29/400
160/160 [=====] - 0s 544us/step - loss: 0.6651
Epoch 30/400
160/160 [=====] - 0s 537us/step - loss: 0.6639
Epoch 31/400
160/160 [=====] - 0s 533us/step - loss: 0.6625
Epoch 32/400
160/160 [=====] - 0s 533us/step - loss: 0.6611
Epoch 33/400
160/160 [=====] - 0s 521us/step - loss: 0.6598
Epoch 34/400
160/160 [=====] - 0s 544us/step - loss: 0.6583
Epoch 35/400
160/160 [=====] - 0s 530us/step - loss: 0.6568
Epoch 36/400
160/160 [=====] - 0s 533us/step - loss: 0.6553
Epoch 37/400
160/160 [=====] - 0s 544us/step - loss: 0.6534
Epoch 38/400
160/160 [=====] - 0s 529us/step - loss: 0.6521
Epoch 39/400
160/160 [=====] - 0s 567us/step - loss: 0.6504
Epoch 40/400
160/160 [=====] - 0s 510us/step - loss: 0.6487
Epoch 41/400
160/160 [=====] - 0s 533us/step - loss: 0.6468
Epoch 42/400
160/160 [=====] - 0s 512us/step - loss: 0.6450
Epoch 43/400
160/160 [=====] - 0s 516us/step - loss: 0.6426
Epoch 44/400
160/160 [=====] - 0s 520us/step - loss: 0.6409
Epoch 45/400
160/160 [=====] - 0s 550us/step - loss: 0.6391
Epoch 46/400
160/160 [=====] - 0s 544us/step - loss: 0.6371
Epoch 47/400
160/160 [=====] - 0s 507us/step - loss: 0.6353
Epoch 48/400
160/160 [=====] - 0s 542us/step - loss: 0.6333
Epoch 49/400
160/160 [=====] - 0s 538us/step - loss: 0.6309
Epoch 50/400

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160/160 [=====] - 0s 540us/step - loss: 0.6292
Epoch 51/400
160/160 [=====] - 0s 540us/step - loss: 0.6268
Epoch 52/400
160/160 [=====] - 0s 529us/step - loss: 0.6249
Epoch 53/400
160/160 [=====] - 0s 515us/step - loss: 0.6227
Epoch 54/400
160/160 [=====] - 0s 567us/step - loss: 0.6207
Epoch 55/400
160/160 [=====] - 0s 537us/step - loss: 0.6182
Epoch 56/400
160/160 [=====] - 0s 534us/step - loss: 0.6159
Epoch 57/400
160/160 [=====] - 0s 563us/step - loss: 0.6138
Epoch 58/400
160/160 [=====] - 0s 512us/step - loss: 0.6110
Epoch 59/400
160/160 [=====] - 0s 525us/step - loss: 0.6087
Epoch 60/400
160/160 [=====] - 0s 551us/step - loss: 0.6061
Epoch 61/400
160/160 [=====] - 0s 532us/step - loss: 0.6038
Epoch 62/400
160/160 [=====] - 0s 538us/step - loss: 0.6012
Epoch 63/400
160/160 [=====] - 0s 528us/step - loss: 0.5983
Epoch 64/400
160/160 [=====] - 0s 515us/step - loss: 0.5958
Epoch 65/400
160/160 [=====] - 0s 510us/step - loss: 0.5928
Epoch 66/400
160/160 [=====] - 0s 528us/step - loss: 0.5901
Epoch 67/400
160/160 [=====] - 0s 517us/step - loss: 0.5872
Epoch 68/400
160/160 [=====] - 0s 526us/step - loss: 0.5845
Epoch 69/400
160/160 [=====] - 0s 541us/step - loss: 0.5810
Epoch 70/400
160/160 [=====] - 0s 519us/step - loss: 0.5788
Epoch 71/400
160/160 [=====] - 0s 529us/step - loss: 0.5752
Epoch 72/400
160/160 [=====] - 0s 523us/step - loss: 0.5727
Epoch 73/400
160/160 [=====] - 0s 529us/step - loss: 0.5695
Epoch 74/400

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160/160 [=====] - 0s 513us/step - loss: 0.5663
Epoch 75/400
160/160 [=====] - 0s 510us/step - loss: 0.5635
Epoch 76/400
160/160 [=====] - 0s 519us/step - loss: 0.5603
Epoch 77/400
160/160 [=====] - 0s 511us/step - loss: 0.5573
Epoch 78/400
160/160 [=====] - 0s 519us/step - loss: 0.5544
Epoch 79/400
160/160 [=====] - 0s 503us/step - loss: 0.5508
Epoch 80/400
160/160 [=====] - 0s 509us/step - loss: 0.5476
Epoch 81/400
160/160 [=====] - 0s 524us/step - loss: 0.5446
Epoch 82/400
160/160 [=====] - 0s 510us/step - loss: 0.5419
Epoch 83/400
160/160 [=====] - 0s 501us/step - loss: 0.5388
Epoch 84/400
160/160 [=====] - 0s 517us/step - loss: 0.5358
Epoch 85/400
160/160 [=====] - 0s 578us/step - loss: 0.5328
Epoch 86/400
160/160 [=====] - 0s 531us/step - loss: 0.5301
Epoch 87/400
160/160 [=====] - 0s 534us/step - loss: 0.5271
Epoch 88/400
160/160 [=====] - 0s 536us/step - loss: 0.5244
Epoch 89/400
160/160 [=====] - 0s 522us/step - loss: 0.5215
Epoch 90/400
160/160 [=====] - 0s 538us/step - loss: 0.5188
Epoch 91/400
160/160 [=====] - 0s 551us/step - loss: 0.5159
Epoch 92/400
160/160 [=====] - 0s 536us/step - loss: 0.5134
Epoch 93/400
160/160 [=====] - 0s 545us/step - loss: 0.5104
Epoch 94/400
160/160 [=====] - 0s 532us/step - loss: 0.5080
Epoch 95/400
160/160 [=====] - 0s 527us/step - loss: 0.5062
Epoch 96/400
160/160 [=====] - 0s 518us/step - loss: 0.5033
Epoch 97/400
160/160 [=====] - 0s 535us/step - loss: 0.5014
Epoch 98/400

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160/160 [=====] - 0s 541us/step - loss: 0.4993
Epoch 99/400
160/160 [=====] - 0s 560us/step - loss: 0.4969
Epoch 100/400
160/160 [=====] - 0s 522us/step - loss: 0.4951
Epoch 101/400
160/160 [=====] - 0s 544us/step - loss: 0.4930
Epoch 102/400
160/160 [=====] - 0s 538us/step - loss: 0.4911
Epoch 103/400
160/160 [=====] - 0s 546us/step - loss: 0.4891
Epoch 104/400
160/160 [=====] - 0s 557us/step - loss: 0.4868
Epoch 105/400
160/160 [=====] - 0s 542us/step - loss: 0.4850
Epoch 106/400
160/160 [=====] - 0s 538us/step - loss: 0.4833
Epoch 107/400
160/160 [=====] - 0s 541us/step - loss: 0.4811
Epoch 108/400
160/160 [=====] - 0s 544us/step - loss: 0.4797
Epoch 109/400
160/160 [=====] - 0s 516us/step - loss: 0.4782
Epoch 110/400
160/160 [=====] - 0s 512us/step - loss: 0.4767
Epoch 111/400
160/160 [=====] - 0s 535us/step - loss: 0.4747
Epoch 112/400
160/160 [=====] - 0s 529us/step - loss: 0.4734
Epoch 113/400
160/160 [=====] - 0s 542us/step - loss: 0.4719
Epoch 114/400
160/160 [=====] - 0s 529us/step - loss: 0.4704
Epoch 115/400
160/160 [=====] - 0s 549us/step - loss: 0.4686
Epoch 116/400
160/160 [=====] - 0s 547us/step - loss: 0.4672
Epoch 117/400
160/160 [=====] - 0s 533us/step - loss: 0.4663
Epoch 118/400
160/160 [=====] - 0s 543us/step - loss: 0.4647
Epoch 119/400
160/160 [=====] - 0s 538us/step - loss: 0.4638
Epoch 120/400
160/160 [=====] - 0s 542us/step - loss: 0.4624
Epoch 121/400
160/160 [=====] - 0s 540us/step - loss: 0.4614
Epoch 122/400

160/160 [=====] - 0s 532us/step - loss: 0.4598
Epoch 123/400
160/160 [=====] - 0s 543us/step - loss: 0.4589
Epoch 124/400
160/160 [=====] - 0s 549us/step - loss: 0.4574
Epoch 125/400
160/160 [=====] - 0s 549us/step - loss: 0.4567
Epoch 126/400
160/160 [=====] - 0s 552us/step - loss: 0.4556
Epoch 127/400
160/160 [=====] - 0s 538us/step - loss: 0.4542
Epoch 128/400
160/160 [=====] - 0s 553us/step - loss: 0.4528
Epoch 129/400
160/160 [=====] - 0s 539us/step - loss: 0.4522
Epoch 130/400
160/160 [=====] - 0s 505us/step - loss: 0.4513
Epoch 131/400
160/160 [=====] - 0s 525us/step - loss: 0.4504
Epoch 132/400
160/160 [=====] - 0s 534us/step - loss: 0.4490
Epoch 133/400
160/160 [=====] - 0s 530us/step - loss: 0.4481
Epoch 134/400
160/160 [=====] - 0s 573us/step - loss: 0.4475
Epoch 135/400
160/160 [=====] - 0s 531us/step - loss: 0.4463
Epoch 136/400
160/160 [=====] - 0s 562us/step - loss: 0.4457
Epoch 137/400
160/160 [=====] - 0s 520us/step - loss: 0.4445
Epoch 138/400
160/160 [=====] - 0s 537us/step - loss: 0.4435
Epoch 139/400
160/160 [=====] - 0s 545us/step - loss: 0.4428
Epoch 140/400
160/160 [=====] - 0s 568us/step - loss: 0.4423
Epoch 141/400
160/160 [=====] - 0s 533us/step - loss: 0.4409
Epoch 142/400
160/160 [=====] - 0s 543us/step - loss: 0.4406
Epoch 143/400
160/160 [=====] - 0s 539us/step - loss: 0.4396
Epoch 144/400
160/160 [=====] - 0s 525us/step - loss: 0.4392
Epoch 145/400
160/160 [=====] - 0s 539us/step - loss: 0.4384
Epoch 146/400

160/160 [=====] - 0s 565us/step - loss: 0.4379
Epoch 147/400
160/160 [=====] - 0s 539us/step - loss: 0.4366
Epoch 148/400
160/160 [=====] - 0s 537us/step - loss: 0.4366
Epoch 149/400
160/160 [=====] - 0s 552us/step - loss: 0.4352
Epoch 150/400
160/160 [=====] - 0s 558us/step - loss: 0.4346
Epoch 151/400
160/160 [=====] - 0s 544us/step - loss: 0.4333
Epoch 152/400
160/160 [=====] - 0s 578us/step - loss: 0.4334
Epoch 153/400
160/160 [=====] - 0s 526us/step - loss: 0.4322
Epoch 154/400
160/160 [=====] - 0s 537us/step - loss: 0.4323
Epoch 155/400
160/160 [=====] - 0s 535us/step - loss: 0.4312
Epoch 156/400
160/160 [=====] - 0s 533us/step - loss: 0.4304
Epoch 157/400
160/160 [=====] - 0s 532us/step - loss: 0.4297
Epoch 158/400
160/160 [=====] - 0s 561us/step - loss: 0.4292
Epoch 159/400
160/160 [=====] - 0s 536us/step - loss: 0.4287
Epoch 160/400
160/160 [=====] - 0s 543us/step - loss: 0.4279
Epoch 161/400
160/160 [=====] - 0s 529us/step - loss: 0.4271
Epoch 162/400
160/160 [=====] - 0s 540us/step - loss: 0.4267
Epoch 163/400
160/160 [=====] - 0s 531us/step - loss: 0.4257
Epoch 164/400
160/160 [=====] - 0s 549us/step - loss: 0.4253
Epoch 165/400
160/160 [=====] - 0s 534us/step - loss: 0.4248
Epoch 166/400
160/160 [=====] - 0s 533us/step - loss: 0.4236
Epoch 167/400
160/160 [=====] - 0s 537us/step - loss: 0.4237
Epoch 168/400
160/160 [=====] - 0s 519us/step - loss: 0.4227
Epoch 169/400
160/160 [=====] - 0s 542us/step - loss: 0.4229
Epoch 170/400

160/160 [=====] - 0s 546us/step - loss: 0.4216
Epoch 171/400
160/160 [=====] - 0s 524us/step - loss: 0.4215
Epoch 172/400
160/160 [=====] - 0s 532us/step - loss: 0.4206
Epoch 173/400
160/160 [=====] - 0s 531us/step - loss: 0.4202
Epoch 174/400
160/160 [=====] - 0s 506us/step - loss: 0.4194
Epoch 175/400
160/160 [=====] - 0s 526us/step - loss: 0.4182
Epoch 176/400
160/160 [=====] - 0s 544us/step - loss: 0.4184
Epoch 177/400
160/160 [=====] - 0s 542us/step - loss: 0.4172
Epoch 178/400
160/160 [=====] - 0s 535us/step - loss: 0.4170
Epoch 179/400
160/160 [=====] - 0s 543us/step - loss: 0.4163
Epoch 180/400
160/160 [=====] - 0s 521us/step - loss: 0.4168
Epoch 181/400
160/160 [=====] - 0s 532us/step - loss: 0.4154
Epoch 182/400
160/160 [=====] - 0s 500us/step - loss: 0.4152
Epoch 183/400
160/160 [=====] - 0s 529us/step - loss: 0.4144
Epoch 184/400
160/160 [=====] - 0s 519us/step - loss: 0.4141
Epoch 185/400
160/160 [=====] - 0s 546us/step - loss: 0.4136
Epoch 186/400
160/160 [=====] - 0s 528us/step - loss: 0.4134
Epoch 187/400
160/160 [=====] - 0s 543us/step - loss: 0.4117
Epoch 188/400
160/160 [=====] - 0s 536us/step - loss: 0.4124
Epoch 189/400
160/160 [=====] - 0s 548us/step - loss: 0.4118
Epoch 190/400
160/160 [=====] - 0s 507us/step - loss: 0.4111
Epoch 191/400
160/160 [=====] - 0s 540us/step - loss: 0.4101
Epoch 192/400
160/160 [=====] - 0s 536us/step - loss: 0.4106
Epoch 193/400
160/160 [=====] - 0s 533us/step - loss: 0.4100
Epoch 194/400

160/160 [=====] - 0s 523us/step - loss: 0.4086
Epoch 195/400
160/160 [=====] - 0s 510us/step - loss: 0.4097
Epoch 196/400
160/160 [=====] - 0s 523us/step - loss: 0.4090
Epoch 197/400
160/160 [=====] - 0s 524us/step - loss: 0.4080
Epoch 198/400
160/160 [=====] - 0s 523us/step - loss: 0.4083
Epoch 199/400
160/160 [=====] - 0s 531us/step - loss: 0.4077
Epoch 200/400
160/160 [=====] - 0s 530us/step - loss: 0.4078
Epoch 201/400
160/160 [=====] - 0s 546us/step - loss: 0.4072
Epoch 202/400
160/160 [=====] - 0s 543us/step - loss: 0.4064
Epoch 203/400
160/160 [=====] - 0s 520us/step - loss: 0.4064
Epoch 204/400
160/160 [=====] - 0s 534us/step - loss: 0.4060
Epoch 205/400
160/160 [=====] - 0s 506us/step - loss: 0.4057
Epoch 206/400
160/160 [=====] - 0s 496us/step - loss: 0.4059
Epoch 207/400
160/160 [=====] - 0s 510us/step - loss: 0.4052
Epoch 208/400
160/160 [=====] - 0s 547us/step - loss: 0.4046
Epoch 209/400
160/160 [=====] - 0s 556us/step - loss: 0.4045
Epoch 210/400
160/160 [=====] - 0s 542us/step - loss: 0.4040
Epoch 211/400
160/160 [=====] - 0s 546us/step - loss: 0.4039
Epoch 212/400
160/160 [=====] - 0s 536us/step - loss: 0.4036
Epoch 213/400
160/160 [=====] - 0s 539us/step - loss: 0.4029
Epoch 214/400
160/160 [=====] - 0s 557us/step - loss: 0.4027
Epoch 215/400
160/160 [=====] - 0s 537us/step - loss: 0.4027
Epoch 216/400
160/160 [=====] - 0s 530us/step - loss: 0.4027
Epoch 217/400
160/160 [=====] - 0s 539us/step - loss: 0.4022
Epoch 218/400

160/160 [=====] - 0s 544us/step - loss: 0.4016
Epoch 219/400
160/160 [=====] - 0s 544us/step - loss: 0.4021
Epoch 220/400
160/160 [=====] - 0s 537us/step - loss: 0.4017
Epoch 221/400
160/160 [=====] - 0s 535us/step - loss: 0.4012
Epoch 222/400
160/160 [=====] - 0s 556us/step - loss: 0.4008
Epoch 223/400
160/160 [=====] - 0s 540us/step - loss: 0.4004
Epoch 224/400
160/160 [=====] - 0s 537us/step - loss: 0.4008
Epoch 225/400
160/160 [=====] - 0s 549us/step - loss: 0.4004
Epoch 226/400
160/160 [=====] - 0s 533us/step - loss: 0.4000
Epoch 227/400
160/160 [=====] - 0s 537us/step - loss: 0.3990
Epoch 228/400
160/160 [=====] - 0s 538us/step - loss: 0.3995
Epoch 229/400
160/160 [=====] - 0s 542us/step - loss: 0.3992
Epoch 230/400
160/160 [=====] - 0s 541us/step - loss: 0.3991
Epoch 231/400
160/160 [=====] - 0s 534us/step - loss: 0.3987
Epoch 232/400
160/160 [=====] - 0s 559us/step - loss: 0.3982
Epoch 233/400
160/160 [=====] - 0s 555us/step - loss: 0.3985
Epoch 234/400
160/160 [=====] - 0s 707us/step - loss: 0.3980
Epoch 235/400
160/160 [=====] - 0s 674us/step - loss: 0.3976
Epoch 236/400
160/160 [=====] - 0s 674us/step - loss: 0.3979
Epoch 237/400
160/160 [=====] - 0s 618us/step - loss: 0.3975
Epoch 238/400
160/160 [=====] - 0s 529us/step - loss: 0.3975
Epoch 239/400
160/160 [=====] - 0s 633us/step - loss: 0.3973
Epoch 240/400
160/160 [=====] - 0s 736us/step - loss: 0.3967
Epoch 241/400
160/160 [=====] - 0s 695us/step - loss: 0.3967
Epoch 242/400

160/160 [=====] - 0s 640us/step - loss: 0.3962
 Epoch 243/400
 160/160 [=====] - 0s 630us/step - loss: 0.3965
 Epoch 244/400
 160/160 [=====] - 0s 641us/step - loss: 0.3961
 Epoch 245/400
 160/160 [=====] - 0s 618us/step - loss: 0.3958
 Epoch 246/400
 160/160 [=====] - 0s 547us/step - loss: 0.3957
 Epoch 247/400
 160/160 [=====] - 0s 525us/step - loss: 0.3951
 Epoch 248/400
 160/160 [=====] - 0s 542us/step - loss: 0.3957
 Epoch 249/400
 160/160 [=====] - 0s 534us/step - loss: 0.3950
 Epoch 250/400
 160/160 [=====] - 0s 559us/step - loss: 0.3948
 Epoch 251/400
 160/160 [=====] - 0s 537us/step - loss: 0.3949
 Epoch 252/400
 160/160 [=====] - 0s 533us/step - loss: 0.3949
 Epoch 253/400
 160/160 [=====] - 0s 547us/step - loss: 0.3944
 Epoch 254/400
 160/160 [=====] - 0s 640us/step - loss: 0.3942
 Epoch 255/400
 160/160 [=====] - 0s 615us/step - loss: 0.3940
 Epoch 256/400
 160/160 [=====] - 0s 634us/step - loss: 0.3938
 Epoch 257/400
 160/160 [=====] - 0s 545us/step - loss: 0.3937
 Epoch 258/400
 160/160 [=====] - 0s 550us/step - loss: 0.3933
 Epoch 259/400
 160/160 [=====] - 0s 548us/step - loss: 0.3937
 Epoch 260/400
 160/160 [=====] - 0s 555us/step - loss: 0.3934
 Epoch 261/400
 160/160 [=====] - 0s 536us/step - loss: 0.3926
 Epoch 262/400
 160/160 [=====] - 0s 538us/step - loss: 0.3927
 Epoch 263/400
 160/160 [=====] - 0s 542us/step - loss: 0.3929
 Epoch 264/400
 160/160 [=====] - 0s 513us/step - loss: 0.3927
 Epoch 265/400
 160/160 [=====] - 0s 566us/step - loss: 0.3922
 Epoch 266/400

160/160 [=====] - 0s 529us/step - loss: 0.3924
Epoch 267/400
160/160 [=====] - 0s 540us/step - loss: 0.3923
Epoch 268/400
160/160 [=====] - 0s 525us/step - loss: 0.3918
Epoch 269/400
160/160 [=====] - 0s 539us/step - loss: 0.3910
Epoch 270/400
160/160 [=====] - 0s 538us/step - loss: 0.3924
Epoch 271/400
160/160 [=====] - 0s 537us/step - loss: 0.3915
Epoch 272/400
160/160 [=====] - 0s 527us/step - loss: 0.3914
Epoch 273/400
160/160 [=====] - 0s 531us/step - loss: 0.3910
Epoch 274/400
160/160 [=====] - 0s 539us/step - loss: 0.3905
Epoch 275/400
160/160 [=====] - 0s 528us/step - loss: 0.3909
Epoch 276/400
160/160 [=====] - 0s 545us/step - loss: 0.3907
Epoch 277/400
160/160 [=====] - 0s 524us/step - loss: 0.3903
Epoch 278/400
160/160 [=====] - 0s 553us/step - loss: 0.3900
Epoch 279/400
160/160 [=====] - 0s 547us/step - loss: 0.3903
Epoch 280/400
160/160 [=====] - 0s 535us/step - loss: 0.3902
Epoch 281/400
160/160 [=====] - 0s 530us/step - loss: 0.3901
Epoch 282/400
160/160 [=====] - 0s 524us/step - loss: 0.3901
Epoch 283/400
160/160 [=====] - 0s 533us/step - loss: 0.3895
Epoch 284/400
160/160 [=====] - 0s 548us/step - loss: 0.3896
Epoch 285/400
160/160 [=====] - 0s 516us/step - loss: 0.3894
Epoch 286/400
160/160 [=====] - 0s 541us/step - loss: 0.3887
Epoch 287/400
160/160 [=====] - 0s 528us/step - loss: 0.3888
Epoch 288/400
160/160 [=====] - 0s 542us/step - loss: 0.3889
Epoch 289/400
160/160 [=====] - 0s 523us/step - loss: 0.3886
Epoch 290/400

160/160 [=====] - 0s 548us/step - loss: 0.3883
Epoch 291/400
160/160 [=====] - 0s 521us/step - loss: 0.3886
Epoch 292/400
160/160 [=====] - 0s 531us/step - loss: 0.3880
Epoch 293/400
160/160 [=====] - 0s 533us/step - loss: 0.3881
Epoch 294/400
160/160 [=====] - 0s 540us/step - loss: 0.3882
Epoch 295/400
160/160 [=====] - 0s 544us/step - loss: 0.3879
Epoch 296/400
160/160 [=====] - 0s 554us/step - loss: 0.3879
Epoch 297/400
160/160 [=====] - 0s 534us/step - loss: 0.3875
Epoch 298/400
160/160 [=====] - 0s 522us/step - loss: 0.3876
Epoch 299/400
160/160 [=====] - 0s 546us/step - loss: 0.3868
Epoch 300/400
160/160 [=====] - 0s 538us/step - loss: 0.3874
Epoch 301/400
160/160 [=====] - 0s 529us/step - loss: 0.3870
Epoch 302/400
160/160 [=====] - 0s 552us/step - loss: 0.3869
Epoch 303/400
160/160 [=====] - 0s 508us/step - loss: 0.3871
Epoch 304/400
160/160 [=====] - 0s 525us/step - loss: 0.3867
Epoch 305/400
160/160 [=====] - 0s 525us/step - loss: 0.3862
Epoch 306/400
160/160 [=====] - 0s 544us/step - loss: 0.3862
Epoch 307/400
160/160 [=====] - 0s 541us/step - loss: 0.3863
Epoch 308/400
160/160 [=====] - 0s 555us/step - loss: 0.3860
Epoch 309/400
160/160 [=====] - 0s 548us/step - loss: 0.3856
Epoch 310/400
160/160 [=====] - 0s 524us/step - loss: 0.3856
Epoch 311/400
160/160 [=====] - 0s 515us/step - loss: 0.3857
Epoch 312/400
160/160 [=====] - 0s 535us/step - loss: 0.3854
Epoch 313/400
160/160 [=====] - 0s 533us/step - loss: 0.3851
Epoch 314/400

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160/160 [=====] - 0s 545us/step - loss: 0.3853
Epoch 315/400
160/160 [=====] - 0s 524us/step - loss: 0.3850
Epoch 316/400
160/160 [=====] - 0s 543us/step - loss: 0.3852
Epoch 317/400
160/160 [=====] - 0s 555us/step - loss: 0.3847
Epoch 318/400
160/160 [=====] - 0s 531us/step - loss: 0.3846
Epoch 319/400
160/160 [=====] - 0s 540us/step - loss: 0.3848
Epoch 320/400
160/160 [=====] - 0s 550us/step - loss: 0.3846
Epoch 321/400
160/160 [=====] - 0s 552us/step - loss: 0.3843
Epoch 322/400
160/160 [=====] - 0s 537us/step - loss: 0.3843
Epoch 323/400
160/160 [=====] - 0s 518us/step - loss: 0.3840
Epoch 324/400
160/160 [=====] - 0s 525us/step - loss: 0.3837
Epoch 325/400
160/160 [=====] - 0s 517us/step - loss: 0.3837
Epoch 326/400
160/160 [=====] - 0s 554us/step - loss: 0.3837
Epoch 327/400
160/160 [=====] - 0s 553us/step - loss: 0.3834
Epoch 328/400
160/160 [=====] - 0s 558us/step - loss: 0.3831
Epoch 329/400
160/160 [=====] - 0s 540us/step - loss: 0.3830
Epoch 330/400
160/160 [=====] - 0s 519us/step - loss: 0.3834
Epoch 331/400
160/160 [=====] - 0s 536us/step - loss: 0.3832
Epoch 332/400
160/160 [=====] - 0s 553us/step - loss: 0.3829
Epoch 333/400
160/160 [=====] - 0s 551us/step - loss: 0.3829
Epoch 334/400
160/160 [=====] - 0s 532us/step - loss: 0.3826
Epoch 335/400
160/160 [=====] - 0s 563us/step - loss: 0.3822
Epoch 336/400
160/160 [=====] - 0s 540us/step - loss: 0.3823
Epoch 337/400
160/160 [=====] - 0s 511us/step - loss: 0.3819
Epoch 338/400

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160/160 [=====] - 0s 528us/step - loss: 0.3819
Epoch 339/400
160/160 [=====] - 0s 533us/step - loss: 0.3814
Epoch 340/400
160/160 [=====] - 0s 567us/step - loss: 0.3819
Epoch 341/400
160/160 [=====] - 0s 548us/step - loss: 0.3821
Epoch 342/400
160/160 [=====] - 0s 541us/step - loss: 0.3817
Epoch 343/400
160/160 [=====] - 0s 541us/step - loss: 0.3813
Epoch 344/400
160/160 [=====] - 0s 539us/step - loss: 0.3814
Epoch 345/400
160/160 [=====] - 0s 534us/step - loss: 0.3804
Epoch 346/400
160/160 [=====] - 0s 545us/step - loss: 0.3806
Epoch 347/400
160/160 [=====] - 0s 529us/step - loss: 0.3811
Epoch 348/400
160/160 [=====] - 0s 535us/step - loss: 0.3807
Epoch 349/400
160/160 [=====] - 0s 525us/step - loss: 0.3807
Epoch 350/400
160/160 [=====] - 0s 529us/step - loss: 0.3802
Epoch 351/400
160/160 [=====] - 0s 538us/step - loss: 0.3804
Epoch 352/400
160/160 [=====] - 0s 529us/step - loss: 0.3796
Epoch 353/400
160/160 [=====] - 0s 537us/step - loss: 0.3800
Epoch 354/400
160/160 [=====] - 0s 530us/step - loss: 0.3800
Epoch 355/400
160/160 [=====] - 0s 557us/step - loss: 0.3788
Epoch 356/400
160/160 [=====] - 0s 531us/step - loss: 0.3802
Epoch 357/400
160/160 [=====] - 0s 552us/step - loss: 0.3793
Epoch 358/400
160/160 [=====] - 0s 519us/step - loss: 0.3787
Epoch 359/400
160/160 [=====] - 0s 540us/step - loss: 0.3791
Epoch 360/400
160/160 [=====] - 0s 542us/step - loss: 0.3800
Epoch 361/400
160/160 [=====] - 0s 546us/step - loss: 0.3780
Epoch 362/400

160/160 [=====] - 0s 533us/step - loss: 0.3792
 Epoch 363/400
 160/160 [=====] - 0s 545us/step - loss: 0.3793
 Epoch 364/400
 160/160 [=====] - 0s 529us/step - loss: 0.3788
 Epoch 365/400
 160/160 [=====] - 0s 527us/step - loss: 0.3788
 Epoch 366/400
 160/160 [=====] - 0s 536us/step - loss: 0.3784
 Epoch 367/400
 160/160 [=====] - 0s 527us/step - loss: 0.3782
 Epoch 368/400
 160/160 [=====] - 0s 541us/step - loss: 0.3773
 Epoch 369/400
 160/160 [=====] - 0s 538us/step - loss: 0.3788
 Epoch 370/400
 160/160 [=====] - 0s 529us/step - loss: 0.3771
 Epoch 371/400
 160/160 [=====] - 0s 531us/step - loss: 0.3771
 Epoch 372/400
 160/160 [=====] - 0s 526us/step - loss: 0.3781
 Epoch 373/400
 160/160 [=====] - 0s 535us/step - loss: 0.3783
 Epoch 374/400
 160/160 [=====] - 0s 526us/step - loss: 0.3769
 Epoch 375/400
 160/160 [=====] - 0s 537us/step - loss: 0.3780
 Epoch 376/400
 160/160 [=====] - 0s 537us/step - loss: 0.3762
 Epoch 377/400
 160/160 [=====] - 0s 526us/step - loss: 0.3774
 Epoch 378/400
 160/160 [=====] - 0s 554us/step - loss: 0.3781
 Epoch 379/400
 160/160 [=====] - 0s 537us/step - loss: 0.3775
 Epoch 380/400
 160/160 [=====] - 0s 538us/step - loss: 0.3764
 Epoch 381/400
 160/160 [=====] - 0s 538us/step - loss: 0.3767
 Epoch 382/400
 160/160 [=====] - 0s 537us/step - loss: 0.3767
 Epoch 383/400
 160/160 [=====] - 0s 536us/step - loss: 0.3759
 Epoch 384/400
 160/160 [=====] - 0s 531us/step - loss: 0.3769
 Epoch 385/400
 160/160 [=====] - 0s 531us/step - loss: 0.3760
 Epoch 386/400

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160/160 [=====] - 0s 532us/step - loss: 0.3769
Epoch 387/400
160/160 [=====] - 0s 536us/step - loss: 0.3767
Epoch 388/400
160/160 [=====] - 0s 550us/step - loss: 0.3757
Epoch 389/400
160/160 [=====] - 0s 533us/step - loss: 0.3763
Epoch 390/400
160/160 [=====] - 0s 539us/step - loss: 0.3755
Epoch 391/400
160/160 [=====] - 0s 516us/step - loss: 0.3756
Epoch 392/400
160/160 [=====] - 0s 544us/step - loss: 0.3752
Epoch 393/400
160/160 [=====] - 0s 533us/step - loss: 0.3763
Epoch 394/400
160/160 [=====] - 0s 516us/step - loss: 0.3750
Epoch 395/400
160/160 [=====] - 0s 496us/step - loss: 0.3759
Epoch 396/400
160/160 [=====] - 0s 500us/step - loss: 0.3756
Epoch 397/400
160/160 [=====] - 0s 525us/step - loss: 0.3747
Epoch 398/400
160/160 [=====] - 0s 535us/step - loss: 0.3760
Epoch 399/400
160/160 [=====] - 0s 529us/step - loss: 0.3753
Epoch 400/400
160/160 [=====] - 0s 539us/step - loss: 0.3746
160/160 [=====] - 0s 736us/step
Epoch 1/400
160/160 [=====] - 0s 2ms/step - loss: 0.6957
Epoch 2/400
160/160 [=====] - 0s 575us/step - loss: 0.6927
Epoch 3/400
160/160 [=====] - 0s 582us/step - loss: 0.6916
Epoch 4/400
160/160 [=====] - 0s 563us/step - loss: 0.6908
Epoch 5/400
160/160 [=====] - 0s 582us/step - loss: 0.6903
Epoch 6/400
160/160 [=====] - 0s 583us/step - loss: 0.6899
Epoch 7/400
160/160 [=====] - 0s 589us/step - loss: 0.6888
Epoch 8/400
160/160 [=====] - 0s 572us/step - loss: 0.6886
Epoch 9/400
160/160 [=====] - 0s 572us/step - loss: 0.6887

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Epoch 10/400
160/160 [=====] - 0s 588us/step - loss: 0.6877
Epoch 11/400
160/160 [=====] - 0s 590us/step - loss: 0.6870
Epoch 12/400
160/160 [=====] - 0s 597us/step - loss: 0.6870
Epoch 13/400
160/160 [=====] - 0s 584us/step - loss: 0.6861
Epoch 14/400
160/160 [=====] - 0s 577us/step - loss: 0.6854
Epoch 15/400
160/160 [=====] - 0s 570us/step - loss: 0.6839
Epoch 16/400
160/160 [=====] - 0s 590us/step - loss: 0.6835
Epoch 17/400
160/160 [=====] - 0s 600us/step - loss: 0.6822
Epoch 18/400
160/160 [=====] - 0s 587us/step - loss: 0.6811
Epoch 19/400
160/160 [=====] - 0s 595us/step - loss: 0.6800
Epoch 20/400
160/160 [=====] - 0s 600us/step - loss: 0.6779
Epoch 21/400
160/160 [=====] - 0s 580us/step - loss: 0.6776
Epoch 22/400
160/160 [=====] - 0s 583us/step - loss: 0.6765
Epoch 23/400
160/160 [=====] - 0s 560us/step - loss: 0.6740
Epoch 24/400
160/160 [=====] - 0s 539us/step - loss: 0.6728
Epoch 25/400
160/160 [=====] - 0s 576us/step - loss: 0.6711
Epoch 26/400
160/160 [=====] - 0s 586us/step - loss: 0.6686
Epoch 27/400
160/160 [=====] - 0s 575us/step - loss: 0.6661
Epoch 28/400
160/160 [=====] - 0s 593us/step - loss: 0.6639
Epoch 29/400
160/160 [=====] - 0s 563us/step - loss: 0.6620
Epoch 30/400
160/160 [=====] - 0s 582us/step - loss: 0.6585
Epoch 31/400
160/160 [=====] - 0s 574us/step - loss: 0.6550
Epoch 32/400
160/160 [=====] - 0s 589us/step - loss: 0.6510
Epoch 33/400
160/160 [=====] - 0s 562us/step - loss: 0.6470

Epoch 34/400
160/160 [=====] - 0s 602us/step - loss: 0.6429
Epoch 35/400
160/160 [=====] - 0s 576us/step - loss: 0.6380
Epoch 36/400
160/160 [=====] - 0s 588us/step - loss: 0.6339
Epoch 37/400
160/160 [=====] - 0s 588us/step - loss: 0.6282
Epoch 38/400
160/160 [=====] - 0s 572us/step - loss: 0.6216
Epoch 39/400
160/160 [=====] - 0s 588us/step - loss: 0.6174
Epoch 40/400
160/160 [=====] - 0s 577us/step - loss: 0.6104
Epoch 41/400
160/160 [=====] - 0s 564us/step - loss: 0.6041
Epoch 42/400
160/160 [=====] - 0s 581us/step - loss: 0.5969
Epoch 43/400
160/160 [=====] - 0s 574us/step - loss: 0.5902
Epoch 44/400
160/160 [=====] - 0s 559us/step - loss: 0.5828
Epoch 45/400
160/160 [=====] - 0s 578us/step - loss: 0.5739
Epoch 46/400
160/160 [=====] - 0s 576us/step - loss: 0.5656
Epoch 47/400
160/160 [=====] - 0s 563us/step - loss: 0.5565
Epoch 48/400
160/160 [=====] - 0s 596us/step - loss: 0.5481
Epoch 49/400
160/160 [=====] - 0s 558us/step - loss: 0.5394
Epoch 50/400
160/160 [=====] - 0s 586us/step - loss: 0.5278
Epoch 51/400
160/160 [=====] - 0s 594us/step - loss: 0.5210
Epoch 52/400
160/160 [=====] - 0s 574us/step - loss: 0.5086
Epoch 53/400
160/160 [=====] - 0s 566us/step - loss: 0.4965
Epoch 54/400
160/160 [=====] - 0s 577us/step - loss: 0.4826
Epoch 55/400
160/160 [=====] - 0s 583us/step - loss: 0.4689
Epoch 56/400
160/160 [=====] - 0s 578us/step - loss: 0.4492
Epoch 57/400
160/160 [=====] - 0s 562us/step - loss: 0.4371

Epoch 58/400
160/160 [=====] - 0s 557us/step - loss: 0.4170
Epoch 59/400
160/160 [=====] - 0s 590us/step - loss: 0.3959
Epoch 60/400
160/160 [=====] - 0s 582us/step - loss: 0.3746
Epoch 61/400
160/160 [=====] - 0s 585us/step - loss: 0.3506
Epoch 62/400
160/160 [=====] - 0s 575us/step - loss: 0.3297
Epoch 63/400
160/160 [=====] - 0s 582us/step - loss: 0.3095
Epoch 64/400
160/160 [=====] - 0s 571us/step - loss: 0.2893
Epoch 65/400
160/160 [=====] - 0s 590us/step - loss: 0.2675
Epoch 66/400
160/160 [=====] - 0s 577us/step - loss: 0.2523
Epoch 67/400
160/160 [=====] - 0s 578us/step - loss: 0.2356
Epoch 68/400
160/160 [=====] - 0s 599us/step - loss: 0.2207
Epoch 69/400
160/160 [=====] - 0s 586us/step - loss: 0.2088
Epoch 70/400
160/160 [=====] - 0s 585us/step - loss: 0.1971
Epoch 71/400
160/160 [=====] - 0s 588us/step - loss: 0.1880
Epoch 72/400
160/160 [=====] - 0s 582us/step - loss: 0.1791
Epoch 73/400
160/160 [=====] - 0s 579us/step - loss: 0.1717
Epoch 74/400
160/160 [=====] - 0s 588us/step - loss: 0.1620
Epoch 75/400
160/160 [=====] - 0s 599us/step - loss: 0.1565
Epoch 76/400
160/160 [=====] - 0s 588us/step - loss: 0.1525
Epoch 77/400
160/160 [=====] - 0s 587us/step - loss: 0.1479
Epoch 78/400
160/160 [=====] - 0s 589us/step - loss: 0.1422
Epoch 79/400
160/160 [=====] - 0s 584us/step - loss: 0.1365
Epoch 80/400
160/160 [=====] - 0s 591us/step - loss: 0.1318
Epoch 81/400
160/160 [=====] - 0s 588us/step - loss: 0.1294

Epoch 82/400
160/160 [=====] - 0s 594us/step - loss: 0.1224
Epoch 83/400
160/160 [=====] - 0s 584us/step - loss: 0.1243
Epoch 84/400
160/160 [=====] - 0s 585us/step - loss: 0.1170
Epoch 85/400
160/160 [=====] - 0s 589us/step - loss: 0.1183
Epoch 86/400
160/160 [=====] - 0s 588us/step - loss: 0.1137
Epoch 87/400
160/160 [=====] - 0s 576us/step - loss: 0.1073
Epoch 88/400
160/160 [=====] - 0s 568us/step - loss: 0.1091
Epoch 89/400
160/160 [=====] - 0s 566us/step - loss: 0.1037
Epoch 90/400
160/160 [=====] - 0s 592us/step - loss: 0.1036
Epoch 91/400
160/160 [=====] - 0s 588us/step - loss: 0.0970
Epoch 92/400
160/160 [=====] - 0s 578us/step - loss: 0.0981
Epoch 93/400
160/160 [=====] - 0s 579us/step - loss: 0.0948
Epoch 94/400
160/160 [=====] - 0s 575us/step - loss: 0.0941
Epoch 95/400
160/160 [=====] - 0s 584us/step - loss: 0.0905
Epoch 96/400
160/160 [=====] - 0s 577us/step - loss: 0.0911
Epoch 97/400
160/160 [=====] - 0s 591us/step - loss: 0.0857
Epoch 98/400
160/160 [=====] - 0s 577us/step - loss: 0.0869
Epoch 99/400
160/160 [=====] - 0s 575us/step - loss: 0.0877
Epoch 100/400
160/160 [=====] - 0s 587us/step - loss: 0.0838
Epoch 101/400
160/160 [=====] - 0s 573us/step - loss: 0.0854
Epoch 102/400
160/160 [=====] - 0s 583us/step - loss: 0.0808
Epoch 103/400
160/160 [=====] - 0s 589us/step - loss: 0.0813
Epoch 104/400
160/160 [=====] - 0s 584us/step - loss: 0.0771
Epoch 105/400
160/160 [=====] - 0s 584us/step - loss: 0.0777

Epoch 106/400
160/160 [=====] - 0s 595us/step - loss: 0.0776
Epoch 107/400
160/160 [=====] - 0s 590us/step - loss: 0.0773
Epoch 108/400
160/160 [=====] - 0s 587us/step - loss: 0.0705
Epoch 109/400
160/160 [=====] - 0s 583us/step - loss: 0.0723
Epoch 110/400
160/160 [=====] - 0s 591us/step - loss: 0.0706
Epoch 111/400
160/160 [=====] - 0s 551us/step - loss: 0.0710
Epoch 112/400
160/160 [=====] - 0s 585us/step - loss: 0.0681
Epoch 113/400
160/160 [=====] - 0s 591us/step - loss: 0.0726
Epoch 114/400
160/160 [=====] - 0s 575us/step - loss: 0.0651
Epoch 115/400
160/160 [=====] - 0s 608us/step - loss: 0.0697
Epoch 116/400
160/160 [=====] - 0s 578us/step - loss: 0.0637
Epoch 117/400
160/160 [=====] - 0s 588us/step - loss: 0.0730
Epoch 118/400
160/160 [=====] - 0s 596us/step - loss: 0.0555
Epoch 119/400
160/160 [=====] - 0s 575us/step - loss: 0.0723
Epoch 120/400
160/160 [=====] - 0s 590us/step - loss: 0.0634
Epoch 121/400
160/160 [=====] - 0s 580us/step - loss: 0.0638
Epoch 122/400
160/160 [=====] - 0s 575us/step - loss: 0.0654
Epoch 123/400
160/160 [=====] - 0s 592us/step - loss: 0.0658
Epoch 124/400
160/160 [=====] - 0s 600us/step - loss: 0.0710
Epoch 125/400
160/160 [=====] - 0s 594us/step - loss: 0.0581
Epoch 126/400
160/160 [=====] - 0s 576us/step - loss: 0.0526
Epoch 127/400
160/160 [=====] - 0s 593us/step - loss: 0.0617
Epoch 128/400
160/160 [=====] - 0s 581us/step - loss: 0.0650
Epoch 129/400
160/160 [=====] - 0s 586us/step - loss: 0.0689

Epoch 130/400
160/160 [=====] - 0s 592us/step - loss: 0.0674
Epoch 131/400
160/160 [=====] - 0s 576us/step - loss: 0.0612
Epoch 132/400
160/160 [=====] - 0s 570us/step - loss: 0.0581
Epoch 133/400
160/160 [=====] - 0s 595us/step - loss: 0.0648
Epoch 134/400
160/160 [=====] - 0s 577us/step - loss: 0.0533
Epoch 135/400
160/160 [=====] - 0s 586us/step - loss: 0.0572
Epoch 136/400
160/160 [=====] - 0s 577us/step - loss: 0.0570
Epoch 137/400
160/160 [=====] - 0s 571us/step - loss: 0.0570
Epoch 138/400
160/160 [=====] - 0s 584us/step - loss: 0.0484
Epoch 139/400
160/160 [=====] - 0s 581us/step - loss: 0.0577
Epoch 140/400
160/160 [=====] - 0s 583us/step - loss: 0.0635
Epoch 141/400
160/160 [=====] - 0s 582us/step - loss: 0.0648
Epoch 142/400
160/160 [=====] - 0s 564us/step - loss: 0.0580
Epoch 143/400
160/160 [=====] - 0s 569us/step - loss: 0.0568
Epoch 144/400
160/160 [=====] - 0s 566us/step - loss: 0.0624
Epoch 145/400
160/160 [=====] - 0s 572us/step - loss: 0.0545
Epoch 146/400
160/160 [=====] - 0s 560us/step - loss: 0.0581
Epoch 147/400
160/160 [=====] - 0s 595us/step - loss: 0.0569
Epoch 148/400
160/160 [=====] - 0s 578us/step - loss: 0.0612
Epoch 149/400
160/160 [=====] - 0s 554us/step - loss: 0.0544
Epoch 150/400
160/160 [=====] - 0s 592us/step - loss: 0.0576
Epoch 151/400
160/160 [=====] - 0s 554us/step - loss: 0.0553
Epoch 152/400
160/160 [=====] - 0s 586us/step - loss: 0.0505
Epoch 153/400
160/160 [=====] - 0s 577us/step - loss: 0.0590

Epoch 154/400
160/160 [=====] - 0s 582us/step - loss: 0.0532
Epoch 155/400
160/160 [=====] - 0s 576us/step - loss: 0.0551
Epoch 156/400
160/160 [=====] - 0s 563us/step - loss: 0.0490
Epoch 157/400
160/160 [=====] - 0s 566us/step - loss: 0.0507
Epoch 158/400
160/160 [=====] - 0s 591us/step - loss: 0.0444
Epoch 159/400
160/160 [=====] - 0s 573us/step - loss: 0.0573
Epoch 160/400
160/160 [=====] - 0s 581us/step - loss: 0.0526
Epoch 161/400
160/160 [=====] - 0s 593us/step - loss: 0.0500
Epoch 162/400
160/160 [=====] - 0s 592us/step - loss: 0.0625
Epoch 163/400
160/160 [=====] - 0s 577us/step - loss: 0.0562
Epoch 164/400
160/160 [=====] - 0s 596us/step - loss: 0.0536
Epoch 165/400
160/160 [=====] - 0s 588us/step - loss: 0.0644
Epoch 166/400
160/160 [=====] - 0s 577us/step - loss: 0.0583
Epoch 167/400
160/160 [=====] - 0s 585us/step - loss: 0.0614
Epoch 168/400
160/160 [=====] - 0s 565us/step - loss: 0.0480
Epoch 169/400
160/160 [=====] - 0s 574us/step - loss: 0.0639
Epoch 170/400
160/160 [=====] - 0s 587us/step - loss: 0.0516
Epoch 171/400
160/160 [=====] - 0s 588us/step - loss: 0.0546
Epoch 172/400
160/160 [=====] - 0s 590us/step - loss: 0.0514
Epoch 173/400
160/160 [=====] - 0s 580us/step - loss: 0.0651
Epoch 174/400
160/160 [=====] - 0s 573us/step - loss: 0.0480
Epoch 175/400
160/160 [=====] - 0s 591us/step - loss: 0.0553
Epoch 176/400
160/160 [=====] - 0s 577us/step - loss: 0.0552
Epoch 177/400
160/160 [=====] - 0s 569us/step - loss: 0.0465

Epoch 178/400
160/160 [=====] - 0s 587us/step - loss: 0.0516
Epoch 179/400
160/160 [=====] - 0s 584us/step - loss: 0.0485
Epoch 180/400
160/160 [=====] - 0s 585us/step - loss: 0.0621
Epoch 181/400
160/160 [=====] - 0s 597us/step - loss: 0.0481
Epoch 182/400
160/160 [=====] - 0s 578us/step - loss: 0.0529
Epoch 183/400
160/160 [=====] - 0s 559us/step - loss: 0.0514
Epoch 184/400
160/160 [=====] - 0s 585us/step - loss: 0.0589
Epoch 185/400
160/160 [=====] - 0s 592us/step - loss: 0.0362
Epoch 186/400
160/160 [=====] - 0s 610us/step - loss: 0.0587
Epoch 187/400
160/160 [=====] - 0s 616us/step - loss: 0.0501
Epoch 188/400
160/160 [=====] - 0s 585us/step - loss: 0.0439
Epoch 189/400
160/160 [=====] - 0s 568us/step - loss: 0.0549
Epoch 190/400
160/160 [=====] - 0s 595us/step - loss: 0.0470
Epoch 191/400
160/160 [=====] - 0s 580us/step - loss: 0.0397
Epoch 192/400
160/160 [=====] - 0s 600us/step - loss: 0.0485
Epoch 193/400
160/160 [=====] - 0s 558us/step - loss: 0.0547
Epoch 194/400
160/160 [=====] - 0s 531us/step - loss: 0.0439
Epoch 195/400
160/160 [=====] - 0s 572us/step - loss: 0.0542
Epoch 196/400
160/160 [=====] - 0s 581us/step - loss: 0.0451
Epoch 197/400
160/160 [=====] - 0s 590us/step - loss: 0.0582
Epoch 198/400
160/160 [=====] - 0s 597us/step - loss: 0.0397
Epoch 199/400
160/160 [=====] - 0s 581us/step - loss: 0.0477
Epoch 200/400
160/160 [=====] - 0s 583us/step - loss: 0.0583
Epoch 201/400
160/160 [=====] - 0s 587us/step - loss: 0.0484

Epoch 202/400
160/160 [=====] - 0s 591us/step - loss: 0.0417
Epoch 203/400
160/160 [=====] - 0s 598us/step - loss: 0.0569
Epoch 204/400
160/160 [=====] - 0s 590us/step - loss: 0.0470
Epoch 205/400
160/160 [=====] - 0s 577us/step - loss: 0.0531
Epoch 206/400
160/160 [=====] - 0s 572us/step - loss: 0.0422
Epoch 207/400
160/160 [=====] - 0s 603us/step - loss: 0.0493
Epoch 208/400
160/160 [=====] - 0s 558us/step - loss: 0.0493
Epoch 209/400
160/160 [=====] - 0s 593us/step - loss: 0.0474
Epoch 210/400
160/160 [=====] - 0s 597us/step - loss: 0.0540
Epoch 211/400
160/160 [=====] - 0s 572us/step - loss: 0.0417
Epoch 212/400
160/160 [=====] - 0s 585us/step - loss: 0.0492
Epoch 213/400
160/160 [=====] - 0s 580us/step - loss: 0.0459
Epoch 214/400
160/160 [=====] - 0s 584us/step - loss: 0.0409
Epoch 215/400
160/160 [=====] - 0s 590us/step - loss: 0.0552
Epoch 216/400
160/160 [=====] - 0s 585us/step - loss: 0.0411
Epoch 217/400
160/160 [=====] - 0s 588us/step - loss: 0.0512
Epoch 218/400
160/160 [=====] - 0s 580us/step - loss: 0.0504
Epoch 219/400
160/160 [=====] - 0s 592us/step - loss: 0.0510
Epoch 220/400
160/160 [=====] - 0s 567us/step - loss: 0.0476
Epoch 221/400
160/160 [=====] - 0s 564us/step - loss: 0.0524
Epoch 222/400
160/160 [=====] - 0s 541us/step - loss: 0.0549
Epoch 223/400
160/160 [=====] - 0s 563us/step - loss: 0.0468
Epoch 224/400
160/160 [=====] - 0s 593us/step - loss: 0.0494
Epoch 225/400
160/160 [=====] - 0s 599us/step - loss: 0.0442

Epoch 226/400
160/160 [=====] - 0s 629us/step - loss: 0.0369
Epoch 227/400
160/160 [=====] - 0s 630us/step - loss: 0.0464
Epoch 228/400
160/160 [=====] - 0s 660us/step - loss: 0.0470
Epoch 229/400
160/160 [=====] - 0s 578us/step - loss: 0.0473
Epoch 230/400
160/160 [=====] - 0s 561us/step - loss: 0.0473
Epoch 231/400
160/160 [=====] - 0s 577us/step - loss: 0.0551
Epoch 232/400
160/160 [=====] - 0s 603us/step - loss: 0.0561
Epoch 233/400
160/160 [=====] - 0s 587us/step - loss: 0.0423
Epoch 234/400
160/160 [=====] - 0s 586us/step - loss: 0.0510
Epoch 235/400
160/160 [=====] - 0s 595us/step - loss: 0.0441
Epoch 236/400
160/160 [=====] - 0s 575us/step - loss: 0.0522
Epoch 237/400
160/160 [=====] - 0s 593us/step - loss: 0.0526
Epoch 238/400
160/160 [=====] - 0s 571us/step - loss: 0.0420
Epoch 239/400
160/160 [=====] - 0s 543us/step - loss: 0.0445
Epoch 240/400
160/160 [=====] - 0s 567us/step - loss: 0.0473
Epoch 241/400
160/160 [=====] - 0s 579us/step - loss: 0.0478
Epoch 242/400
160/160 [=====] - 0s 605us/step - loss: 0.0436
Epoch 243/400
160/160 [=====] - 0s 631us/step - loss: 0.0469
Epoch 244/400
160/160 [=====] - 0s 585us/step - loss: 0.0454
Epoch 245/400
160/160 [=====] - 0s 586us/step - loss: 0.0499
Epoch 246/400
160/160 [=====] - 0s 589us/step - loss: 0.0515
Epoch 247/400
160/160 [=====] - 0s 545us/step - loss: 0.0498
Epoch 248/400
160/160 [=====] - 0s 559us/step - loss: 0.0391
Epoch 249/400
160/160 [=====] - 0s 596us/step - loss: 0.0357

Epoch 250/400
160/160 [=====] - 0s 572us/step - loss: 0.0432
Epoch 251/400
160/160 [=====] - 0s 586us/step - loss: 0.0480
Epoch 252/400
160/160 [=====] - 0s 565us/step - loss: 0.0508
Epoch 253/400
160/160 [=====] - 0s 596us/step - loss: 0.0497
Epoch 254/400
160/160 [=====] - 0s 601us/step - loss: 0.0420
Epoch 255/400
160/160 [=====] - 0s 591us/step - loss: 0.0412
Epoch 256/400
160/160 [=====] - 0s 591us/step - loss: 0.0404
Epoch 257/400
160/160 [=====] - 0s 571us/step - loss: 0.0453
Epoch 258/400
160/160 [=====] - 0s 570us/step - loss: 0.0512
Epoch 259/400
160/160 [=====] - 0s 575us/step - loss: 0.0441
Epoch 260/400
160/160 [=====] - 0s 580us/step - loss: 0.0452
Epoch 261/400
160/160 [=====] - 0s 579us/step - loss: 0.0487
Epoch 262/400
160/160 [=====] - 0s 576us/step - loss: 0.0446
Epoch 263/400
160/160 [=====] - 0s 569us/step - loss: 0.0425
Epoch 264/400
160/160 [=====] - 0s 593us/step - loss: 0.0409
Epoch 265/400
160/160 [=====] - 0s 583us/step - loss: 0.0413
Epoch 266/400
160/160 [=====] - 0s 583us/step - loss: 0.0440
Epoch 267/400
160/160 [=====] - 0s 597us/step - loss: 0.0379
Epoch 268/400
160/160 [=====] - 0s 573us/step - loss: 0.0430
Epoch 269/400
160/160 [=====] - 0s 575us/step - loss: 0.0378
Epoch 270/400
160/160 [=====] - 0s 577us/step - loss: 0.0376
Epoch 271/400
160/160 [=====] - 0s 593us/step - loss: 0.0443
Epoch 272/400
160/160 [=====] - 0s 563us/step - loss: 0.0449
Epoch 273/400
160/160 [=====] - 0s 586us/step - loss: 0.0487

Epoch 274/400
160/160 [=====] - 0s 576us/step - loss: 0.0374
Epoch 275/400
160/160 [=====] - 0s 589us/step - loss: 0.0473
Epoch 276/400
160/160 [=====] - 0s 590us/step - loss: 0.0405
Epoch 277/400
160/160 [=====] - 0s 595us/step - loss: 0.0416
Epoch 278/400
160/160 [=====] - 0s 596us/step - loss: 0.0404
Epoch 279/400
160/160 [=====] - 0s 591us/step - loss: 0.0379
Epoch 280/400
160/160 [=====] - 0s 577us/step - loss: 0.0383
Epoch 281/400
160/160 [=====] - 0s 561us/step - loss: 0.0415
Epoch 282/400
160/160 [=====] - 0s 622us/step - loss: 0.0356
Epoch 283/400
160/160 [=====] - 0s 573us/step - loss: 0.0389
Epoch 284/400
160/160 [=====] - 0s 588us/step - loss: 0.0380
Epoch 285/400
160/160 [=====] - 0s 578us/step - loss: 0.0466
Epoch 286/400
160/160 [=====] - 0s 585us/step - loss: 0.0402
Epoch 287/400
160/160 [=====] - 0s 586us/step - loss: 0.0407
Epoch 288/400
160/160 [=====] - 0s 601us/step - loss: 0.0408
Epoch 289/400
160/160 [=====] - 0s 572us/step - loss: 0.0446
Epoch 290/400
160/160 [=====] - 0s 590us/step - loss: 0.0423
Epoch 291/400
160/160 [=====] - 0s 586us/step - loss: 0.0393
Epoch 292/400
160/160 [=====] - 0s 564us/step - loss: 0.0434
Epoch 293/400
160/160 [=====] - 0s 599us/step - loss: 0.0400
Epoch 294/400
160/160 [=====] - 0s 578us/step - loss: 0.0406
Epoch 295/400
160/160 [=====] - 0s 581us/step - loss: 0.0437
Epoch 296/400
160/160 [=====] - 0s 585us/step - loss: 0.0416
Epoch 297/400
160/160 [=====] - 0s 584us/step - loss: 0.0374

Epoch 298/400
160/160 [=====] - 0s 567us/step - loss: 0.0412
Epoch 299/400
160/160 [=====] - 0s 576us/step - loss: 0.0398
Epoch 300/400
160/160 [=====] - 0s 533us/step - loss: 0.0410
Epoch 301/400
160/160 [=====] - 0s 550us/step - loss: 0.0454
Epoch 302/400
160/160 [=====] - 0s 593us/step - loss: 0.0361
Epoch 303/400
160/160 [=====] - 0s 565us/step - loss: 0.0408
Epoch 304/400
160/160 [=====] - 0s 580us/step - loss: 0.0423
Epoch 305/400
160/160 [=====] - 0s 598us/step - loss: 0.0362
Epoch 306/400
160/160 [=====] - 0s 594us/step - loss: 0.0427
Epoch 307/400
160/160 [=====] - 0s 581us/step - loss: 0.0438
Epoch 308/400
160/160 [=====] - 0s 594us/step - loss: 0.0363
Epoch 309/400
160/160 [=====] - 0s 587us/step - loss: 0.0407
Epoch 310/400
160/160 [=====] - 0s 600us/step - loss: 0.0398
Epoch 311/400
160/160 [=====] - 0s 600us/step - loss: 0.0397
Epoch 312/400
160/160 [=====] - 0s 588us/step - loss: 0.0450
Epoch 313/400
160/160 [=====] - 0s 575us/step - loss: 0.0403
Epoch 314/400
160/160 [=====] - 0s 567us/step - loss: 0.0426
Epoch 315/400
160/160 [=====] - 0s 596us/step - loss: 0.0440
Epoch 316/400
160/160 [=====] - 0s 588us/step - loss: 0.0368
Epoch 317/400
160/160 [=====] - 0s 575us/step - loss: 0.0373
Epoch 318/400
160/160 [=====] - 0s 588us/step - loss: 0.0415
Epoch 319/400
160/160 [=====] - 0s 590us/step - loss: 0.0410
Epoch 320/400
160/160 [=====] - 0s 608us/step - loss: 0.0373
Epoch 321/400
160/160 [=====] - 0s 579us/step - loss: 0.0424

Epoch 322/400
160/160 [=====] - 0s 585us/step - loss: 0.0334
Epoch 323/400
160/160 [=====] - 0s 565us/step - loss: 0.0367
Epoch 324/400
160/160 [=====] - 0s 585us/step - loss: 0.0358
Epoch 325/400
160/160 [=====] - 0s 576us/step - loss: 0.0346
Epoch 326/400
160/160 [=====] - 0s 575us/step - loss: 0.0368
Epoch 327/400
160/160 [=====] - 0s 582us/step - loss: 0.0374
Epoch 328/400
160/160 [=====] - 0s 582us/step - loss: 0.0434
Epoch 329/400
160/160 [=====] - 0s 587us/step - loss: 0.0370
Epoch 330/400
160/160 [=====] - 0s 569us/step - loss: 0.0388
Epoch 331/400
160/160 [=====] - 0s 591us/step - loss: 0.0446
Epoch 332/400
160/160 [=====] - 0s 555us/step - loss: 0.0406
Epoch 333/400
160/160 [=====] - 0s 595us/step - loss: 0.0409
Epoch 334/400
160/160 [=====] - 0s 547us/step - loss: 0.0406
Epoch 335/400
160/160 [=====] - 0s 587us/step - loss: 0.0379
Epoch 336/400
160/160 [=====] - 0s 581us/step - loss: 0.0429
Epoch 337/400
160/160 [=====] - 0s 565us/step - loss: 0.0463
Epoch 338/400
160/160 [=====] - 0s 573us/step - loss: 0.0369
Epoch 339/400
160/160 [=====] - 0s 589us/step - loss: 0.0398
Epoch 340/400
160/160 [=====] - 0s 570us/step - loss: 0.0399
Epoch 341/400
160/160 [=====] - 0s 588us/step - loss: 0.0404
Epoch 342/400
160/160 [=====] - 0s 560us/step - loss: 0.0428
Epoch 343/400
160/160 [=====] - 0s 585us/step - loss: 0.0338
Epoch 344/400
160/160 [=====] - 0s 594us/step - loss: 0.0408
Epoch 345/400
160/160 [=====] - 0s 593us/step - loss: 0.0354

Epoch 346/400
160/160 [=====] - 0s 584us/step - loss: 0.0428
Epoch 347/400
160/160 [=====] - 0s 587us/step - loss: 0.0358
Epoch 348/400
160/160 [=====] - 0s 572us/step - loss: 0.0396
Epoch 349/400
160/160 [=====] - 0s 587us/step - loss: 0.0365
Epoch 350/400
160/160 [=====] - 0s 586us/step - loss: 0.0347
Epoch 351/400
160/160 [=====] - 0s 590us/step - loss: 0.0412
Epoch 352/400
160/160 [=====] - 0s 597us/step - loss: 0.0367
Epoch 353/400
160/160 [=====] - 0s 564us/step - loss: 0.0372
Epoch 354/400
160/160 [=====] - 0s 591us/step - loss: 0.0354
Epoch 355/400
160/160 [=====] - 0s 585us/step - loss: 0.0419
Epoch 356/400
160/160 [=====] - 0s 596us/step - loss: 0.0369
Epoch 357/400
160/160 [=====] - 0s 581us/step - loss: 0.0364
Epoch 358/400
160/160 [=====] - 0s 579us/step - loss: 0.0372
Epoch 359/400
160/160 [=====] - 0s 581us/step - loss: 0.0414
Epoch 360/400
160/160 [=====] - 0s 589us/step - loss: 0.0343
Epoch 361/400
160/160 [=====] - 0s 592us/step - loss: 0.0358
Epoch 362/400
160/160 [=====] - 0s 568us/step - loss: 0.0348
Epoch 363/400
160/160 [=====] - 0s 588us/step - loss: 0.0398
Epoch 364/400
160/160 [=====] - 0s 593us/step - loss: 0.0354
Epoch 365/400
160/160 [=====] - 0s 588us/step - loss: 0.0329
Epoch 366/400
160/160 [=====] - 0s 572us/step - loss: 0.0314
Epoch 367/400
160/160 [=====] - 0s 583us/step - loss: 0.0365
Epoch 368/400
160/160 [=====] - 0s 585us/step - loss: 0.0361
Epoch 369/400
160/160 [=====] - 0s 584us/step - loss: 0.0329

Epoch 370/400
160/160 [=====] - 0s 578us/step - loss: 0.0368
Epoch 371/400
160/160 [=====] - 0s 574us/step - loss: 0.0326
Epoch 372/400
160/160 [=====] - 0s 603us/step - loss: 0.0401
Epoch 373/400
160/160 [=====] - 0s 595us/step - loss: 0.0361
Epoch 374/400
160/160 [=====] - 0s 584us/step - loss: 0.0338
Epoch 375/400
160/160 [=====] - 0s 578us/step - loss: 0.0371
Epoch 376/400
160/160 [=====] - 0s 592us/step - loss: 0.0358
Epoch 377/400
160/160 [=====] - 0s 585us/step - loss: 0.0301
Epoch 378/400
160/160 [=====] - 0s 593us/step - loss: 0.0366
Epoch 379/400
160/160 [=====] - 0s 559us/step - loss: 0.0367
Epoch 380/400
160/160 [=====] - 0s 580us/step - loss: 0.0380
Epoch 381/400
160/160 [=====] - 0s 611us/step - loss: 0.0346
Epoch 382/400
160/160 [=====] - 0s 603us/step - loss: 0.0369
Epoch 383/400
160/160 [=====] - 0s 613us/step - loss: 0.0339
Epoch 384/400
160/160 [=====] - 0s 609us/step - loss: 0.0368
Epoch 385/400
160/160 [=====] - 0s 595us/step - loss: 0.0400
Epoch 386/400
160/160 [=====] - 0s 597us/step - loss: 0.0401
Epoch 387/400
160/160 [=====] - 0s 607us/step - loss: 0.0365
Epoch 388/400
160/160 [=====] - 0s 602us/step - loss: 0.0389
Epoch 389/400
160/160 [=====] - 0s 627us/step - loss: 0.0370
Epoch 390/400
160/160 [=====] - 0s 620us/step - loss: 0.0362
Epoch 391/400
160/160 [=====] - 0s 575us/step - loss: 0.0346
Epoch 392/400
160/160 [=====] - 0s 595us/step - loss: 0.0395
Epoch 393/400
160/160 [=====] - 0s 587us/step - loss: 0.0373

Epoch 394/400
160/160 [=====] - 0s 609us/step - loss: 0.0328
Epoch 395/400
160/160 [=====] - 0s 600us/step - loss: 0.0368
Epoch 396/400
160/160 [=====] - 0s 599us/step - loss: 0.0398
Epoch 397/400
160/160 [=====] - 0s 582us/step - loss: 0.0388
Epoch 398/400
160/160 [=====] - 0s 593us/step - loss: 0.0382
Epoch 399/400
160/160 [=====] - 0s 598us/step - loss: 0.0345
Epoch 400/400
160/160 [=====] - 0s 600us/step - loss: 0.0367
160/160 [=====] - 0s 862us/step
Epoch 1/400
160/160 [=====] - 0s 2ms/step - loss: 0.7266
Epoch 2/400
160/160 [=====] - 0s 608us/step - loss: 0.6900
Epoch 3/400
160/160 [=====] - 0s 635us/step - loss: 0.6866
Epoch 4/400
160/160 [=====] - 0s 636us/step - loss: 0.6854
Epoch 5/400
160/160 [=====] - 0s 659us/step - loss: 0.6829
Epoch 6/400
160/160 [=====] - 0s 641us/step - loss: 0.6821
Epoch 7/400
160/160 [=====] - 0s 621us/step - loss: 0.6820
Epoch 8/400
160/160 [=====] - 0s 618us/step - loss: 0.6799
Epoch 9/400
160/160 [=====] - 0s 641us/step - loss: 0.6776
Epoch 10/400
160/160 [=====] - 0s 633us/step - loss: 0.6770
Epoch 11/400
160/160 [=====] - 0s 640us/step - loss: 0.6766
Epoch 12/400
160/160 [=====] - 0s 613us/step - loss: 0.6738
Epoch 13/400
160/160 [=====] - 0s 660us/step - loss: 0.6716
Epoch 14/400
160/160 [=====] - 0s 636us/step - loss: 0.6707
Epoch 15/400
160/160 [=====] - 0s 635us/step - loss: 0.6669
Epoch 16/400
160/160 [=====] - 0s 641us/step - loss: 0.6670
Epoch 17/400

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160/160 [=====] - 0s 617us/step - loss: 0.6625
Epoch 18/400
160/160 [=====] - 0s 605us/step - loss: 0.6605
Epoch 19/400
160/160 [=====] - 0s 605us/step - loss: 0.6580
Epoch 20/400
160/160 [=====] - 0s 663us/step - loss: 0.6556
Epoch 21/400
160/160 [=====] - 0s 619us/step - loss: 0.6518
Epoch 22/400
160/160 [=====] - 0s 614us/step - loss: 0.6481
Epoch 23/400
160/160 [=====] - 0s 631us/step - loss: 0.6435
Epoch 24/400
160/160 [=====] - 0s 607us/step - loss: 0.6420
Epoch 25/400
160/160 [=====] - 0s 595us/step - loss: 0.6322
Epoch 26/400
160/160 [=====] - 0s 633us/step - loss: 0.6276
Epoch 27/400
160/160 [=====] - 0s 628us/step - loss: 0.6252
Epoch 28/400
160/160 [=====] - 0s 623us/step - loss: 0.6188
Epoch 29/400
160/160 [=====] - 0s 625us/step - loss: 0.6085
Epoch 30/400
160/160 [=====] - 0s 618us/step - loss: 0.6024
Epoch 31/400
160/160 [=====] - 0s 634us/step - loss: 0.5922
Epoch 32/400
160/160 [=====] - 0s 636us/step - loss: 0.5811
Epoch 33/400
160/160 [=====] - 0s 638us/step - loss: 0.5671
Epoch 34/400
160/160 [=====] - 0s 634us/step - loss: 0.5522
Epoch 35/400
160/160 [=====] - 0s 617us/step - loss: 0.5341
Epoch 36/400
160/160 [=====] - 0s 638us/step - loss: 0.5116
Epoch 37/400
160/160 [=====] - 0s 627us/step - loss: 0.4811
Epoch 38/400
160/160 [=====] - 0s 628us/step - loss: 0.4554
Epoch 39/400
160/160 [=====] - 0s 625us/step - loss: 0.4261
Epoch 40/400
160/160 [=====] - 0s 623us/step - loss: 0.4044
Epoch 41/400

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160/160 [=====] - 0s 584us/step - loss: 0.3799
Epoch 42/400
160/160 [=====] - 0s 616us/step - loss: 0.3570
Epoch 43/400
160/160 [=====] - 0s 641us/step - loss: 0.3337
Epoch 44/400
160/160 [=====] - 0s 632us/step - loss: 0.3180
Epoch 45/400
160/160 [=====] - 0s 615us/step - loss: 0.3016
Epoch 46/400
160/160 [=====] - 0s 634us/step - loss: 0.2879
Epoch 47/400
160/160 [=====] - 0s 618us/step - loss: 0.2779
Epoch 48/400
160/160 [=====] - 0s 634us/step - loss: 0.2610
Epoch 49/400
160/160 [=====] - 0s 626us/step - loss: 0.2544
Epoch 50/400
160/160 [=====] - 0s 629us/step - loss: 0.2397
Epoch 51/400
160/160 [=====] - 0s 616us/step - loss: 0.2379
Epoch 52/400
160/160 [=====] - 0s 626us/step - loss: 0.2259
Epoch 53/400
160/160 [=====] - 0s 636us/step - loss: 0.2158
Epoch 54/400
160/160 [=====] - 0s 631us/step - loss: 0.2060
Epoch 55/400
160/160 [=====] - 0s 625us/step - loss: 0.2008
Epoch 56/400
160/160 [=====] - 0s 635us/step - loss: 0.1994
Epoch 57/400
160/160 [=====] - 0s 641us/step - loss: 0.1903
Epoch 58/400
160/160 [=====] - 0s 638us/step - loss: 0.1860
Epoch 59/400
160/160 [=====] - 0s 622us/step - loss: 0.1830
Epoch 60/400
160/160 [=====] - 0s 623us/step - loss: 0.1753
Epoch 61/400
160/160 [=====] - 0s 628us/step - loss: 0.1791
Epoch 62/400
160/160 [=====] - 0s 628us/step - loss: 0.1732
Epoch 63/400
160/160 [=====] - 0s 641us/step - loss: 0.1586
Epoch 64/400
160/160 [=====] - 0s 637us/step - loss: 0.1548
Epoch 65/400

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160/160 [=====] - 0s 629us/step - loss: 0.1591
Epoch 66/400
160/160 [=====] - 0s 620us/step - loss: 0.1472
Epoch 67/400
160/160 [=====] - 0s 610us/step - loss: 0.1599
Epoch 68/400
160/160 [=====] - 0s 606us/step - loss: 0.1469
Epoch 69/400
160/160 [=====] - 0s 614us/step - loss: 0.1493
Epoch 70/400
160/160 [=====] - 0s 635us/step - loss: 0.1519
Epoch 71/400
160/160 [=====] - 0s 630us/step - loss: 0.1385
Epoch 72/400
160/160 [=====] - 0s 608us/step - loss: 0.1329
Epoch 73/400
160/160 [=====] - 0s 665us/step - loss: 0.1420
Epoch 74/400
160/160 [=====] - 0s 620us/step - loss: 0.1248
Epoch 75/400
160/160 [=====] - 0s 599us/step - loss: 0.1413
Epoch 76/400
160/160 [=====] - 0s 604us/step - loss: 0.1291
Epoch 77/400
160/160 [=====] - 0s 596us/step - loss: 0.1245
Epoch 78/400
160/160 [=====] - 0s 664us/step - loss: 0.1268
Epoch 79/400
160/160 [=====] - 0s 629us/step - loss: 0.1448
Epoch 80/400
160/160 [=====] - 0s 623us/step - loss: 0.1260
Epoch 81/400
160/160 [=====] - 0s 597us/step - loss: 0.1157
Epoch 82/400
160/160 [=====] - 0s 603us/step - loss: 0.1343
Epoch 83/400
160/160 [=====] - 0s 604us/step - loss: 0.1269
Epoch 84/400
160/160 [=====] - 0s 641us/step - loss: 0.1263
Epoch 85/400
160/160 [=====] - 0s 618us/step - loss: 0.1291
Epoch 86/400
160/160 [=====] - 0s 612us/step - loss: 0.1020
Epoch 87/400
160/160 [=====] - 0s 678us/step - loss: 0.1065
Epoch 88/400
160/160 [=====] - 0s 594us/step - loss: 0.1149
Epoch 89/400

160/160 [=====] - 0s 622us/step - loss: 0.1137
Epoch 90/400
160/160 [=====] - 0s 623us/step - loss: 0.1167
Epoch 91/400
160/160 [=====] - 0s 618us/step - loss: 0.1050
Epoch 92/400
160/160 [=====] - 0s 612us/step - loss: 0.1107
Epoch 93/400
160/160 [=====] - 0s 613us/step - loss: 0.1022
Epoch 94/400
160/160 [=====] - 0s 640us/step - loss: 0.1175
Epoch 95/400
160/160 [=====] - 0s 632us/step - loss: 0.1081
Epoch 96/400
160/160 [=====] - 0s 624us/step - loss: 0.1032
Epoch 97/400
160/160 [=====] - 0s 616us/step - loss: 0.1162
Epoch 98/400
160/160 [=====] - 0s 620us/step - loss: 0.0943
Epoch 99/400
160/160 [=====] - 0s 638us/step - loss: 0.0829
Epoch 100/400
160/160 [=====] - 0s 622us/step - loss: 0.0954
Epoch 101/400
160/160 [=====] - 0s 602us/step - loss: 0.0893
Epoch 102/400
160/160 [=====] - 0s 627us/step - loss: 0.1135
Epoch 103/400
160/160 [=====] - 0s 630us/step - loss: 0.0875
Epoch 104/400
160/160 [=====] - 0s 637us/step - loss: 0.1251
Epoch 105/400
160/160 [=====] - 0s 634us/step - loss: 0.1182
Epoch 106/400
160/160 [=====] - 0s 634us/step - loss: 0.0939
Epoch 107/400
160/160 [=====] - 0s 624us/step - loss: 0.0990
Epoch 108/400
160/160 [=====] - 0s 642us/step - loss: 0.0936
Epoch 109/400
160/160 [=====] - 0s 638us/step - loss: 0.0938
Epoch 110/400
160/160 [=====] - 0s 637us/step - loss: 0.0982
Epoch 111/400
160/160 [=====] - 0s 620us/step - loss: 0.1054
Epoch 112/400
160/160 [=====] - 0s 635us/step - loss: 0.1039
Epoch 113/400

160/160 [=====] - 0s 637us/step - loss: 0.1097
 Epoch 114/400
 160/160 [=====] - 0s 647us/step - loss: 0.0810
 Epoch 115/400
 160/160 [=====] - 0s 639us/step - loss: 0.0940
 Epoch 116/400
 160/160 [=====] - 0s 620us/step - loss: 0.1046
 Epoch 117/400
 160/160 [=====] - 0s 617us/step - loss: 0.0855
 Epoch 118/400
 160/160 [=====] - 0s 631us/step - loss: 0.0996
 Epoch 119/400
 160/160 [=====] - 0s 621us/step - loss: 0.1238
 Epoch 120/400
 160/160 [=====] - 0s 638us/step - loss: 0.0840
 Epoch 121/400
 160/160 [=====] - 0s 634us/step - loss: 0.1115
 Epoch 122/400
 160/160 [=====] - 0s 641us/step - loss: 0.0887
 Epoch 123/400
 160/160 [=====] - 0s 628us/step - loss: 0.0841
 Epoch 124/400
 160/160 [=====] - 0s 637us/step - loss: 0.0921
 Epoch 125/400
 160/160 [=====] - 0s 632us/step - loss: 0.0695
 Epoch 126/400
 160/160 [=====] - 0s 628us/step - loss: 0.1008
 Epoch 127/400
 160/160 [=====] - 0s 629us/step - loss: 0.1024
 Epoch 128/400
 160/160 [=====] - 0s 637us/step - loss: 0.0832
 Epoch 129/400
 160/160 [=====] - 0s 635us/step - loss: 0.0908
 Epoch 130/400
 160/160 [=====] - 0s 592us/step - loss: 0.0773
 Epoch 131/400
 160/160 [=====] - 0s 597us/step - loss: 0.1034
 Epoch 132/400
 160/160 [=====] - 0s 590us/step - loss: 0.0728
 Epoch 133/400
 160/160 [=====] - 0s 612us/step - loss: 0.0856
 Epoch 134/400
 160/160 [=====] - 0s 578us/step - loss: 0.0965
 Epoch 135/400
 160/160 [=====] - 0s 596us/step - loss: 0.0811
 Epoch 136/400
 160/160 [=====] - 0s 623us/step - loss: 0.0793
 Epoch 137/400

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160/160 [=====] - 0s 658us/step - loss: 0.0893
Epoch 138/400
160/160 [=====] - 0s 626us/step - loss: 0.0794
Epoch 139/400
160/160 [=====] - 0s 605us/step - loss: 0.0960
Epoch 140/400
160/160 [=====] - 0s 653us/step - loss: 0.0894
Epoch 141/400
160/160 [=====] - 0s 658us/step - loss: 0.0833
Epoch 142/400
160/160 [=====] - 0s 661us/step - loss: 0.0740
Epoch 143/400
160/160 [=====] - 0s 604us/step - loss: 0.0748
Epoch 144/400
160/160 [=====] - 0s 597us/step - loss: 0.0794
Epoch 145/400
160/160 [=====] - 0s 622us/step - loss: 0.0667
Epoch 146/400
160/160 [=====] - 0s 600us/step - loss: 0.1010
Epoch 147/400
160/160 [=====] - 0s 627us/step - loss: 0.1043
Epoch 148/400
160/160 [=====] - 0s 617us/step - loss: 0.0768
Epoch 149/400
160/160 [=====] - 0s 590us/step - loss: 0.0800
Epoch 150/400
160/160 [=====] - 0s 625us/step - loss: 0.0671
Epoch 151/400
160/160 [=====] - 0s 627us/step - loss: 0.1101
Epoch 152/400
160/160 [=====] - 0s 617us/step - loss: 0.0747
Epoch 153/400
160/160 [=====] - 0s 639us/step - loss: 0.0933
Epoch 154/400
160/160 [=====] - 0s 632us/step - loss: 0.0690
Epoch 155/400
160/160 [=====] - 0s 618us/step - loss: 0.0791
Epoch 156/400
160/160 [=====] - 0s 611us/step - loss: 0.1016
Epoch 157/400
160/160 [=====] - 0s 621us/step - loss: 0.0723
Epoch 158/400
160/160 [=====] - 0s 630us/step - loss: 0.0879
Epoch 159/400
160/160 [=====] - 0s 629us/step - loss: 0.0914
Epoch 160/400
160/160 [=====] - 0s 604us/step - loss: 0.0969
Epoch 161/400

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160/160 [=====] - 0s 613us/step - loss: 0.0973
Epoch 162/400
160/160 [=====] - 0s 628us/step - loss: 0.0583
Epoch 163/400
160/160 [=====] - 0s 660us/step - loss: 0.0739
Epoch 164/400
160/160 [=====] - 0s 635us/step - loss: 0.0965
Epoch 165/400
160/160 [=====] - 0s 614us/step - loss: 0.0885
Epoch 166/400
160/160 [=====] - 0s 622us/step - loss: 0.0914
Epoch 167/400
160/160 [=====] - 0s 619us/step - loss: 0.0541
Epoch 168/400
160/160 [=====] - 0s 636us/step - loss: 0.0900
Epoch 169/400
160/160 [=====] - 0s 615us/step - loss: 0.1008
Epoch 170/400
160/160 [=====] - 0s 626us/step - loss: 0.0775
Epoch 171/400
160/160 [=====] - 0s 617us/step - loss: 0.0800
Epoch 172/400
160/160 [=====] - 0s 633us/step - loss: 0.0946
Epoch 173/400
160/160 [=====] - 0s 622us/step - loss: 0.0744
Epoch 174/400
160/160 [=====] - 0s 640us/step - loss: 0.0663
Epoch 175/400
160/160 [=====] - 0s 627us/step - loss: 0.0808
Epoch 176/400
160/160 [=====] - 0s 631us/step - loss: 0.0472
Epoch 177/400
160/160 [=====] - 0s 632us/step - loss: 0.0649
Epoch 178/400
160/160 [=====] - 0s 648us/step - loss: 0.0659
Epoch 179/400
160/160 [=====] - 0s 628us/step - loss: 0.0626
Epoch 180/400
160/160 [=====] - 0s 630us/step - loss: 0.0620
Epoch 181/400
160/160 [=====] - 0s 631us/step - loss: 0.0741
Epoch 182/400
160/160 [=====] - 0s 648us/step - loss: 0.0628
Epoch 183/400
160/160 [=====] - 0s 636us/step - loss: 0.0910
Epoch 184/400
160/160 [=====] - 0s 641us/step - loss: 0.0591
Epoch 185/400

```

160/160 [=====] - 0s 624us/step - loss: 0.0777
 Epoch 186/400
 160/160 [=====] - 0s 620us/step - loss: 0.0670
 Epoch 187/400
 160/160 [=====] - 0s 634us/step - loss: 0.0720
 Epoch 188/400
 160/160 [=====] - 0s 629us/step - loss: 0.0897
 Epoch 189/400
 160/160 [=====] - 0s 632us/step - loss: 0.0524
 Epoch 190/400
 160/160 [=====] - 0s 629us/step - loss: 0.0590
 Epoch 191/400
 160/160 [=====] - 0s 626us/step - loss: 0.0594
 Epoch 192/400
 160/160 [=====] - 0s 621us/step - loss: 0.0827
 Epoch 193/400
 160/160 [=====] - 0s 628us/step - loss: 0.0820
 Epoch 194/400
 160/160 [=====] - 0s 654us/step - loss: 0.0587
 Epoch 195/400
 160/160 [=====] - 0s 634us/step - loss: 0.0898
 Epoch 196/400
 160/160 [=====] - 0s 601us/step - loss: 0.0735
 Epoch 197/400
 160/160 [=====] - 0s 617us/step - loss: 0.0719
 Epoch 198/400
 160/160 [=====] - 0s 597us/step - loss: 0.0640
 Epoch 199/400
 160/160 [=====] - 0s 624us/step - loss: 0.0625
 Epoch 200/400
 160/160 [=====] - 0s 627us/step - loss: 0.0600
 Epoch 201/400
 160/160 [=====] - 0s 614us/step - loss: 0.0710
 Epoch 202/400
 160/160 [=====] - 0s 644us/step - loss: 0.0550
 Epoch 203/400
 160/160 [=====] - 0s 648us/step - loss: 0.0587
 Epoch 204/400
 160/160 [=====] - 0s 645us/step - loss: 0.0708
 Epoch 205/400
 160/160 [=====] - 0s 621us/step - loss: 0.0924
 Epoch 206/400
 160/160 [=====] - 0s 611us/step - loss: 0.0648
 Epoch 207/400
 160/160 [=====] - 0s 603us/step - loss: 0.0611
 Epoch 208/400
 160/160 [=====] - 0s 622us/step - loss: 0.0690
 Epoch 209/400

160/160 [=====] - 0s 634us/step - loss: 0.0712
Epoch 210/400
160/160 [=====] - 0s 632us/step - loss: 0.0659
Epoch 211/400
160/160 [=====] - 0s 617us/step - loss: 0.0667
Epoch 212/400
160/160 [=====] - 0s 619us/step - loss: 0.0603
Epoch 213/400
160/160 [=====] - 0s 630us/step - loss: 0.0521
Epoch 214/400
160/160 [=====] - 0s 623us/step - loss: 0.0642
Epoch 215/400
160/160 [=====] - 0s 613us/step - loss: 0.0500
Epoch 216/400
160/160 [=====] - 0s 606us/step - loss: 0.0621
Epoch 217/400
160/160 [=====] - 0s 606us/step - loss: 0.0651
Epoch 218/400
160/160 [=====] - 0s 607us/step - loss: 0.0558
Epoch 219/400
160/160 [=====] - 0s 603us/step - loss: 0.0563
Epoch 220/400
160/160 [=====] - 0s 628us/step - loss: 0.0538
Epoch 221/400
160/160 [=====] - 0s 625us/step - loss: 0.0571
Epoch 222/400
160/160 [=====] - 0s 607us/step - loss: 0.0461
Epoch 223/400
160/160 [=====] - 0s 581us/step - loss: 0.0597
Epoch 224/400
160/160 [=====] - 0s 610us/step - loss: 0.0525
Epoch 225/400
160/160 [=====] - 0s 628us/step - loss: 0.0524
Epoch 226/400
160/160 [=====] - 0s 617us/step - loss: 0.0494
Epoch 227/400
160/160 [=====] - 0s 628us/step - loss: 0.0576
Epoch 228/400
160/160 [=====] - 0s 629us/step - loss: 0.0543
Epoch 229/400
160/160 [=====] - 0s 621us/step - loss: 0.0522
Epoch 230/400
160/160 [=====] - 0s 611us/step - loss: 0.0508
Epoch 231/400
160/160 [=====] - 0s 630us/step - loss: 0.0544
Epoch 232/400
160/160 [=====] - 0s 639us/step - loss: 0.0608
Epoch 233/400

160/160 [=====] - 0s 620us/step - loss: 0.0564
Epoch 234/400
160/160 [=====] - 0s 606us/step - loss: 0.0527
Epoch 235/400
160/160 [=====] - 0s 621us/step - loss: 0.0564
Epoch 236/400
160/160 [=====] - 0s 635us/step - loss: 0.0638
Epoch 237/400
160/160 [=====] - 0s 632us/step - loss: 0.0547
Epoch 238/400
160/160 [=====] - 0s 604us/step - loss: 0.0556
Epoch 239/400
160/160 [=====] - 0s 602us/step - loss: 0.0504
Epoch 240/400
160/160 [=====] - 0s 622us/step - loss: 0.0521
Epoch 241/400
160/160 [=====] - 0s 658us/step - loss: 0.0541
Epoch 242/400
160/160 [=====] - 0s 653us/step - loss: 0.0451
Epoch 243/400
160/160 [=====] - 0s 637us/step - loss: 0.0518
Epoch 244/400
160/160 [=====] - 0s 604us/step - loss: 0.0472
Epoch 245/400
160/160 [=====] - 0s 617us/step - loss: 0.0583
Epoch 246/400
160/160 [=====] - 0s 624us/step - loss: 0.0477
Epoch 247/400
160/160 [=====] - 0s 636us/step - loss: 0.0479
Epoch 248/400
160/160 [=====] - 0s 605us/step - loss: 0.0432
Epoch 249/400
160/160 [=====] - 0s 611us/step - loss: 0.0614
Epoch 250/400
160/160 [=====] - 0s 605us/step - loss: 0.0514
Epoch 251/400
160/160 [=====] - 0s 609us/step - loss: 0.0496
Epoch 252/400
160/160 [=====] - 0s 637us/step - loss: 0.0489
Epoch 253/400
160/160 [=====] - 0s 632us/step - loss: 0.0484
Epoch 254/400
160/160 [=====] - 0s 628us/step - loss: 0.0506
Epoch 255/400
160/160 [=====] - 0s 610us/step - loss: 0.0515
Epoch 256/400
160/160 [=====] - 0s 639us/step - loss: 0.0506
Epoch 257/400

160/160 [=====] - 0s 618us/step - loss: 0.0383
Epoch 258/400
160/160 [=====] - 0s 609us/step - loss: 0.0535
Epoch 259/400
160/160 [=====] - 0s 616us/step - loss: 0.0452
Epoch 260/400
160/160 [=====] - 0s 620us/step - loss: 0.0586
Epoch 261/400
160/160 [=====] - 0s 624us/step - loss: 0.0583
Epoch 262/400
160/160 [=====] - 0s 610us/step - loss: 0.0507
Epoch 263/400
160/160 [=====] - 0s 624us/step - loss: 0.0540
Epoch 264/400
160/160 [=====] - 0s 631us/step - loss: 0.0563
Epoch 265/400
160/160 [=====] - 0s 625us/step - loss: 0.0512
Epoch 266/400
160/160 [=====] - 0s 599us/step - loss: 0.0424
Epoch 267/400
160/160 [=====] - 0s 604us/step - loss: 0.0498
Epoch 268/400
160/160 [=====] - 0s 636us/step - loss: 0.0515
Epoch 269/400
160/160 [=====] - 0s 631us/step - loss: 0.0598
Epoch 270/400
160/160 [=====] - 0s 617us/step - loss: 0.0519
Epoch 271/400
160/160 [=====] - 0s 606us/step - loss: 0.0459
Epoch 272/400
160/160 [=====] - 0s 618us/step - loss: 0.0435
Epoch 273/400
160/160 [=====] - 0s 629us/step - loss: 0.0448
Epoch 274/400
160/160 [=====] - 0s 622us/step - loss: 0.0394
Epoch 275/400
160/160 [=====] - 0s 607us/step - loss: 0.0583
Epoch 276/400
160/160 [=====] - 0s 605us/step - loss: 0.0490
Epoch 277/400
160/160 [=====] - 0s 632us/step - loss: 0.0451
Epoch 278/400
160/160 [=====] - 0s 623us/step - loss: 0.0353
Epoch 279/400
160/160 [=====] - 0s 632us/step - loss: 0.0430
Epoch 280/400
160/160 [=====] - 0s 626us/step - loss: 0.0484
Epoch 281/400

```

160/160 [=====] - 0s 629us/step - loss: 0.0425
Epoch 282/400
160/160 [=====] - 0s 615us/step - loss: 0.0510
Epoch 283/400
160/160 [=====] - 0s 622us/step - loss: 0.0482
Epoch 284/400
160/160 [=====] - 0s 625us/step - loss: 0.0517
Epoch 285/400
160/160 [=====] - 0s 623us/step - loss: 0.0432
Epoch 286/400
160/160 [=====] - 0s 600us/step - loss: 0.0451
Epoch 287/400
160/160 [=====] - 0s 602us/step - loss: 0.0487
Epoch 288/400
160/160 [=====] - 0s 620us/step - loss: 0.0451
Epoch 289/400
160/160 [=====] - 0s 639us/step - loss: 0.0476
Epoch 290/400
160/160 [=====] - 0s 623us/step - loss: 0.0523
Epoch 291/400
160/160 [=====] - 0s 624us/step - loss: 0.0494
Epoch 292/400
160/160 [=====] - 0s 594us/step - loss: 0.0443
Epoch 293/400
160/160 [=====] - 0s 578us/step - loss: 0.0349
Epoch 294/400
160/160 [=====] - 0s 577us/step - loss: 0.0465
Epoch 295/400
160/160 [=====] - 0s 626us/step - loss: 0.0546
Epoch 296/400
160/160 [=====] - 0s 623us/step - loss: 0.0487
Epoch 297/400
160/160 [=====] - 0s 621us/step - loss: 0.0439
Epoch 298/400
160/160 [=====] - 0s 632us/step - loss: 0.0364
Epoch 299/400
160/160 [=====] - 0s 624us/step - loss: 0.0537
Epoch 300/400
160/160 [=====] - 0s 652us/step - loss: 0.0427
Epoch 301/400
160/160 [=====] - 0s 626us/step - loss: 0.0471
Epoch 302/400
160/160 [=====] - 0s 654us/step - loss: 0.0397
Epoch 303/400
160/160 [=====] - 0s 632us/step - loss: 0.0451
Epoch 304/400
160/160 [=====] - 0s 707us/step - loss: 0.0637
Epoch 305/400

```

160/160 [=====] - 0s 629us/step - loss: 0.0519
 Epoch 306/400
 160/160 [=====] - 0s 629us/step - loss: 0.0543
 Epoch 307/400
 160/160 [=====] - 0s 629us/step - loss: 0.0511
 Epoch 308/400
 160/160 [=====] - 0s 619us/step - loss: 0.0419
 Epoch 309/400
 160/160 [=====] - 0s 592us/step - loss: 0.0473
 Epoch 310/400
 160/160 [=====] - 0s 642us/step - loss: 0.0493
 Epoch 311/400
 160/160 [=====] - 0s 640us/step - loss: 0.0487
 Epoch 312/400
 160/160 [=====] - 0s 634us/step - loss: 0.0386
 Epoch 313/400
 160/160 [=====] - 0s 623us/step - loss: 0.0459
 Epoch 314/400
 160/160 [=====] - 0s 636us/step - loss: 0.0513
 Epoch 315/400
 160/160 [=====] - 0s 619us/step - loss: 0.0367
 Epoch 316/400
 160/160 [=====] - 0s 673us/step - loss: 0.0450
 Epoch 317/400
 160/160 [=====] - 0s 643us/step - loss: 0.0461
 Epoch 318/400
 160/160 [=====] - 0s 638us/step - loss: 0.0409
 Epoch 319/400
 160/160 [=====] - 0s 646us/step - loss: 0.0472
 Epoch 320/400
 160/160 [=====] - 0s 634us/step - loss: 0.0403
 Epoch 321/400
 160/160 [=====] - 0s 628us/step - loss: 0.0472
 Epoch 322/400
 160/160 [=====] - 0s 629us/step - loss: 0.0548
 Epoch 323/400
 160/160 [=====] - 0s 628us/step - loss: 0.0455
 Epoch 324/400
 160/160 [=====] - 0s 627us/step - loss: 0.0511
 Epoch 325/400
 160/160 [=====] - 0s 601us/step - loss: 0.0363
 Epoch 326/400
 160/160 [=====] - 0s 636us/step - loss: 0.0463
 Epoch 327/400
 160/160 [=====] - 0s 613us/step - loss: 0.0496
 Epoch 328/400
 160/160 [=====] - 0s 599us/step - loss: 0.0430
 Epoch 329/400

160/160 [=====] - 0s 588us/step - loss: 0.0484
Epoch 330/400
160/160 [=====] - 0s 637us/step - loss: 0.0435
Epoch 331/400
160/160 [=====] - 0s 644us/step - loss: 0.0461
Epoch 332/400
160/160 [=====] - 0s 637us/step - loss: 0.0418
Epoch 333/400
160/160 [=====] - 0s 620us/step - loss: 0.0402
Epoch 334/400
160/160 [=====] - 0s 617us/step - loss: 0.0433
Epoch 335/400
160/160 [=====] - 0s 608us/step - loss: 0.0377
Epoch 336/400
160/160 [=====] - 0s 623us/step - loss: 0.0458
Epoch 337/400
160/160 [=====] - 0s 628us/step - loss: 0.0396
Epoch 338/400
160/160 [=====] - 0s 613us/step - loss: 0.0394
Epoch 339/400
160/160 [=====] - 0s 623us/step - loss: 0.0380
Epoch 340/400
160/160 [=====] - 0s 625us/step - loss: 0.0602
Epoch 341/400
160/160 [=====] - 0s 637us/step - loss: 0.0550
Epoch 342/400
160/160 [=====] - 0s 640us/step - loss: 0.0439
Epoch 343/400
160/160 [=====] - 0s 618us/step - loss: 0.0383
Epoch 344/400
160/160 [=====] - 0s 627us/step - loss: 0.0517
Epoch 345/400
160/160 [=====] - 0s 612us/step - loss: 0.0476
Epoch 346/400
160/160 [=====] - 0s 613us/step - loss: 0.0439
Epoch 347/400
160/160 [=====] - 0s 612us/step - loss: 0.0392
Epoch 348/400
160/160 [=====] - 0s 616us/step - loss: 0.0459
Epoch 349/400
160/160 [=====] - 0s 613us/step - loss: 0.0422
Epoch 350/400
160/160 [=====] - 0s 608us/step - loss: 0.0441
Epoch 351/400
160/160 [=====] - 0s 638us/step - loss: 0.0448
Epoch 352/400
160/160 [=====] - 0s 605us/step - loss: 0.0371
Epoch 353/400

```

160/160 [=====] - 0s 629us/step - loss: 0.0439
Epoch 354/400
160/160 [=====] - 0s 616us/step - loss: 0.0458
Epoch 355/400
160/160 [=====] - 0s 606us/step - loss: 0.0410
Epoch 356/400
160/160 [=====] - 0s 603us/step - loss: 0.0419
Epoch 357/400
160/160 [=====] - 0s 599us/step - loss: 0.0383
Epoch 358/400
160/160 [=====] - 0s 630us/step - loss: 0.0386
Epoch 359/400
160/160 [=====] - 0s 628us/step - loss: 0.0467
Epoch 360/400
160/160 [=====] - 0s 615us/step - loss: 0.0404
Epoch 361/400
160/160 [=====] - 0s 659us/step - loss: 0.0401
Epoch 362/400
160/160 [=====] - 0s 634us/step - loss: 0.0373
Epoch 363/400
160/160 [=====] - 0s 632us/step - loss: 0.0373
Epoch 364/400
160/160 [=====] - 0s 622us/step - loss: 0.0398
Epoch 365/400
160/160 [=====] - 0s 590us/step - loss: 0.0389
Epoch 366/400
160/160 [=====] - 0s 613us/step - loss: 0.0372
Epoch 367/400
160/160 [=====] - 0s 621us/step - loss: 0.0439
Epoch 368/400
160/160 [=====] - 0s 637us/step - loss: 0.0412
Epoch 369/400
160/160 [=====] - 0s 617us/step - loss: 0.0405
Epoch 370/400
160/160 [=====] - 0s 610us/step - loss: 0.0474
Epoch 371/400
160/160 [=====] - 0s 609us/step - loss: 0.0446
Epoch 372/400
160/160 [=====] - 0s 624us/step - loss: 0.0354
Epoch 373/400
160/160 [=====] - 0s 622us/step - loss: 0.0431
Epoch 374/400
160/160 [=====] - 0s 628us/step - loss: 0.0427
Epoch 375/400
160/160 [=====] - 0s 631us/step - loss: 0.0355
Epoch 376/400
160/160 [=====] - 0s 628us/step - loss: 0.0363
Epoch 377/400

```

```

160/160 [=====] - 0s 621us/step - loss: 0.0428
Epoch 378/400
160/160 [=====] - 0s 656us/step - loss: 0.0456
Epoch 379/400
160/160 [=====] - 0s 667us/step - loss: 0.0378
Epoch 380/400
160/160 [=====] - 0s 686us/step - loss: 0.0423
Epoch 381/400
160/160 [=====] - 0s 665us/step - loss: 0.0382
Epoch 382/400
160/160 [=====] - 0s 674us/step - loss: 0.0387
Epoch 383/400
160/160 [=====] - 0s 616us/step - loss: 0.0451
Epoch 384/400
160/160 [=====] - 0s 645us/step - loss: 0.0433
Epoch 385/400
160/160 [=====] - 0s 609us/step - loss: 0.0405
Epoch 386/400
160/160 [=====] - 0s 590us/step - loss: 0.0406
Epoch 387/400
160/160 [=====] - 0s 642us/step - loss: 0.0414
Epoch 388/400
160/160 [=====] - 0s 609us/step - loss: 0.0384
Epoch 389/400
160/160 [=====] - 0s 659us/step - loss: 0.0429
Epoch 390/400
160/160 [=====] - 0s 666us/step - loss: 0.0391
Epoch 391/400
160/160 [=====] - 0s 608us/step - loss: 0.0387
Epoch 392/400
160/160 [=====] - 0s 639us/step - loss: 0.0427
Epoch 393/400
160/160 [=====] - 0s 637us/step - loss: 0.0401
Epoch 394/400
160/160 [=====] - 0s 640us/step - loss: 0.0389
Epoch 395/400
160/160 [=====] - 0s 663us/step - loss: 0.0434
Epoch 396/400
160/160 [=====] - 0s 647us/step - loss: 0.0395
Epoch 397/400
160/160 [=====] - 0s 632us/step - loss: 0.0334
Epoch 398/400
160/160 [=====] - 0s 631us/step - loss: 0.0376
Epoch 399/400
160/160 [=====] - 0s 651us/step - loss: 0.0386
Epoch 400/400
160/160 [=====] - 0s 663us/step - loss: 0.0418
160/160 [=====] - 0s 943us/step

```

In [22]: *### Four Layer Neural Networks ###*

```
model = Sequential()

model.add(Dense(4, input_dim=2, activation='tanh')) #sigmoid, relu
# model.add(Dense(2, activation='tanh'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_4one = model.evaluate(X, y)

model = Sequential()

model.add(Dense(4, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='relu'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_4two = model.evaluate(X, y)

model = Sequential()

model.add(Dense(4, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='relu'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
```

```

model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_4three = model.evaluate(X, y)

model = Sequential()

model.add(Dense(4, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='relu'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='tanh'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_4four = model.evaluate(X, y)

model = Sequential()

model.add(Dense(4, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='relu'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='tanh'))
model.add(Dense(4, input_dim = 4, activation='relu'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores_4five = model.evaluate(X, y)

scores4 = [scores_4one, scores_4two, scores_4three, scores_4four, scores_4five]

```


Epoch 1/400
160/160 [=====] - 0s 2ms/step - loss: 0.7009
Epoch 2/400
160/160 [=====] - 0s 492us/step - loss: 0.6985
Epoch 3/400
160/160 [=====] - 0s 487us/step - loss: 0.6974
Epoch 4/400
160/160 [=====] - 0s 501us/step - loss: 0.6961
Epoch 5/400
160/160 [=====] - 0s 469us/step - loss: 0.6954
Epoch 6/400
160/160 [=====] - 0s 499us/step - loss: 0.6948
Epoch 7/400
160/160 [=====] - 0s 494us/step - loss: 0.6944
Epoch 8/400
160/160 [=====] - 0s 479us/step - loss: 0.6936
Epoch 9/400
160/160 [=====] - 0s 479us/step - loss: 0.6935
Epoch 10/400
160/160 [=====] - 0s 511us/step - loss: 0.6929
Epoch 11/400
160/160 [=====] - 0s 498us/step - loss: 0.6927
Epoch 12/400
160/160 [=====] - 0s 481us/step - loss: 0.6926
Epoch 13/400
160/160 [=====] - 0s 485us/step - loss: 0.6920
Epoch 14/400
160/160 [=====] - 0s 489us/step - loss: 0.6913
Epoch 15/400
160/160 [=====] - 0s 489us/step - loss: 0.6913
Epoch 16/400
160/160 [=====] - 0s 479us/step - loss: 0.6908
Epoch 17/400
160/160 [=====] - 0s 492us/step - loss: 0.6904
Epoch 18/400
160/160 [=====] - 0s 527us/step - loss: 0.6901
Epoch 19/400
160/160 [=====] - 0s 555us/step - loss: 0.6895
Epoch 20/400
160/160 [=====] - 0s 496us/step - loss: 0.6891
Epoch 21/400
160/160 [=====] - 0s 497us/step - loss: 0.6887
Epoch 22/400
160/160 [=====] - 0s 497us/step - loss: 0.6880
Epoch 23/400
160/160 [=====] - 0s 515us/step - loss: 0.6876
Epoch 24/400
160/160 [=====] - 0s 501us/step - loss: 0.6868

Epoch 25/400
160/160 [=====] - 0s 495us/step - loss: 0.6859
Epoch 26/400
160/160 [=====] - 0s 499us/step - loss: 0.6852
Epoch 27/400
160/160 [=====] - 0s 490us/step - loss: 0.6844
Epoch 28/400
160/160 [=====] - 0s 481us/step - loss: 0.6834
Epoch 29/400
160/160 [=====] - 0s 487us/step - loss: 0.6824
Epoch 30/400
160/160 [=====] - 0s 476us/step - loss: 0.6814
Epoch 31/400
160/160 [=====] - 0s 508us/step - loss: 0.6802
Epoch 32/400
160/160 [=====] - 0s 484us/step - loss: 0.6791
Epoch 33/400
160/160 [=====] - 0s 500us/step - loss: 0.6778
Epoch 34/400
160/160 [=====] - 0s 514us/step - loss: 0.6761
Epoch 35/400
160/160 [=====] - 0s 481us/step - loss: 0.6746
Epoch 36/400
160/160 [=====] - 0s 507us/step - loss: 0.6729
Epoch 37/400
160/160 [=====] - 0s 476us/step - loss: 0.6713
Epoch 38/400
160/160 [=====] - 0s 486us/step - loss: 0.6693
Epoch 39/400
160/160 [=====] - 0s 456us/step - loss: 0.6672
Epoch 40/400
160/160 [=====] - 0s 484us/step - loss: 0.6648
Epoch 41/400
160/160 [=====] - 0s 472us/step - loss: 0.6624
Epoch 42/400
160/160 [=====] - 0s 487us/step - loss: 0.6600
Epoch 43/400
160/160 [=====] - 0s 478us/step - loss: 0.6577
Epoch 44/400
160/160 [=====] - 0s 491us/step - loss: 0.6551
Epoch 45/400
160/160 [=====] - 0s 493us/step - loss: 0.6516
Epoch 46/400
160/160 [=====] - 0s 493us/step - loss: 0.6487
Epoch 47/400
160/160 [=====] - 0s 508us/step - loss: 0.6456
Epoch 48/400
160/160 [=====] - 0s 506us/step - loss: 0.6419

Epoch 49/400
160/160 [=====] - 0s 486us/step - loss: 0.6385
Epoch 50/400
160/160 [=====] - 0s 492us/step - loss: 0.6345
Epoch 51/400
160/160 [=====] - 0s 497us/step - loss: 0.6310
Epoch 52/400
160/160 [=====] - 0s 479us/step - loss: 0.6268
Epoch 53/400
160/160 [=====] - 0s 483us/step - loss: 0.6225
Epoch 54/400
160/160 [=====] - 0s 493us/step - loss: 0.6181
Epoch 55/400
160/160 [=====] - 0s 460us/step - loss: 0.6136
Epoch 56/400
160/160 [=====] - 0s 471us/step - loss: 0.6088
Epoch 57/400
160/160 [=====] - 0s 475us/step - loss: 0.6042
Epoch 58/400
160/160 [=====] - 0s 441us/step - loss: 0.5994
Epoch 59/400
160/160 [=====] - 0s 472us/step - loss: 0.5946
Epoch 60/400
160/160 [=====] - 0s 470us/step - loss: 0.5893
Epoch 61/400
160/160 [=====] - 0s 481us/step - loss: 0.5842
Epoch 62/400
160/160 [=====] - 0s 444us/step - loss: 0.5792
Epoch 63/400
160/160 [=====] - 0s 471us/step - loss: 0.5734
Epoch 64/400
160/160 [=====] - 0s 474us/step - loss: 0.5685
Epoch 65/400
160/160 [=====] - 0s 463us/step - loss: 0.5629
Epoch 66/400
160/160 [=====] - 0s 468us/step - loss: 0.5572
Epoch 67/400
160/160 [=====] - 0s 492us/step - loss: 0.5521
Epoch 68/400
160/160 [=====] - 0s 487us/step - loss: 0.5464
Epoch 69/400
160/160 [=====] - 0s 486us/step - loss: 0.5412
Epoch 70/400
160/160 [=====] - 0s 465us/step - loss: 0.5358
Epoch 71/400
160/160 [=====] - 0s 466us/step - loss: 0.5300
Epoch 72/400
160/160 [=====] - 0s 483us/step - loss: 0.5247

Epoch 73/400
160/160 [=====] - 0s 489us/step - loss: 0.5190
Epoch 74/400
160/160 [=====] - 0s 467us/step - loss: 0.5136
Epoch 75/400
160/160 [=====] - 0s 478us/step - loss: 0.5086
Epoch 76/400
160/160 [=====] - 0s 461us/step - loss: 0.5029
Epoch 77/400
160/160 [=====] - 0s 474us/step - loss: 0.4981
Epoch 78/400
160/160 [=====] - 0s 472us/step - loss: 0.4928
Epoch 79/400
160/160 [=====] - 0s 465us/step - loss: 0.4879
Epoch 80/400
160/160 [=====] - 0s 472us/step - loss: 0.4829
Epoch 81/400
160/160 [=====] - 0s 463us/step - loss: 0.4780
Epoch 82/400
160/160 [=====] - 0s 464us/step - loss: 0.4734
Epoch 83/400
160/160 [=====] - 0s 470us/step - loss: 0.4686
Epoch 84/400
160/160 [=====] - 0s 494us/step - loss: 0.4643
Epoch 85/400
160/160 [=====] - 0s 467us/step - loss: 0.4599
Epoch 86/400
160/160 [=====] - 0s 461us/step - loss: 0.4553
Epoch 87/400
160/160 [=====] - 0s 460us/step - loss: 0.4510
Epoch 88/400
160/160 [=====] - 0s 472us/step - loss: 0.4470
Epoch 89/400
160/160 [=====] - 0s 470us/step - loss: 0.4433
Epoch 90/400
160/160 [=====] - 0s 530us/step - loss: 0.4390
Epoch 91/400
160/160 [=====] - 0s 475us/step - loss: 0.4354
Epoch 92/400
160/160 [=====] - 0s 464us/step - loss: 0.4313
Epoch 93/400
160/160 [=====] - 0s 466us/step - loss: 0.4280
Epoch 94/400
160/160 [=====] - 0s 476us/step - loss: 0.4244
Epoch 95/400
160/160 [=====] - 0s 482us/step - loss: 0.4213
Epoch 96/400
160/160 [=====] - 0s 490us/step - loss: 0.4182

Epoch 97/400
160/160 [=====] - 0s 487us/step - loss: 0.4149
Epoch 98/400
160/160 [=====] - 0s 485us/step - loss: 0.4115
Epoch 99/400
160/160 [=====] - 0s 467us/step - loss: 0.4088
Epoch 100/400
160/160 [=====] - 0s 458us/step - loss: 0.4061
Epoch 101/400
160/160 [=====] - 0s 464us/step - loss: 0.4030
Epoch 102/400
160/160 [=====] - 0s 461us/step - loss: 0.4004
Epoch 103/400
160/160 [=====] - 0s 468us/step - loss: 0.3978
Epoch 104/400
160/160 [=====] - 0s 459us/step - loss: 0.3951
Epoch 105/400
160/160 [=====] - 0s 465us/step - loss: 0.3924
Epoch 106/400
160/160 [=====] - 0s 467us/step - loss: 0.3902
Epoch 107/400
160/160 [=====] - 0s 464us/step - loss: 0.3883
Epoch 108/400
160/160 [=====] - 0s 456us/step - loss: 0.3857
Epoch 109/400
160/160 [=====] - 0s 462us/step - loss: 0.3838
Epoch 110/400
160/160 [=====] - 0s 470us/step - loss: 0.3817
Epoch 111/400
160/160 [=====] - 0s 461us/step - loss: 0.3797
Epoch 112/400
160/160 [=====] - 0s 454us/step - loss: 0.3778
Epoch 113/400
160/160 [=====] - 0s 463us/step - loss: 0.3756
Epoch 114/400
160/160 [=====] - 0s 457us/step - loss: 0.3741
Epoch 115/400
160/160 [=====] - 0s 495us/step - loss: 0.3726
Epoch 116/400
160/160 [=====] - 0s 468us/step - loss: 0.3710
Epoch 117/400
160/160 [=====] - 0s 463us/step - loss: 0.3690
Epoch 118/400
160/160 [=====] - 0s 469us/step - loss: 0.3676
Epoch 119/400
160/160 [=====] - 0s 468us/step - loss: 0.3662
Epoch 120/400
160/160 [=====] - 0s 479us/step - loss: 0.3645

Epoch 121/400
160/160 [=====] - 0s 458us/step - loss: 0.3628
Epoch 122/400
160/160 [=====] - 0s 469us/step - loss: 0.3619
Epoch 123/400
160/160 [=====] - 0s 455us/step - loss: 0.3602
Epoch 124/400
160/160 [=====] - 0s 471us/step - loss: 0.3591
Epoch 125/400
160/160 [=====] - 0s 460us/step - loss: 0.3579
Epoch 126/400
160/160 [=====] - 0s 470us/step - loss: 0.3568
Epoch 127/400
160/160 [=====] - 0s 460us/step - loss: 0.3553
Epoch 128/400
160/160 [=====] - 0s 469us/step - loss: 0.3543
Epoch 129/400
160/160 [=====] - 0s 460us/step - loss: 0.3533
Epoch 130/400
160/160 [=====] - 0s 483us/step - loss: 0.3521
Epoch 131/400
160/160 [=====] - 0s 460us/step - loss: 0.3515
Epoch 132/400
160/160 [=====] - 0s 468us/step - loss: 0.3499
Epoch 133/400
160/160 [=====] - 0s 471us/step - loss: 0.3491
Epoch 134/400
160/160 [=====] - 0s 466us/step - loss: 0.3482
Epoch 135/400
160/160 [=====] - 0s 473us/step - loss: 0.3472
Epoch 136/400
160/160 [=====] - 0s 464us/step - loss: 0.3463
Epoch 137/400
160/160 [=====] - 0s 497us/step - loss: 0.3453
Epoch 138/400
160/160 [=====] - 0s 476us/step - loss: 0.3450
Epoch 139/400
160/160 [=====] - 0s 462us/step - loss: 0.3441
Epoch 140/400
160/160 [=====] - 0s 465us/step - loss: 0.3435
Epoch 141/400
160/160 [=====] - 0s 465us/step - loss: 0.3427
Epoch 142/400
160/160 [=====] - 0s 466us/step - loss: 0.3419
Epoch 143/400
160/160 [=====] - 0s 468us/step - loss: 0.3411
Epoch 144/400
160/160 [=====] - 0s 472us/step - loss: 0.3401

Epoch 145/400
160/160 [=====] - 0s 467us/step - loss: 0.3401
Epoch 146/400
160/160 [=====] - 0s 459us/step - loss: 0.3394
Epoch 147/400
160/160 [=====] - 0s 469us/step - loss: 0.3385
Epoch 148/400
160/160 [=====] - 0s 467us/step - loss: 0.3380
Epoch 149/400
160/160 [=====] - 0s 472us/step - loss: 0.3375
Epoch 150/400
160/160 [=====] - 0s 463us/step - loss: 0.3373
Epoch 151/400
160/160 [=====] - 0s 462us/step - loss: 0.3365
Epoch 152/400
160/160 [=====] - 0s 460us/step - loss: 0.3360
Epoch 153/400
160/160 [=====] - 0s 467us/step - loss: 0.3352
Epoch 154/400
160/160 [=====] - 0s 459us/step - loss: 0.3349
Epoch 155/400
160/160 [=====] - 0s 459us/step - loss: 0.3345
Epoch 156/400
160/160 [=====] - 0s 462us/step - loss: 0.3339
Epoch 157/400
160/160 [=====] - 0s 469us/step - loss: 0.3337
Epoch 158/400
160/160 [=====] - 0s 464us/step - loss: 0.3330
Epoch 159/400
160/160 [=====] - 0s 480us/step - loss: 0.3325
Epoch 160/400
160/160 [=====] - 0s 467us/step - loss: 0.3320
Epoch 161/400
160/160 [=====] - 0s 461us/step - loss: 0.3319
Epoch 162/400
160/160 [=====] - 0s 464us/step - loss: 0.3316
Epoch 163/400
160/160 [=====] - 0s 469us/step - loss: 0.3312
Epoch 164/400
160/160 [=====] - 0s 466us/step - loss: 0.3309
Epoch 165/400
160/160 [=====] - 0s 469us/step - loss: 0.3304
Epoch 166/400
160/160 [=====] - 0s 456us/step - loss: 0.3302
Epoch 167/400
160/160 [=====] - 0s 459us/step - loss: 0.3299
Epoch 168/400
160/160 [=====] - 0s 458us/step - loss: 0.3296

Epoch 169/400
160/160 [=====] - 0s 465us/step - loss: 0.3291
Epoch 170/400
160/160 [=====] - 0s 465us/step - loss: 0.3290
Epoch 171/400
160/160 [=====] - 0s 464us/step - loss: 0.3289
Epoch 172/400
160/160 [=====] - 0s 455us/step - loss: 0.3285
Epoch 173/400
160/160 [=====] - 0s 479us/step - loss: 0.3280
Epoch 174/400
160/160 [=====] - 0s 457us/step - loss: 0.3280
Epoch 175/400
160/160 [=====] - 0s 459us/step - loss: 0.3277
Epoch 176/400
160/160 [=====] - 0s 462us/step - loss: 0.3274
Epoch 177/400
160/160 [=====] - 0s 472us/step - loss: 0.3272
Epoch 178/400
160/160 [=====] - 0s 461us/step - loss: 0.3270
Epoch 179/400
160/160 [=====] - 0s 464us/step - loss: 0.3265
Epoch 180/400
160/160 [=====] - 0s 470us/step - loss: 0.3262
Epoch 181/400
160/160 [=====] - 0s 466us/step - loss: 0.3261
Epoch 182/400
160/160 [=====] - 0s 477us/step - loss: 0.3258
Epoch 183/400
160/160 [=====] - 0s 480us/step - loss: 0.3257
Epoch 184/400
160/160 [=====] - 0s 478us/step - loss: 0.3253
Epoch 185/400
160/160 [=====] - 0s 470us/step - loss: 0.3250
Epoch 186/400
160/160 [=====] - 0s 459us/step - loss: 0.3250
Epoch 187/400
160/160 [=====] - 0s 471us/step - loss: 0.3247
Epoch 188/400
160/160 [=====] - 0s 455us/step - loss: 0.3245
Epoch 189/400
160/160 [=====] - 0s 465us/step - loss: 0.3247
Epoch 190/400
160/160 [=====] - 0s 467us/step - loss: 0.3245
Epoch 191/400
160/160 [=====] - 0s 474us/step - loss: 0.3245
Epoch 192/400
160/160 [=====] - 0s 461us/step - loss: 0.3238

Epoch 193/400
160/160 [=====] - 0s 470us/step - loss: 0.3234
Epoch 194/400
160/160 [=====] - 0s 466us/step - loss: 0.3238
Epoch 195/400
160/160 [=====] - 0s 456us/step - loss: 0.3234
Epoch 196/400
160/160 [=====] - 0s 480us/step - loss: 0.3237
Epoch 197/400
160/160 [=====] - 0s 451us/step - loss: 0.3232
Epoch 198/400
160/160 [=====] - 0s 463us/step - loss: 0.3233
Epoch 199/400
160/160 [=====] - 0s 462us/step - loss: 0.3231
Epoch 200/400
160/160 [=====] - 0s 462us/step - loss: 0.3226
Epoch 201/400
160/160 [=====] - 0s 465us/step - loss: 0.3231
Epoch 202/400
160/160 [=====] - 0s 466us/step - loss: 0.3227
Epoch 203/400
160/160 [=====] - 0s 472us/step - loss: 0.3228
Epoch 204/400
160/160 [=====] - 0s 459us/step - loss: 0.3226
Epoch 205/400
160/160 [=====] - 0s 462us/step - loss: 0.3222
Epoch 206/400
160/160 [=====] - 0s 463us/step - loss: 0.3224
Epoch 207/400
160/160 [=====] - 0s 457us/step - loss: 0.3223
Epoch 208/400
160/160 [=====] - 0s 458us/step - loss: 0.3216
Epoch 209/400
160/160 [=====] - 0s 468us/step - loss: 0.3222
Epoch 210/400
160/160 [=====] - 0s 450us/step - loss: 0.3218
Epoch 211/400
160/160 [=====] - 0s 461us/step - loss: 0.3215
Epoch 212/400
160/160 [=====] - 0s 461us/step - loss: 0.3216
Epoch 213/400
160/160 [=====] - 0s 474us/step - loss: 0.3214
Epoch 214/400
160/160 [=====] - 0s 455us/step - loss: 0.3217
Epoch 215/400
160/160 [=====] - 0s 477us/step - loss: 0.3214
Epoch 216/400
160/160 [=====] - 0s 460us/step - loss: 0.3210

Epoch 217/400
160/160 [=====] - 0s 466us/step - loss: 0.3209
Epoch 218/400
160/160 [=====] - 0s 456us/step - loss: 0.3211
Epoch 219/400
160/160 [=====] - 0s 463us/step - loss: 0.3209
Epoch 220/400
160/160 [=====] - 0s 463us/step - loss: 0.3208
Epoch 221/400
160/160 [=====] - 0s 465us/step - loss: 0.3208
Epoch 222/400
160/160 [=====] - 0s 471us/step - loss: 0.3211
Epoch 223/400
160/160 [=====] - 0s 471us/step - loss: 0.3208
Epoch 224/400
160/160 [=====] - 0s 470us/step - loss: 0.3208
Epoch 225/400
160/160 [=====] - 0s 466us/step - loss: 0.3206
Epoch 226/400
160/160 [=====] - 0s 458us/step - loss: 0.3207
Epoch 227/400
160/160 [=====] - 0s 463us/step - loss: 0.3207
Epoch 228/400
160/160 [=====] - 0s 450us/step - loss: 0.3200
Epoch 229/400
160/160 [=====] - 0s 474us/step - loss: 0.3205
Epoch 230/400
160/160 [=====] - 0s 468us/step - loss: 0.3204
Epoch 231/400
160/160 [=====] - 0s 469us/step - loss: 0.3203
Epoch 232/400
160/160 [=====] - 0s 459us/step - loss: 0.3202
Epoch 233/400
160/160 [=====] - 0s 464us/step - loss: 0.3200
Epoch 234/400
160/160 [=====] - 0s 467us/step - loss: 0.3206
Epoch 235/400
160/160 [=====] - 0s 462us/step - loss: 0.3204
Epoch 236/400
160/160 [=====] - 0s 472us/step - loss: 0.3204
Epoch 237/400
160/160 [=====] - 0s 462us/step - loss: 0.3202
Epoch 238/400
160/160 [=====] - 0s 463us/step - loss: 0.3199
Epoch 239/400
160/160 [=====] - 0s 462us/step - loss: 0.3199
Epoch 240/400
160/160 [=====] - 0s 455us/step - loss: 0.3202

Epoch 241/400
160/160 [=====] - 0s 465us/step - loss: 0.3201
Epoch 242/400
160/160 [=====] - 0s 456us/step - loss: 0.3197
Epoch 243/400
160/160 [=====] - 0s 477us/step - loss: 0.3198
Epoch 244/400
160/160 [=====] - 0s 467us/step - loss: 0.3197
Epoch 245/400
160/160 [=====] - 0s 463us/step - loss: 0.3197
Epoch 246/400
160/160 [=====] - 0s 454us/step - loss: 0.3200
Epoch 247/400
160/160 [=====] - 0s 460us/step - loss: 0.3197
Epoch 248/400
160/160 [=====] - 0s 453us/step - loss: 0.3197
Epoch 249/400
160/160 [=====] - 0s 468us/step - loss: 0.3198
Epoch 250/400
160/160 [=====] - 0s 472us/step - loss: 0.3196
Epoch 251/400
160/160 [=====] - 0s 462us/step - loss: 0.3195
Epoch 252/400
160/160 [=====] - 0s 461us/step - loss: 0.3195
Epoch 253/400
160/160 [=====] - 0s 473us/step - loss: 0.3192
Epoch 254/400
160/160 [=====] - 0s 460us/step - loss: 0.3194
Epoch 255/400
160/160 [=====] - 0s 467us/step - loss: 0.3189
Epoch 256/400
160/160 [=====] - 0s 457us/step - loss: 0.3192
Epoch 257/400
160/160 [=====] - 0s 455us/step - loss: 0.3191
Epoch 258/400
160/160 [=====] - 0s 471us/step - loss: 0.3195
Epoch 259/400
160/160 [=====] - 0s 465us/step - loss: 0.3192
Epoch 260/400
160/160 [=====] - 0s 450us/step - loss: 0.3189
Epoch 261/400
160/160 [=====] - 0s 464us/step - loss: 0.3188
Epoch 262/400
160/160 [=====] - 0s 475us/step - loss: 0.3189
Epoch 263/400
160/160 [=====] - 0s 473us/step - loss: 0.3195
Epoch 264/400
160/160 [=====] - 0s 460us/step - loss: 0.3187

Epoch 265/400
160/160 [=====] - 0s 465us/step - loss: 0.3190
Epoch 266/400
160/160 [=====] - 0s 468us/step - loss: 0.3187
Epoch 267/400
160/160 [=====] - 0s 457us/step - loss: 0.3190
Epoch 268/400
160/160 [=====] - 0s 456us/step - loss: 0.3187
Epoch 269/400
160/160 [=====] - 0s 467us/step - loss: 0.3190
Epoch 270/400
160/160 [=====] - 0s 470us/step - loss: 0.3190
Epoch 271/400
160/160 [=====] - 0s 441us/step - loss: 0.3188
Epoch 272/400
160/160 [=====] - 0s 464us/step - loss: 0.3186
Epoch 273/400
160/160 [=====] - 0s 451us/step - loss: 0.3187
Epoch 274/400
160/160 [=====] - 0s 456us/step - loss: 0.3191
Epoch 275/400
160/160 [=====] - 0s 457us/step - loss: 0.3192
Epoch 276/400
160/160 [=====] - 0s 452us/step - loss: 0.3187
Epoch 277/400
160/160 [=====] - 0s 461us/step - loss: 0.3191
Epoch 278/400
160/160 [=====] - 0s 433us/step - loss: 0.3187
Epoch 279/400
160/160 [=====] - 0s 450us/step - loss: 0.3189
Epoch 280/400
160/160 [=====] - 0s 458us/step - loss: 0.3186
Epoch 281/400
160/160 [=====] - 0s 462us/step - loss: 0.3184
Epoch 282/400
160/160 [=====] - 0s 463us/step - loss: 0.3186
Epoch 283/400
160/160 [=====] - 0s 472us/step - loss: 0.3179
Epoch 284/400
160/160 [=====] - 0s 458us/step - loss: 0.3181
Epoch 285/400
160/160 [=====] - 0s 460us/step - loss: 0.3187
Epoch 286/400
160/160 [=====] - 0s 439us/step - loss: 0.3183
Epoch 287/400
160/160 [=====] - 0s 457us/step - loss: 0.3186
Epoch 288/400
160/160 [=====] - 0s 478us/step - loss: 0.3184

Epoch 289/400
160/160 [=====] - 0s 482us/step - loss: 0.3185
Epoch 290/400
160/160 [=====] - 0s 465us/step - loss: 0.3184
Epoch 291/400
160/160 [=====] - 0s 478us/step - loss: 0.3183
Epoch 292/400
160/160 [=====] - 0s 453us/step - loss: 0.3183
Epoch 293/400
160/160 [=====] - 0s 458us/step - loss: 0.3184
Epoch 294/400
160/160 [=====] - 0s 460us/step - loss: 0.3185
Epoch 295/400
160/160 [=====] - 0s 457us/step - loss: 0.3184
Epoch 296/400
160/160 [=====] - 0s 453us/step - loss: 0.3185
Epoch 297/400
160/160 [=====] - 0s 466us/step - loss: 0.3183
Epoch 298/400
160/160 [=====] - 0s 455us/step - loss: 0.3187
Epoch 299/400
160/160 [=====] - 0s 469us/step - loss: 0.3184
Epoch 300/400
160/160 [=====] - 0s 460us/step - loss: 0.3189
Epoch 301/400
160/160 [=====] - 0s 462us/step - loss: 0.3182
Epoch 302/400
160/160 [=====] - 0s 457us/step - loss: 0.3184
Epoch 303/400
160/160 [=====] - 0s 481us/step - loss: 0.3184
Epoch 304/400
160/160 [=====] - 0s 455us/step - loss: 0.3185
Epoch 305/400
160/160 [=====] - 0s 459us/step - loss: 0.3183
Epoch 306/400
160/160 [=====] - 0s 464us/step - loss: 0.3182
Epoch 307/400
160/160 [=====] - 0s 480us/step - loss: 0.3179
Epoch 308/400
160/160 [=====] - 0s 485us/step - loss: 0.3184
Epoch 309/400
160/160 [=====] - 0s 483us/step - loss: 0.3181
Epoch 310/400
160/160 [=====] - 0s 446us/step - loss: 0.3182
Epoch 311/400
160/160 [=====] - 0s 453us/step - loss: 0.3185
Epoch 312/400
160/160 [=====] - 0s 475us/step - loss: 0.3181

Epoch 313/400
160/160 [=====] - 0s 469us/step - loss: 0.3184
Epoch 314/400
160/160 [=====] - 0s 484us/step - loss: 0.3181
Epoch 315/400
160/160 [=====] - 0s 469us/step - loss: 0.3182
Epoch 316/400
160/160 [=====] - 0s 464us/step - loss: 0.3182
Epoch 317/400
160/160 [=====] - 0s 464us/step - loss: 0.3179
Epoch 318/400
160/160 [=====] - 0s 464us/step - loss: 0.3183
Epoch 319/400
160/160 [=====] - 0s 464us/step - loss: 0.3184
Epoch 320/400
160/160 [=====] - 0s 473us/step - loss: 0.3179
Epoch 321/400
160/160 [=====] - 0s 486us/step - loss: 0.3179
Epoch 322/400
160/160 [=====] - 0s 457us/step - loss: 0.3186
Epoch 323/400
160/160 [=====] - 0s 475us/step - loss: 0.3182
Epoch 324/400
160/160 [=====] - 0s 473us/step - loss: 0.3181
Epoch 325/400
160/160 [=====] - 0s 466us/step - loss: 0.3179
Epoch 326/400
160/160 [=====] - 0s 470us/step - loss: 0.3180
Epoch 327/400
160/160 [=====] - 0s 519us/step - loss: 0.3179
Epoch 328/400
160/160 [=====] - 0s 512us/step - loss: 0.3181
Epoch 329/400
160/160 [=====] - 0s 515us/step - loss: 0.3181
Epoch 330/400
160/160 [=====] - 0s 518us/step - loss: 0.3179
Epoch 331/400
160/160 [=====] - 0s 515us/step - loss: 0.3180
Epoch 332/400
160/160 [=====] - 0s 458us/step - loss: 0.3179
Epoch 333/400
160/160 [=====] - 0s 466us/step - loss: 0.3177
Epoch 334/400
160/160 [=====] - 0s 466us/step - loss: 0.3178
Epoch 335/400
160/160 [=====] - 0s 468us/step - loss: 0.3179
Epoch 336/400
160/160 [=====] - 0s 462us/step - loss: 0.3183

Epoch 337/400
160/160 [=====] - 0s 468us/step - loss: 0.3180
Epoch 338/400
160/160 [=====] - 0s 465us/step - loss: 0.3181
Epoch 339/400
160/160 [=====] - 0s 474us/step - loss: 0.3178
Epoch 340/400
160/160 [=====] - 0s 470us/step - loss: 0.3172
Epoch 341/400
160/160 [=====] - 0s 472us/step - loss: 0.3178
Epoch 342/400
160/160 [=====] - 0s 474us/step - loss: 0.3178
Epoch 343/400
160/160 [=====] - 0s 465us/step - loss: 0.3173
Epoch 344/400
160/160 [=====] - 0s 442us/step - loss: 0.3180
Epoch 345/400
160/160 [=====] - 0s 468us/step - loss: 0.3178
Epoch 346/400
160/160 [=====] - 0s 455us/step - loss: 0.3181
Epoch 347/400
160/160 [=====] - 0s 466us/step - loss: 0.3178
Epoch 348/400
160/160 [=====] - 0s 471us/step - loss: 0.3176
Epoch 349/400
160/160 [=====] - 0s 472us/step - loss: 0.3170
Epoch 350/400
160/160 [=====] - 0s 456us/step - loss: 0.3178
Epoch 351/400
160/160 [=====] - 0s 465us/step - loss: 0.3181
Epoch 352/400
160/160 [=====] - 0s 460us/step - loss: 0.3180
Epoch 353/400
160/160 [=====] - 0s 465us/step - loss: 0.3183
Epoch 354/400
160/160 [=====] - 0s 472us/step - loss: 0.3175
Epoch 355/400
160/160 [=====] - 0s 470us/step - loss: 0.3176
Epoch 356/400
160/160 [=====] - 0s 486us/step - loss: 0.3175
Epoch 357/400
160/160 [=====] - 0s 466us/step - loss: 0.3178
Epoch 358/400
160/160 [=====] - 0s 468us/step - loss: 0.3180
Epoch 359/400
160/160 [=====] - 0s 464us/step - loss: 0.3177
Epoch 360/400
160/160 [=====] - 0s 455us/step - loss: 0.3177

Epoch 361/400
160/160 [=====] - 0s 425us/step - loss: 0.3178
Epoch 362/400
160/160 [=====] - 0s 450us/step - loss: 0.3173
Epoch 363/400
160/160 [=====] - 0s 437us/step - loss: 0.3174
Epoch 364/400
160/160 [=====] - 0s 462us/step - loss: 0.3179
Epoch 365/400
160/160 [=====] - 0s 445us/step - loss: 0.3180
Epoch 366/400
160/160 [=====] - 0s 439us/step - loss: 0.3179
Epoch 367/400
160/160 [=====] - 0s 464us/step - loss: 0.3179
Epoch 368/400
160/160 [=====] - 0s 446us/step - loss: 0.3177
Epoch 369/400
160/160 [=====] - 0s 472us/step - loss: 0.3173
Epoch 370/400
160/160 [=====] - 0s 475us/step - loss: 0.3178
Epoch 371/400
160/160 [=====] - 0s 467us/step - loss: 0.3172
Epoch 372/400
160/160 [=====] - 0s 467us/step - loss: 0.3175
Epoch 373/400
160/160 [=====] - 0s 466us/step - loss: 0.3178
Epoch 374/400
160/160 [=====] - 0s 461us/step - loss: 0.3171
Epoch 375/400
160/160 [=====] - 0s 471us/step - loss: 0.3172
Epoch 376/400
160/160 [=====] - 0s 460us/step - loss: 0.3175
Epoch 377/400
160/160 [=====] - 0s 479us/step - loss: 0.3179
Epoch 378/400
160/160 [=====] - 0s 467us/step - loss: 0.3182
Epoch 379/400
160/160 [=====] - 0s 469us/step - loss: 0.3174
Epoch 380/400
160/160 [=====] - 0s 469us/step - loss: 0.3176
Epoch 381/400
160/160 [=====] - 0s 469us/step - loss: 0.3178
Epoch 382/400
160/160 [=====] - 0s 477us/step - loss: 0.3175
Epoch 383/400
160/160 [=====] - 0s 470us/step - loss: 0.3174
Epoch 384/400
160/160 [=====] - 0s 489us/step - loss: 0.3176

Epoch 385/400
 160/160 [=====] - 0s 465us/step - loss: 0.3171
 Epoch 386/400
 160/160 [=====] - 0s 472us/step - loss: 0.3174
 Epoch 387/400
 160/160 [=====] - 0s 462us/step - loss: 0.3174
 Epoch 388/400
 160/160 [=====] - 0s 483us/step - loss: 0.3175
 Epoch 389/400
 160/160 [=====] - 0s 469us/step - loss: 0.3170
 Epoch 390/400
 160/160 [=====] - 0s 458us/step - loss: 0.3173
 Epoch 391/400
 160/160 [=====] - 0s 470us/step - loss: 0.3175
 Epoch 392/400
 160/160 [=====] - 0s 449us/step - loss: 0.3177
 Epoch 393/400
 160/160 [=====] - 0s 472us/step - loss: 0.3175
 Epoch 394/400
 160/160 [=====] - 0s 465us/step - loss: 0.3176
 Epoch 395/400
 160/160 [=====] - 0s 467us/step - loss: 0.3174
 Epoch 396/400
 160/160 [=====] - 0s 465us/step - loss: 0.3174
 Epoch 397/400
 160/160 [=====] - 0s 459us/step - loss: 0.3173
 Epoch 398/400
 160/160 [=====] - 0s 472us/step - loss: 0.3174
 Epoch 399/400
 160/160 [=====] - 0s 462us/step - loss: 0.3175
 Epoch 400/400
 160/160 [=====] - 0s 478us/step - loss: 0.3171
 160/160 [=====] - 0s 960us/step
 Epoch 1/400
 160/160 [=====] - 0s 2ms/step - loss: 0.6654
 Epoch 2/400
 160/160 [=====] - 0s 509us/step - loss: 0.6545
 Epoch 3/400
 160/160 [=====] - 0s 502us/step - loss: 0.6451
 Epoch 4/400
 160/160 [=====] - 0s 509us/step - loss: 0.6366
 Epoch 5/400
 160/160 [=====] - 0s 516us/step - loss: 0.6283
 Epoch 6/400
 160/160 [=====] - 0s 519us/step - loss: 0.6202
 Epoch 7/400
 160/160 [=====] - 0s 517us/step - loss: 0.6122
 Epoch 8/400

160/160 [=====] - 0s 519us/step - loss: 0.6046
 Epoch 9/400
 160/160 [=====] - 0s 524us/step - loss: 0.5976
 Epoch 10/400
 160/160 [=====] - 0s 522us/step - loss: 0.5902
 Epoch 11/400
 160/160 [=====] - 0s 508us/step - loss: 0.5835
 Epoch 12/400
 160/160 [=====] - 0s 520us/step - loss: 0.5765
 Epoch 13/400
 160/160 [=====] - 0s 514us/step - loss: 0.5699
 Epoch 14/400
 160/160 [=====] - 0s 511us/step - loss: 0.5627
 Epoch 15/400
 160/160 [=====] - 0s 511us/step - loss: 0.5561
 Epoch 16/400
 160/160 [=====] - 0s 515us/step - loss: 0.5499
 Epoch 17/400
 160/160 [=====] - 0s 514us/step - loss: 0.5435
 Epoch 18/400
 160/160 [=====] - 0s 530us/step - loss: 0.5370
 Epoch 19/400
 160/160 [=====] - 0s 515us/step - loss: 0.5314
 Epoch 20/400
 160/160 [=====] - 0s 515us/step - loss: 0.5255
 Epoch 21/400
 160/160 [=====] - 0s 523us/step - loss: 0.5199
 Epoch 22/400
 160/160 [=====] - 0s 534us/step - loss: 0.5146
 Epoch 23/400
 160/160 [=====] - 0s 509us/step - loss: 0.5093
 Epoch 24/400
 160/160 [=====] - 0s 510us/step - loss: 0.5045
 Epoch 25/400
 160/160 [=====] - 0s 509us/step - loss: 0.4998
 Epoch 26/400
 160/160 [=====] - 0s 497us/step - loss: 0.4955
 Epoch 27/400
 160/160 [=====] - 0s 517us/step - loss: 0.4917
 Epoch 28/400
 160/160 [=====] - 0s 514us/step - loss: 0.4877
 Epoch 29/400
 160/160 [=====] - 0s 534us/step - loss: 0.4843
 Epoch 30/400
 160/160 [=====] - 0s 516us/step - loss: 0.4812
 Epoch 31/400
 160/160 [=====] - 0s 524us/step - loss: 0.4781
 Epoch 32/400

160/160 [=====] - 0s 508us/step - loss: 0.4752
Epoch 33/400
160/160 [=====] - 0s 508us/step - loss: 0.4726
Epoch 34/400
160/160 [=====] - 0s 520us/step - loss: 0.4699
Epoch 35/400
160/160 [=====] - 0s 516us/step - loss: 0.4671
Epoch 36/400
160/160 [=====] - 0s 520us/step - loss: 0.4653
Epoch 37/400
160/160 [=====] - 0s 519us/step - loss: 0.4630
Epoch 38/400
160/160 [=====] - 0s 516us/step - loss: 0.4608
Epoch 39/400
160/160 [=====] - 0s 525us/step - loss: 0.4593
Epoch 40/400
160/160 [=====] - 0s 513us/step - loss: 0.4573
Epoch 41/400
160/160 [=====] - 0s 523us/step - loss: 0.4556
Epoch 42/400
160/160 [=====] - 0s 530us/step - loss: 0.4539
Epoch 43/400
160/160 [=====] - 0s 504us/step - loss: 0.4526
Epoch 44/400
160/160 [=====] - 0s 522us/step - loss: 0.4509
Epoch 45/400
160/160 [=====] - 0s 508us/step - loss: 0.4496
Epoch 46/400
160/160 [=====] - 0s 516us/step - loss: 0.4482
Epoch 47/400
160/160 [=====] - 0s 506us/step - loss: 0.4466
Epoch 48/400
160/160 [=====] - 0s 523us/step - loss: 0.4460
Epoch 49/400
160/160 [=====] - 0s 504us/step - loss: 0.4451
Epoch 50/400
160/160 [=====] - 0s 514us/step - loss: 0.4444
Epoch 51/400
160/160 [=====] - 0s 506us/step - loss: 0.4434
Epoch 52/400
160/160 [=====] - 0s 510us/step - loss: 0.4419
Epoch 53/400
160/160 [=====] - 0s 516us/step - loss: 0.4410
Epoch 54/400
160/160 [=====] - 0s 513us/step - loss: 0.4404
Epoch 55/400
160/160 [=====] - 0s 528us/step - loss: 0.4395
Epoch 56/400

160/160 [=====] - 0s 524us/step - loss: 0.4387
Epoch 57/400
160/160 [=====] - 0s 528us/step - loss: 0.4381
Epoch 58/400
160/160 [=====] - 0s 509us/step - loss: 0.4368
Epoch 59/400
160/160 [=====] - 0s 515us/step - loss: 0.4363
Epoch 60/400
160/160 [=====] - 0s 519us/step - loss: 0.4362
Epoch 61/400
160/160 [=====] - 0s 525us/step - loss: 0.4350
Epoch 62/400
160/160 [=====] - 0s 513us/step - loss: 0.4340
Epoch 63/400
160/160 [=====] - 0s 510us/step - loss: 0.4332
Epoch 64/400
160/160 [=====] - 0s 591us/step - loss: 0.4328
Epoch 65/400
160/160 [=====] - 0s 525us/step - loss: 0.4324
Epoch 66/400
160/160 [=====] - 0s 523us/step - loss: 0.4316
Epoch 67/400
160/160 [=====] - 0s 516us/step - loss: 0.4311
Epoch 68/400
160/160 [=====] - 0s 514us/step - loss: 0.4306
Epoch 69/400
160/160 [=====] - 0s 509us/step - loss: 0.4299
Epoch 70/400
160/160 [=====] - 0s 522us/step - loss: 0.4291
Epoch 71/400
160/160 [=====] - 0s 507us/step - loss: 0.4292
Epoch 72/400
160/160 [=====] - 0s 513us/step - loss: 0.4281
Epoch 73/400
160/160 [=====] - 0s 507us/step - loss: 0.4279
Epoch 74/400
160/160 [=====] - 0s 517us/step - loss: 0.4271
Epoch 75/400
160/160 [=====] - 0s 528us/step - loss: 0.4274
Epoch 76/400
160/160 [=====] - 0s 527us/step - loss: 0.4263
Epoch 77/400
160/160 [=====] - 0s 524us/step - loss: 0.4261
Epoch 78/400
160/160 [=====] - 0s 517us/step - loss: 0.4255
Epoch 79/400
160/160 [=====] - 0s 504us/step - loss: 0.4253
Epoch 80/400

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160/160 [=====] - 0s 519us/step - loss: 0.4244
Epoch 81/400
160/160 [=====] - 0s 506us/step - loss: 0.4247
Epoch 82/400
160/160 [=====] - 0s 511us/step - loss: 0.4239
Epoch 83/400
160/160 [=====] - 0s 509us/step - loss: 0.4234
Epoch 84/400
160/160 [=====] - 0s 513us/step - loss: 0.4229
Epoch 85/400
160/160 [=====] - 0s 505us/step - loss: 0.4228
Epoch 86/400
160/160 [=====] - 0s 528us/step - loss: 0.4224
Epoch 87/400
160/160 [=====] - 0s 502us/step - loss: 0.4217
Epoch 88/400
160/160 [=====] - 0s 519us/step - loss: 0.4216
Epoch 89/400
160/160 [=====] - 0s 507us/step - loss: 0.4211
Epoch 90/400
160/160 [=====] - 0s 576us/step - loss: 0.4206
Epoch 91/400
160/160 [=====] - 0s 516us/step - loss: 0.4204
Epoch 92/400
160/160 [=====] - 0s 519us/step - loss: 0.4200
Epoch 93/400
160/160 [=====] - 0s 512us/step - loss: 0.4205
Epoch 94/400
160/160 [=====] - 0s 500us/step - loss: 0.4193
Epoch 95/400
160/160 [=====] - 0s 515us/step - loss: 0.4189
Epoch 96/400
160/160 [=====] - 0s 519us/step - loss: 0.4184
Epoch 97/400
160/160 [=====] - 0s 517us/step - loss: 0.4176
Epoch 98/400
160/160 [=====] - 0s 507us/step - loss: 0.4178
Epoch 99/400
160/160 [=====] - 0s 523us/step - loss: 0.4175
Epoch 100/400
160/160 [=====] - 0s 512us/step - loss: 0.4170
Epoch 101/400
160/160 [=====] - 0s 519us/step - loss: 0.4170
Epoch 102/400
160/160 [=====] - 0s 520us/step - loss: 0.4164
Epoch 103/400
160/160 [=====] - 0s 496us/step - loss: 0.4162
Epoch 104/400

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160/160 [=====] - 0s 507us/step - loss: 0.4164
 Epoch 105/400
 160/160 [=====] - 0s 526us/step - loss: 0.4156
 Epoch 106/400
 160/160 [=====] - 0s 493us/step - loss: 0.4152
 Epoch 107/400
 160/160 [=====] - 0s 513us/step - loss: 0.4149
 Epoch 108/400
 160/160 [=====] - 0s 512us/step - loss: 0.4145
 Epoch 109/400
 160/160 [=====] - 0s 513us/step - loss: 0.4145
 Epoch 110/400
 160/160 [=====] - 0s 517us/step - loss: 0.4137
 Epoch 111/400
 160/160 [=====] - 0s 516us/step - loss: 0.4135
 Epoch 112/400
 160/160 [=====] - 0s 520us/step - loss: 0.4130
 Epoch 113/400
 160/160 [=====] - 0s 510us/step - loss: 0.4130
 Epoch 114/400
 160/160 [=====] - 0s 512us/step - loss: 0.4124
 Epoch 115/400
 160/160 [=====] - 0s 504us/step - loss: 0.4118
 Epoch 116/400
 160/160 [=====] - 0s 510us/step - loss: 0.4119
 Epoch 117/400
 160/160 [=====] - 0s 522us/step - loss: 0.4117
 Epoch 118/400
 160/160 [=====] - 0s 508us/step - loss: 0.4112
 Epoch 119/400
 160/160 [=====] - 0s 504us/step - loss: 0.4112
 Epoch 120/400
 160/160 [=====] - 0s 506us/step - loss: 0.4107
 Epoch 121/400
 160/160 [=====] - 0s 508us/step - loss: 0.4105
 Epoch 122/400
 160/160 [=====] - 0s 503us/step - loss: 0.4100
 Epoch 123/400
 160/160 [=====] - 0s 521us/step - loss: 0.4100
 Epoch 124/400
 160/160 [=====] - 0s 511us/step - loss: 0.4096
 Epoch 125/400
 160/160 [=====] - 0s 515us/step - loss: 0.4091
 Epoch 126/400
 160/160 [=====] - 0s 523us/step - loss: 0.4091
 Epoch 127/400
 160/160 [=====] - 0s 519us/step - loss: 0.4087
 Epoch 128/400

160/160 [=====] - 0s 513us/step - loss: 0.4089
 Epoch 129/400
 160/160 [=====] - 0s 509us/step - loss: 0.4079
 Epoch 130/400
 160/160 [=====] - 0s 518us/step - loss: 0.4076
 Epoch 131/400
 160/160 [=====] - 0s 522us/step - loss: 0.4079
 Epoch 132/400
 160/160 [=====] - 0s 516us/step - loss: 0.4074
 Epoch 133/400
 160/160 [=====] - 0s 515us/step - loss: 0.4075
 Epoch 134/400
 160/160 [=====] - 0s 510us/step - loss: 0.4068
 Epoch 135/400
 160/160 [=====] - 0s 513us/step - loss: 0.4061
 Epoch 136/400
 160/160 [=====] - 0s 510us/step - loss: 0.4067
 Epoch 137/400
 160/160 [=====] - 0s 517us/step - loss: 0.4062
 Epoch 138/400
 160/160 [=====] - 0s 509us/step - loss: 0.4058
 Epoch 139/400
 160/160 [=====] - 0s 512us/step - loss: 0.4055
 Epoch 140/400
 160/160 [=====] - 0s 514us/step - loss: 0.4056
 Epoch 141/400
 160/160 [=====] - 0s 522us/step - loss: 0.4054
 Epoch 142/400
 160/160 [=====] - 0s 518us/step - loss: 0.4044
 Epoch 143/400
 160/160 [=====] - 0s 519us/step - loss: 0.4050
 Epoch 144/400
 160/160 [=====] - 0s 522us/step - loss: 0.4047
 Epoch 145/400
 160/160 [=====] - 0s 516us/step - loss: 0.4042
 Epoch 146/400
 160/160 [=====] - 0s 524us/step - loss: 0.4035
 Epoch 147/400
 160/160 [=====] - 0s 524us/step - loss: 0.4038
 Epoch 148/400
 160/160 [=====] - 0s 502us/step - loss: 0.4041
 Epoch 149/400
 160/160 [=====] - 0s 514us/step - loss: 0.4036
 Epoch 150/400
 160/160 [=====] - 0s 529us/step - loss: 0.4035
 Epoch 151/400
 160/160 [=====] - 0s 513us/step - loss: 0.4031
 Epoch 152/400

160/160 [=====] - 0s 518us/step - loss: 0.4032
Epoch 153/400
160/160 [=====] - 0s 517us/step - loss: 0.4025
Epoch 154/400
160/160 [=====] - 0s 510us/step - loss: 0.4027
Epoch 155/400
160/160 [=====] - 0s 520us/step - loss: 0.4029
Epoch 156/400
160/160 [=====] - 0s 518us/step - loss: 0.4025
Epoch 157/400
160/160 [=====] - 0s 524us/step - loss: 0.4023
Epoch 158/400
160/160 [=====] - 0s 520us/step - loss: 0.4021
Epoch 159/400
160/160 [=====] - 0s 524us/step - loss: 0.4024
Epoch 160/400
160/160 [=====] - 0s 506us/step - loss: 0.4019
Epoch 161/400
160/160 [=====] - 0s 523us/step - loss: 0.4017
Epoch 162/400
160/160 [=====] - 0s 519us/step - loss: 0.4015
Epoch 163/400
160/160 [=====] - 0s 537us/step - loss: 0.4011
Epoch 164/400
160/160 [=====] - 0s 515us/step - loss: 0.4014
Epoch 165/400
160/160 [=====] - 0s 517us/step - loss: 0.4011
Epoch 166/400
160/160 [=====] - 0s 506us/step - loss: 0.4010
Epoch 167/400
160/160 [=====] - 0s 513us/step - loss: 0.4011
Epoch 168/400
160/160 [=====] - 0s 519us/step - loss: 0.4005
Epoch 169/400
160/160 [=====] - 0s 518us/step - loss: 0.4002
Epoch 170/400
160/160 [=====] - 0s 526us/step - loss: 0.4004
Epoch 171/400
160/160 [=====] - 0s 521us/step - loss: 0.4003
Epoch 172/400
160/160 [=====] - 0s 520us/step - loss: 0.4005
Epoch 173/400
160/160 [=====] - 0s 499us/step - loss: 0.3991
Epoch 174/400
160/160 [=====] - 0s 499us/step - loss: 0.3999
Epoch 175/400
160/160 [=====] - 0s 506us/step - loss: 0.3997
Epoch 176/400


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160/160 [=====] - 0s 520us/step - loss: 0.3994
Epoch 177/400
160/160 [=====] - 0s 507us/step - loss: 0.3996
Epoch 178/400
160/160 [=====] - 0s 524us/step - loss: 0.3993
Epoch 179/400
160/160 [=====] - 0s 520us/step - loss: 0.3992
Epoch 180/400
160/160 [=====] - 0s 523us/step - loss: 0.3990
Epoch 181/400
160/160 [=====] - 0s 516us/step - loss: 0.3990
Epoch 182/400
160/160 [=====] - 0s 524us/step - loss: 0.3985
Epoch 183/400
160/160 [=====] - 0s 499us/step - loss: 0.3987
Epoch 184/400
160/160 [=====] - 0s 504us/step - loss: 0.3988
Epoch 185/400
160/160 [=====] - 0s 513us/step - loss: 0.3985
Epoch 186/400
160/160 [=====] - 0s 520us/step - loss: 0.3979
Epoch 187/400
160/160 [=====] - 0s 520us/step - loss: 0.3984
Epoch 188/400
160/160 [=====] - 0s 506us/step - loss: 0.3978
Epoch 189/400
160/160 [=====] - 0s 518us/step - loss: 0.3978
Epoch 190/400
160/160 [=====] - 0s 518us/step - loss: 0.3973
Epoch 191/400
160/160 [=====] - 0s 510us/step - loss: 0.3975
Epoch 192/400
160/160 [=====] - 0s 521us/step - loss: 0.3974
Epoch 193/400
160/160 [=====] - 0s 513us/step - loss: 0.3975
Epoch 194/400
160/160 [=====] - 0s 520us/step - loss: 0.3974
Epoch 195/400
160/160 [=====] - 0s 512us/step - loss: 0.3971
Epoch 196/400
160/160 [=====] - 0s 509us/step - loss: 0.3970
Epoch 197/400
160/160 [=====] - 0s 523us/step - loss: 0.3969
Epoch 198/400
160/160 [=====] - 0s 508us/step - loss: 0.3968
Epoch 199/400
160/160 [=====] - 0s 509us/step - loss: 0.3968
Epoch 200/400

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160/160 [=====] - 0s 507us/step - loss: 0.3967
Epoch 201/400
160/160 [=====] - 0s 523us/step - loss: 0.3961
Epoch 202/400
160/160 [=====] - 0s 526us/step - loss: 0.3966
Epoch 203/400
160/160 [=====] - 0s 513us/step - loss: 0.3962
Epoch 204/400
160/160 [=====] - 0s 520us/step - loss: 0.3960
Epoch 205/400
160/160 [=====] - 0s 518us/step - loss: 0.3960
Epoch 206/400
160/160 [=====] - 0s 525us/step - loss: 0.3954
Epoch 207/400
160/160 [=====] - 0s 519us/step - loss: 0.3954
Epoch 208/400
160/160 [=====] - 0s 520us/step - loss: 0.3956
Epoch 209/400
160/160 [=====] - 0s 522us/step - loss: 0.3952
Epoch 210/400
160/160 [=====] - 0s 540us/step - loss: 0.3955
Epoch 211/400
160/160 [=====] - 0s 526us/step - loss: 0.3953
Epoch 212/400
160/160 [=====] - 0s 529us/step - loss: 0.3951
Epoch 213/400
160/160 [=====] - 0s 527us/step - loss: 0.3948
Epoch 214/400
160/160 [=====] - 0s 521us/step - loss: 0.3948
Epoch 215/400
160/160 [=====] - 0s 534us/step - loss: 0.3950
Epoch 216/400
160/160 [=====] - 0s 516us/step - loss: 0.3948
Epoch 217/400
160/160 [=====] - 0s 536us/step - loss: 0.3946
Epoch 218/400
160/160 [=====] - 0s 519us/step - loss: 0.3947
Epoch 219/400
160/160 [=====] - 0s 531us/step - loss: 0.3946
Epoch 220/400
160/160 [=====] - 0s 530us/step - loss: 0.3938
Epoch 221/400
160/160 [=====] - 0s 526us/step - loss: 0.3944
Epoch 222/400
160/160 [=====] - 0s 527us/step - loss: 0.3941
Epoch 223/400
160/160 [=====] - 0s 509us/step - loss: 0.3937
Epoch 224/400

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160/160 [=====] - 0s 530us/step - loss: 0.3940
Epoch 225/400
160/160 [=====] - 0s 506us/step - loss: 0.3935
Epoch 226/400
160/160 [=====] - 0s 522us/step - loss: 0.3936
Epoch 227/400
160/160 [=====] - 0s 528us/step - loss: 0.3934
Epoch 228/400
160/160 [=====] - 0s 530us/step - loss: 0.3930
Epoch 229/400
160/160 [=====] - 0s 522us/step - loss: 0.3930
Epoch 230/400
160/160 [=====] - 0s 529us/step - loss: 0.3932
Epoch 231/400
160/160 [=====] - 0s 589us/step - loss: 0.3930
Epoch 232/400
160/160 [=====] - 0s 493us/step - loss: 0.3930
Epoch 233/400
160/160 [=====] - 0s 474us/step - loss: 0.3930
Epoch 234/400
160/160 [=====] - 0s 500us/step - loss: 0.3928
Epoch 235/400
160/160 [=====] - 0s 498us/step - loss: 0.3924
Epoch 236/400
160/160 [=====] - 0s 519us/step - loss: 0.3924
Epoch 237/400
160/160 [=====] - 0s 512us/step - loss: 0.3924
Epoch 238/400
160/160 [=====] - 0s 509us/step - loss: 0.3928
Epoch 239/400
160/160 [=====] - 0s 521us/step - loss: 0.3923
Epoch 240/400
160/160 [=====] - 0s 523us/step - loss: 0.3922
Epoch 241/400
160/160 [=====] - 0s 529us/step - loss: 0.3920
Epoch 242/400
160/160 [=====] - 0s 526us/step - loss: 0.3921
Epoch 243/400
160/160 [=====] - 0s 510us/step - loss: 0.3916
Epoch 244/400
160/160 [=====] - 0s 518us/step - loss: 0.3912
Epoch 245/400
160/160 [=====] - 0s 531us/step - loss: 0.3912
Epoch 246/400
160/160 [=====] - 0s 522us/step - loss: 0.3915
Epoch 247/400
160/160 [=====] - 0s 524us/step - loss: 0.3914
Epoch 248/400

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160/160 [=====] - 0s 528us/step - loss: 0.3911
 Epoch 249/400
 160/160 [=====] - 0s 516us/step - loss: 0.3910
 Epoch 250/400
 160/160 [=====] - 0s 529us/step - loss: 0.3909
 Epoch 251/400
 160/160 [=====] - 0s 532us/step - loss: 0.3907
 Epoch 252/400
 160/160 [=====] - 0s 517us/step - loss: 0.3910
 Epoch 253/400
 160/160 [=====] - 0s 514us/step - loss: 0.3904
 Epoch 254/400
 160/160 [=====] - 0s 509us/step - loss: 0.3908
 Epoch 255/400
 160/160 [=====] - 0s 519us/step - loss: 0.3905
 Epoch 256/400
 160/160 [=====] - 0s 517us/step - loss: 0.3905
 Epoch 257/400
 160/160 [=====] - 0s 520us/step - loss: 0.3904
 Epoch 258/400
 160/160 [=====] - 0s 554us/step - loss: 0.3901
 Epoch 259/400
 160/160 [=====] - 0s 528us/step - loss: 0.3902
 Epoch 260/400
 160/160 [=====] - 0s 534us/step - loss: 0.3900
 Epoch 261/400
 160/160 [=====] - 0s 504us/step - loss: 0.3898
 Epoch 262/400
 160/160 [=====] - 0s 499us/step - loss: 0.3898
 Epoch 263/400
 160/160 [=====] - 0s 477us/step - loss: 0.3897
 Epoch 264/400
 160/160 [=====] - 0s 517us/step - loss: 0.3895
 Epoch 265/400
 160/160 [=====] - 0s 512us/step - loss: 0.3896
 Epoch 266/400
 160/160 [=====] - 0s 516us/step - loss: 0.3894
 Epoch 267/400
 160/160 [=====] - 0s 527us/step - loss: 0.3891
 Epoch 268/400
 160/160 [=====] - 0s 521us/step - loss: 0.3892
 Epoch 269/400
 160/160 [=====] - 0s 502us/step - loss: 0.3888
 Epoch 270/400
 160/160 [=====] - 0s 536us/step - loss: 0.3891
 Epoch 271/400
 160/160 [=====] - 0s 525us/step - loss: 0.3890
 Epoch 272/400

160/160 [=====] - 0s 515us/step - loss: 0.3889
Epoch 273/400
160/160 [=====] - 0s 511us/step - loss: 0.3887
Epoch 274/400
160/160 [=====] - 0s 506us/step - loss: 0.3887
Epoch 275/400
160/160 [=====] - 0s 509us/step - loss: 0.3884
Epoch 276/400
160/160 [=====] - 0s 526us/step - loss: 0.3886
Epoch 277/400
160/160 [=====] - 0s 503us/step - loss: 0.3886
Epoch 278/400
160/160 [=====] - 0s 516us/step - loss: 0.3883
Epoch 279/400
160/160 [=====] - 0s 522us/step - loss: 0.3882
Epoch 280/400
160/160 [=====] - 0s 504us/step - loss: 0.3881
Epoch 281/400
160/160 [=====] - 0s 506us/step - loss: 0.3878
Epoch 282/400
160/160 [=====] - 0s 526us/step - loss: 0.3880
Epoch 283/400
160/160 [=====] - 0s 524us/step - loss: 0.3876
Epoch 284/400
160/160 [=====] - 0s 525us/step - loss: 0.3877
Epoch 285/400
160/160 [=====] - 0s 510us/step - loss: 0.3876
Epoch 286/400
160/160 [=====] - 0s 506us/step - loss: 0.3877
Epoch 287/400
160/160 [=====] - 0s 508us/step - loss: 0.3875
Epoch 288/400
160/160 [=====] - 0s 524us/step - loss: 0.3872
Epoch 289/400
160/160 [=====] - 0s 518us/step - loss: 0.3869
Epoch 290/400
160/160 [=====] - 0s 516us/step - loss: 0.3868
Epoch 291/400
160/160 [=====] - 0s 516us/step - loss: 0.3871
Epoch 292/400
160/160 [=====] - 0s 516us/step - loss: 0.3869
Epoch 293/400
160/160 [=====] - 0s 516us/step - loss: 0.3870
Epoch 294/400
160/160 [=====] - 0s 535us/step - loss: 0.3865
Epoch 295/400
160/160 [=====] - 0s 505us/step - loss: 0.3865
Epoch 296/400

160/160 [=====] - 0s 509us/step - loss: 0.3867
Epoch 297/400
160/160 [=====] - 0s 508us/step - loss: 0.3864
Epoch 298/400
160/160 [=====] - 0s 515us/step - loss: 0.3863
Epoch 299/400
160/160 [=====] - 0s 513us/step - loss: 0.3853
Epoch 300/400
160/160 [=====] - 0s 521us/step - loss: 0.3863
Epoch 301/400
160/160 [=====] - 0s 505us/step - loss: 0.3864
Epoch 302/400
160/160 [=====] - 0s 510us/step - loss: 0.3861
Epoch 303/400
160/160 [=====] - 0s 505us/step - loss: 0.3858
Epoch 304/400
160/160 [=====] - 0s 518us/step - loss: 0.3860
Epoch 305/400
160/160 [=====] - 0s 511us/step - loss: 0.3860
Epoch 306/400
160/160 [=====] - 0s 523us/step - loss: 0.3857
Epoch 307/400
160/160 [=====] - 0s 519us/step - loss: 0.3855
Epoch 308/400
160/160 [=====] - 0s 519us/step - loss: 0.3855
Epoch 309/400
160/160 [=====] - 0s 513us/step - loss: 0.3853
Epoch 310/400
160/160 [=====] - 0s 507us/step - loss: 0.3853
Epoch 311/400
160/160 [=====] - 0s 526us/step - loss: 0.3849
Epoch 312/400
160/160 [=====] - 0s 521us/step - loss: 0.3849
Epoch 313/400
160/160 [=====] - 0s 520us/step - loss: 0.3851
Epoch 314/400
160/160 [=====] - 0s 517us/step - loss: 0.3844
Epoch 315/400
160/160 [=====] - 0s 529us/step - loss: 0.3850
Epoch 316/400
160/160 [=====] - 0s 500us/step - loss: 0.3847
Epoch 317/400
160/160 [=====] - 0s 504us/step - loss: 0.3843
Epoch 318/400
160/160 [=====] - 0s 532us/step - loss: 0.3844
Epoch 319/400
160/160 [=====] - 0s 515us/step - loss: 0.3844
Epoch 320/400

160/160 [=====] - 0s 507us/step - loss: 0.3842
 Epoch 321/400
 160/160 [=====] - 0s 516us/step - loss: 0.3839
 Epoch 322/400
 160/160 [=====] - 0s 510us/step - loss: 0.3843
 Epoch 323/400
 160/160 [=====] - 0s 508us/step - loss: 0.3843
 Epoch 324/400
 160/160 [=====] - 0s 523us/step - loss: 0.3836
 Epoch 325/400
 160/160 [=====] - 0s 512us/step - loss: 0.3842
 Epoch 326/400
 160/160 [=====] - 0s 518us/step - loss: 0.3838
 Epoch 327/400
 160/160 [=====] - 0s 522us/step - loss: 0.3837
 Epoch 328/400
 160/160 [=====] - 0s 518us/step - loss: 0.3836
 Epoch 329/400
 160/160 [=====] - 0s 517us/step - loss: 0.3835
 Epoch 330/400
 160/160 [=====] - 0s 517us/step - loss: 0.3833
 Epoch 331/400
 160/160 [=====] - 0s 505us/step - loss: 0.3836
 Epoch 332/400
 160/160 [=====] - 0s 518us/step - loss: 0.3829
 Epoch 333/400
 160/160 [=====] - 0s 522us/step - loss: 0.3833
 Epoch 334/400
 160/160 [=====] - 0s 532us/step - loss: 0.3832
 Epoch 335/400
 160/160 [=====] - 0s 502us/step - loss: 0.3826
 Epoch 336/400
 160/160 [=====] - 0s 525us/step - loss: 0.3831
 Epoch 337/400
 160/160 [=====] - 0s 529us/step - loss: 0.3829
 Epoch 338/400
 160/160 [=====] - 0s 516us/step - loss: 0.3828
 Epoch 339/400
 160/160 [=====] - 0s 516us/step - loss: 0.3825
 Epoch 340/400
 160/160 [=====] - 0s 520us/step - loss: 0.3829
 Epoch 341/400
 160/160 [=====] - 0s 499us/step - loss: 0.3827
 Epoch 342/400
 160/160 [=====] - 0s 526us/step - loss: 0.3820
 Epoch 343/400
 160/160 [=====] - 0s 508us/step - loss: 0.3825
 Epoch 344/400

160/160 [=====] - 0s 513us/step - loss: 0.3823
 Epoch 345/400
 160/160 [=====] - 0s 532us/step - loss: 0.3824
 Epoch 346/400
 160/160 [=====] - 0s 513us/step - loss: 0.3823
 Epoch 347/400
 160/160 [=====] - 0s 532us/step - loss: 0.3821
 Epoch 348/400
 160/160 [=====] - 0s 506us/step - loss: 0.3818
 Epoch 349/400
 160/160 [=====] - 0s 519us/step - loss: 0.3820
 Epoch 350/400
 160/160 [=====] - 0s 548us/step - loss: 0.3817
 Epoch 351/400
 160/160 [=====] - 0s 526us/step - loss: 0.3819
 Epoch 352/400
 160/160 [=====] - 0s 523us/step - loss: 0.3819
 Epoch 353/400
 160/160 [=====] - 0s 519us/step - loss: 0.3816
 Epoch 354/400
 160/160 [=====] - 0s 532us/step - loss: 0.3814
 Epoch 355/400
 160/160 [=====] - 0s 515us/step - loss: 0.3812
 Epoch 356/400
 160/160 [=====] - 0s 563us/step - loss: 0.3813
 Epoch 357/400
 160/160 [=====] - 0s 533us/step - loss: 0.3811
 Epoch 358/400
 160/160 [=====] - 0s 569us/step - loss: 0.3814
 Epoch 359/400
 160/160 [=====] - 0s 594us/step - loss: 0.3812
 Epoch 360/400
 160/160 [=====] - 0s 519us/step - loss: 0.3810
 Epoch 361/400
 160/160 [=====] - 0s 514us/step - loss: 0.3810
 Epoch 362/400
 160/160 [=====] - 0s 516us/step - loss: 0.3807
 Epoch 363/400
 160/160 [=====] - 0s 527us/step - loss: 0.3807
 Epoch 364/400
 160/160 [=====] - 0s 521us/step - loss: 0.3808
 Epoch 365/400
 160/160 [=====] - 0s 530us/step - loss: 0.3806
 Epoch 366/400
 160/160 [=====] - 0s 517us/step - loss: 0.3805
 Epoch 367/400
 160/160 [=====] - 0s 504us/step - loss: 0.3800
 Epoch 368/400


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160/160 [=====] - 0s 508us/step - loss: 0.3805
Epoch 369/400
160/160 [=====] - 0s 530us/step - loss: 0.3802
Epoch 370/400
160/160 [=====] - 0s 515us/step - loss: 0.3800
Epoch 371/400
160/160 [=====] - 0s 521us/step - loss: 0.3801
Epoch 372/400
160/160 [=====] - 0s 519us/step - loss: 0.3805
Epoch 373/400
160/160 [=====] - 0s 521us/step - loss: 0.3802
Epoch 374/400
160/160 [=====] - 0s 514us/step - loss: 0.3799
Epoch 375/400
160/160 [=====] - 0s 525us/step - loss: 0.3802
Epoch 376/400
160/160 [=====] - 0s 514us/step - loss: 0.3799
Epoch 377/400
160/160 [=====] - 0s 528us/step - loss: 0.3796
Epoch 378/400
160/160 [=====] - 0s 494us/step - loss: 0.3797
Epoch 379/400
160/160 [=====] - 0s 488us/step - loss: 0.3796
Epoch 380/400
160/160 [=====] - 0s 486us/step - loss: 0.3793
Epoch 381/400
160/160 [=====] - 0s 541us/step - loss: 0.3793
Epoch 382/400
160/160 [=====] - 0s 526us/step - loss: 0.3794
Epoch 383/400
160/160 [=====] - 0s 508us/step - loss: 0.3793
Epoch 384/400
160/160 [=====] - 0s 513us/step - loss: 0.3793
Epoch 385/400
160/160 [=====] - 0s 507us/step - loss: 0.3789
Epoch 386/400
160/160 [=====] - 0s 518us/step - loss: 0.3792
Epoch 387/400
160/160 [=====] - 0s 514us/step - loss: 0.3792
Epoch 388/400
160/160 [=====] - 0s 514us/step - loss: 0.3790
Epoch 389/400
160/160 [=====] - 0s 518us/step - loss: 0.3786
Epoch 390/400
160/160 [=====] - 0s 504us/step - loss: 0.3786
Epoch 391/400
160/160 [=====] - 0s 516us/step - loss: 0.3785
Epoch 392/400

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160/160 [=====] - 0s 516us/step - loss: 0.3786
Epoch 393/400
160/160 [=====] - 0s 515us/step - loss: 0.3783
Epoch 394/400
160/160 [=====] - 0s 510us/step - loss: 0.3787
Epoch 395/400
160/160 [=====] - 0s 523us/step - loss: 0.3784
Epoch 396/400
160/160 [=====] - 0s 498us/step - loss: 0.3783
Epoch 397/400
160/160 [=====] - 0s 521us/step - loss: 0.3784
Epoch 398/400
160/160 [=====] - 0s 515us/step - loss: 0.3781
Epoch 399/400
160/160 [=====] - 0s 514us/step - loss: 0.3778
Epoch 400/400
160/160 [=====] - 0s 511us/step - loss: 0.3780
160/160 [=====] - 0s 1ms/step
Epoch 1/400
160/160 [=====] - 0s 2ms/step - loss: 0.7276
Epoch 2/400
160/160 [=====] - 0s 556us/step - loss: 0.7126
Epoch 3/400
160/160 [=====] - 0s 566us/step - loss: 0.7049
Epoch 4/400
160/160 [=====] - 0s 524us/step - loss: 0.7016
Epoch 5/400
160/160 [=====] - 0s 564us/step - loss: 0.6991
Epoch 6/400
160/160 [=====] - 0s 564us/step - loss: 0.6970
Epoch 7/400
160/160 [=====] - 0s 558us/step - loss: 0.6951
Epoch 8/400
160/160 [=====] - 0s 560us/step - loss: 0.6936
Epoch 9/400
160/160 [=====] - 0s 560us/step - loss: 0.6919
Epoch 10/400
160/160 [=====] - 0s 551us/step - loss: 0.6901
Epoch 11/400
160/160 [=====] - 0s 565us/step - loss: 0.6886
Epoch 12/400
160/160 [=====] - 0s 569us/step - loss: 0.6869
Epoch 13/400
160/160 [=====] - 0s 577us/step - loss: 0.6849
Epoch 14/400
160/160 [=====] - 0s 507us/step - loss: 0.6834
Epoch 15/400
160/160 [=====] - 0s 518us/step - loss: 0.6814

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Epoch 16/400
160/160 [=====] - 0s 540us/step - loss: 0.6797
Epoch 17/400
160/160 [=====] - 0s 575us/step - loss: 0.6776
Epoch 18/400
160/160 [=====] - 0s 550us/step - loss: 0.6757
Epoch 19/400
160/160 [=====] - 0s 562us/step - loss: 0.6738
Epoch 20/400
160/160 [=====] - 0s 561us/step - loss: 0.6718
Epoch 21/400
160/160 [=====] - 0s 559us/step - loss: 0.6696
Epoch 22/400
160/160 [=====] - 0s 569us/step - loss: 0.6673
Epoch 23/400
160/160 [=====] - 0s 532us/step - loss: 0.6648
Epoch 24/400
160/160 [=====] - 0s 535us/step - loss: 0.6621
Epoch 25/400
160/160 [=====] - 0s 542us/step - loss: 0.6595
Epoch 26/400
160/160 [=====] - 0s 524us/step - loss: 0.6564
Epoch 27/400
160/160 [=====] - 0s 538us/step - loss: 0.6536
Epoch 28/400
160/160 [=====] - 0s 550us/step - loss: 0.6504
Epoch 29/400
160/160 [=====] - 0s 553us/step - loss: 0.6470
Epoch 30/400
160/160 [=====] - 0s 570us/step - loss: 0.6439
Epoch 31/400
160/160 [=====] - 0s 567us/step - loss: 0.6402
Epoch 32/400
160/160 [=====] - 0s 560us/step - loss: 0.6362
Epoch 33/400
160/160 [=====] - 0s 552us/step - loss: 0.6320
Epoch 34/400
160/160 [=====] - 0s 575us/step - loss: 0.6279
Epoch 35/400
160/160 [=====] - 0s 543us/step - loss: 0.6233
Epoch 36/400
160/160 [=====] - 0s 562us/step - loss: 0.6182
Epoch 37/400
160/160 [=====] - 0s 564us/step - loss: 0.6129
Epoch 38/400
160/160 [=====] - 0s 553us/step - loss: 0.6072
Epoch 39/400
160/160 [=====] - 0s 541us/step - loss: 0.6014

Epoch 40/400
160/160 [=====] - 0s 524us/step - loss: 0.5949
Epoch 41/400
160/160 [=====] - 0s 544us/step - loss: 0.5883
Epoch 42/400
160/160 [=====] - 0s 568us/step - loss: 0.5813
Epoch 43/400
160/160 [=====] - 0s 550us/step - loss: 0.5736
Epoch 44/400
160/160 [=====] - 0s 560us/step - loss: 0.5659
Epoch 45/400
160/160 [=====] - 0s 565us/step - loss: 0.5576
Epoch 46/400
160/160 [=====] - 0s 570us/step - loss: 0.5490
Epoch 47/400
160/160 [=====] - 0s 568us/step - loss: 0.5399
Epoch 48/400
160/160 [=====] - 0s 547us/step - loss: 0.5300
Epoch 49/400
160/160 [=====] - 0s 570us/step - loss: 0.5205
Epoch 50/400
160/160 [=====] - 0s 564us/step - loss: 0.5104
Epoch 51/400
160/160 [=====] - 0s 555us/step - loss: 0.4999
Epoch 52/400
160/160 [=====] - 0s 559us/step - loss: 0.4888
Epoch 53/400
160/160 [=====] - 0s 560us/step - loss: 0.4779
Epoch 54/400
160/160 [=====] - 0s 539us/step - loss: 0.4667
Epoch 55/400
160/160 [=====] - 0s 515us/step - loss: 0.4553
Epoch 56/400
160/160 [=====] - 0s 550us/step - loss: 0.4438
Epoch 57/400
160/160 [=====] - 0s 567us/step - loss: 0.4322
Epoch 58/400
160/160 [=====] - 0s 565us/step - loss: 0.4208
Epoch 59/400
160/160 [=====] - 0s 555us/step - loss: 0.4090
Epoch 60/400
160/160 [=====] - 0s 564us/step - loss: 0.3974
Epoch 61/400
160/160 [=====] - 0s 533us/step - loss: 0.3861
Epoch 62/400
160/160 [=====] - 0s 566us/step - loss: 0.3748
Epoch 63/400
160/160 [=====] - 0s 556us/step - loss: 0.3640

Epoch 64/400
160/160 [=====] - 0s 552us/step - loss: 0.3535
Epoch 65/400
160/160 [=====] - 0s 545us/step - loss: 0.3428
Epoch 66/400
160/160 [=====] - 0s 561us/step - loss: 0.3336
Epoch 67/400
160/160 [=====] - 0s 550us/step - loss: 0.3238
Epoch 68/400
160/160 [=====] - 0s 564us/step - loss: 0.3139
Epoch 69/400
160/160 [=====] - 0s 556us/step - loss: 0.3054
Epoch 70/400
160/160 [=====] - 0s 543us/step - loss: 0.2967
Epoch 71/400
160/160 [=====] - 0s 577us/step - loss: 0.2887
Epoch 72/400
160/160 [=====] - 0s 556us/step - loss: 0.2806
Epoch 73/400
160/160 [=====] - 0s 559us/step - loss: 0.2724
Epoch 74/400
160/160 [=====] - 0s 559us/step - loss: 0.2656
Epoch 75/400
160/160 [=====] - 0s 545us/step - loss: 0.2583
Epoch 76/400
160/160 [=====] - 0s 556us/step - loss: 0.2521
Epoch 77/400
160/160 [=====] - 0s 551us/step - loss: 0.2454
Epoch 78/400
160/160 [=====] - 0s 564us/step - loss: 0.2394
Epoch 79/400
160/160 [=====] - 0s 546us/step - loss: 0.2333
Epoch 80/400
160/160 [=====] - 0s 557us/step - loss: 0.2276
Epoch 81/400
160/160 [=====] - 0s 561us/step - loss: 0.2224
Epoch 82/400
160/160 [=====] - 0s 538us/step - loss: 0.2172
Epoch 83/400
160/160 [=====] - 0s 562us/step - loss: 0.2121
Epoch 84/400
160/160 [=====] - 0s 568us/step - loss: 0.2073
Epoch 85/400
160/160 [=====] - 0s 557us/step - loss: 0.2029
Epoch 86/400
160/160 [=====] - 0s 555us/step - loss: 0.1983
Epoch 87/400
160/160 [=====] - 0s 555us/step - loss: 0.1944

Epoch 88/400
160/160 [=====] - 0s 558us/step - loss: 0.1901
Epoch 89/400
160/160 [=====] - 0s 581us/step - loss: 0.1861
Epoch 90/400
160/160 [=====] - 0s 558us/step - loss: 0.1826
Epoch 91/400
160/160 [=====] - 0s 566us/step - loss: 0.1782
Epoch 92/400
160/160 [=====] - 0s 555us/step - loss: 0.1751
Epoch 93/400
160/160 [=====] - 0s 565us/step - loss: 0.1715
Epoch 94/400
160/160 [=====] - 0s 567us/step - loss: 0.1679
Epoch 95/400
160/160 [=====] - 0s 559us/step - loss: 0.1653
Epoch 96/400
160/160 [=====] - 0s 558us/step - loss: 0.1621
Epoch 97/400
160/160 [=====] - 0s 561us/step - loss: 0.1585
Epoch 98/400
160/160 [=====] - 0s 554us/step - loss: 0.1558
Epoch 99/400
160/160 [=====] - 0s 559us/step - loss: 0.1528
Epoch 100/400
160/160 [=====] - 0s 561us/step - loss: 0.1501
Epoch 101/400
160/160 [=====] - 0s 567us/step - loss: 0.1479
Epoch 102/400
160/160 [=====] - 0s 558us/step - loss: 0.1448
Epoch 103/400
160/160 [=====] - 0s 573us/step - loss: 0.1420
Epoch 104/400
160/160 [=====] - 0s 562us/step - loss: 0.1402
Epoch 105/400
160/160 [=====] - 0s 568us/step - loss: 0.1379
Epoch 106/400
160/160 [=====] - 0s 578us/step - loss: 0.1354
Epoch 107/400
160/160 [=====] - 0s 522us/step - loss: 0.1335
Epoch 108/400
160/160 [=====] - 0s 565us/step - loss: 0.1310
Epoch 109/400
160/160 [=====] - 0s 573us/step - loss: 0.1290
Epoch 110/400
160/160 [=====] - 0s 566us/step - loss: 0.1271
Epoch 111/400
160/160 [=====] - 0s 555us/step - loss: 0.1250

Epoch 112/400
160/160 [=====] - 0s 572us/step - loss: 0.1230
Epoch 113/400
160/160 [=====] - 0s 538us/step - loss: 0.1213
Epoch 114/400
160/160 [=====] - 0s 555us/step - loss: 0.1195
Epoch 115/400
160/160 [=====] - 0s 562us/step - loss: 0.1178
Epoch 116/400
160/160 [=====] - 0s 550us/step - loss: 0.1164
Epoch 117/400
160/160 [=====] - 0s 564us/step - loss: 0.1145
Epoch 118/400
160/160 [=====] - 0s 572us/step - loss: 0.1129
Epoch 119/400
160/160 [=====] - 0s 561us/step - loss: 0.1116
Epoch 120/400
160/160 [=====] - 0s 557us/step - loss: 0.1101
Epoch 121/400
160/160 [=====] - 0s 569us/step - loss: 0.1086
Epoch 122/400
160/160 [=====] - 0s 537us/step - loss: 0.1072
Epoch 123/400
160/160 [=====] - 0s 582us/step - loss: 0.1057
Epoch 124/400
160/160 [=====] - 0s 564us/step - loss: 0.1043
Epoch 125/400
160/160 [=====] - 0s 564us/step - loss: 0.1033
Epoch 126/400
160/160 [=====] - 0s 557us/step - loss: 0.1018
Epoch 127/400
160/160 [=====] - 0s 553us/step - loss: 0.1004
Epoch 128/400
160/160 [=====] - 0s 568us/step - loss: 0.0995
Epoch 129/400
160/160 [=====] - 0s 561us/step - loss: 0.0986
Epoch 130/400
160/160 [=====] - 0s 561us/step - loss: 0.0971
Epoch 131/400
160/160 [=====] - 0s 558us/step - loss: 0.0964
Epoch 132/400
160/160 [=====] - 0s 556us/step - loss: 0.0946
Epoch 133/400
160/160 [=====] - 0s 564us/step - loss: 0.0941
Epoch 134/400
160/160 [=====] - 0s 581us/step - loss: 0.0929
Epoch 135/400
160/160 [=====] - 0s 567us/step - loss: 0.0918

Epoch 136/400
160/160 [=====] - 0s 560us/step - loss: 0.0910
Epoch 137/400
160/160 [=====] - 0s 567us/step - loss: 0.0896
Epoch 138/400
160/160 [=====] - 0s 532us/step - loss: 0.0891
Epoch 139/400
160/160 [=====] - 0s 532us/step - loss: 0.0868
Epoch 140/400
160/160 [=====] - 0s 549us/step - loss: 0.0872
Epoch 141/400
160/160 [=====] - 0s 565us/step - loss: 0.0867
Epoch 142/400
160/160 [=====] - 0s 564us/step - loss: 0.0855
Epoch 143/400
160/160 [=====] - 0s 572us/step - loss: 0.0844
Epoch 144/400
160/160 [=====] - 0s 566us/step - loss: 0.0835
Epoch 145/400
160/160 [=====] - 0s 580us/step - loss: 0.0825
Epoch 146/400
160/160 [=====] - 0s 552us/step - loss: 0.0825
Epoch 147/400
160/160 [=====] - 0s 572us/step - loss: 0.0811
Epoch 148/400
160/160 [=====] - 0s 547us/step - loss: 0.0810
Epoch 149/400
160/160 [=====] - 0s 571us/step - loss: 0.0800
Epoch 150/400
160/160 [=====] - 0s 562us/step - loss: 0.0790
Epoch 151/400
160/160 [=====] - 0s 563us/step - loss: 0.0772
Epoch 152/400
160/160 [=====] - 0s 556us/step - loss: 0.0782
Epoch 153/400
160/160 [=====] - 0s 552us/step - loss: 0.0761
Epoch 154/400
160/160 [=====] - 0s 565us/step - loss: 0.0773
Epoch 155/400
160/160 [=====] - 0s 544us/step - loss: 0.0764
Epoch 156/400
160/160 [=====] - 0s 588us/step - loss: 0.0754
Epoch 157/400
160/160 [=====] - 0s 535us/step - loss: 0.0752
Epoch 158/400
160/160 [=====] - 0s 557us/step - loss: 0.0745
Epoch 159/400
160/160 [=====] - 0s 532us/step - loss: 0.0736

Epoch 160/400
160/160 [=====] - 0s 544us/step - loss: 0.0736
Epoch 161/400
160/160 [=====] - 0s 548us/step - loss: 0.0713
Epoch 162/400
160/160 [=====] - 0s 568us/step - loss: 0.0718
Epoch 163/400
160/160 [=====] - 0s 545us/step - loss: 0.0718
Epoch 164/400
160/160 [=====] - 0s 583us/step - loss: 0.0691
Epoch 165/400
160/160 [=====] - 0s 542us/step - loss: 0.0708
Epoch 166/400
160/160 [=====] - 0s 563us/step - loss: 0.0695
Epoch 167/400
160/160 [=====] - 0s 574us/step - loss: 0.0701
Epoch 168/400
160/160 [=====] - 0s 560us/step - loss: 0.0691
Epoch 169/400
160/160 [=====] - 0s 558us/step - loss: 0.0692
Epoch 170/400
160/160 [=====] - 0s 561us/step - loss: 0.0682
Epoch 171/400
160/160 [=====] - 0s 565us/step - loss: 0.0673
Epoch 172/400
160/160 [=====] - 0s 558us/step - loss: 0.0676
Epoch 173/400
160/160 [=====] - 0s 559us/step - loss: 0.0667
Epoch 174/400
160/160 [=====] - 0s 563us/step - loss: 0.0662
Epoch 175/400
160/160 [=====] - 0s 531us/step - loss: 0.0658
Epoch 176/400
160/160 [=====] - 0s 557us/step - loss: 0.0641
Epoch 177/400
160/160 [=====] - 0s 572us/step - loss: 0.0631
Epoch 178/400
160/160 [=====] - 0s 550us/step - loss: 0.0639
Epoch 179/400
160/160 [=====] - 0s 579us/step - loss: 0.0632
Epoch 180/400
160/160 [=====] - 0s 557us/step - loss: 0.0633
Epoch 181/400
160/160 [=====] - 0s 566us/step - loss: 0.0622
Epoch 182/400
160/160 [=====] - 0s 558us/step - loss: 0.0607
Epoch 183/400
160/160 [=====] - 0s 553us/step - loss: 0.0623

Epoch 184/400
160/160 [=====] - 0s 557us/step - loss: 0.0607
Epoch 185/400
160/160 [=====] - 0s 563us/step - loss: 0.0610
Epoch 186/400
160/160 [=====] - 0s 551us/step - loss: 0.0618
Epoch 187/400
160/160 [=====] - 0s 557us/step - loss: 0.0605
Epoch 188/400
160/160 [=====] - 0s 558us/step - loss: 0.0596
Epoch 189/400
160/160 [=====] - 0s 569us/step - loss: 0.0599
Epoch 190/400
160/160 [=====] - 0s 570us/step - loss: 0.0595
Epoch 191/400
160/160 [=====] - 0s 563us/step - loss: 0.0594
Epoch 192/400
160/160 [=====] - 0s 552us/step - loss: 0.0583
Epoch 193/400
160/160 [=====] - 0s 550us/step - loss: 0.0597
Epoch 194/400
160/160 [=====] - 0s 558us/step - loss: 0.0591
Epoch 195/400
160/160 [=====] - 0s 557us/step - loss: 0.0584
Epoch 196/400
160/160 [=====] - 0s 599us/step - loss: 0.0580
Epoch 197/400
160/160 [=====] - 0s 583us/step - loss: 0.0574
Epoch 198/400
160/160 [=====] - 0s 563us/step - loss: 0.0562
Epoch 199/400
160/160 [=====] - 0s 564us/step - loss: 0.0560
Epoch 200/400
160/160 [=====] - 0s 556us/step - loss: 0.0570
Epoch 201/400
160/160 [=====] - 0s 570us/step - loss: 0.0577
Epoch 202/400
160/160 [=====] - 0s 549us/step - loss: 0.0565
Epoch 203/400
160/160 [=====] - 0s 562us/step - loss: 0.0553
Epoch 204/400
160/160 [=====] - 0s 566us/step - loss: 0.0548
Epoch 205/400
160/160 [=====] - 0s 554us/step - loss: 0.0555
Epoch 206/400
160/160 [=====] - 0s 566us/step - loss: 0.0559
Epoch 207/400
160/160 [=====] - 0s 560us/step - loss: 0.0548

Epoch 208/400
160/160 [=====] - 0s 567us/step - loss: 0.0554
Epoch 209/400
160/160 [=====] - 0s 563us/step - loss: 0.0539
Epoch 210/400
160/160 [=====] - 0s 561us/step - loss: 0.0528
Epoch 211/400
160/160 [=====] - 0s 562us/step - loss: 0.0537
Epoch 212/400
160/160 [=====] - 0s 571us/step - loss: 0.0535
Epoch 213/400
160/160 [=====] - 0s 548us/step - loss: 0.0522
Epoch 214/400
160/160 [=====] - 0s 576us/step - loss: 0.0537
Epoch 215/400
160/160 [=====] - 0s 566us/step - loss: 0.0537
Epoch 216/400
160/160 [=====] - 0s 566us/step - loss: 0.0534
Epoch 217/400
160/160 [=====] - 0s 560us/step - loss: 0.0527
Epoch 218/400
160/160 [=====] - 0s 568us/step - loss: 0.0522
Epoch 219/400
160/160 [=====] - 0s 548us/step - loss: 0.0525
Epoch 220/400
160/160 [=====] - 0s 544us/step - loss: 0.0496
Epoch 221/400
160/160 [=====] - 0s 554us/step - loss: 0.0523
Epoch 222/400
160/160 [=====] - 0s 575us/step - loss: 0.0521
Epoch 223/400
160/160 [=====] - 0s 568us/step - loss: 0.0500
Epoch 224/400
160/160 [=====] - 0s 565us/step - loss: 0.0515
Epoch 225/400
160/160 [=====] - 0s 562us/step - loss: 0.0502
Epoch 226/400
160/160 [=====] - 0s 566us/step - loss: 0.0491
Epoch 227/400
160/160 [=====] - 0s 556us/step - loss: 0.0506
Epoch 228/400
160/160 [=====] - 0s 563us/step - loss: 0.0491
Epoch 229/400
160/160 [=====] - 0s 563us/step - loss: 0.0495
Epoch 230/400
160/160 [=====] - 0s 571us/step - loss: 0.0493
Epoch 231/400
160/160 [=====] - 0s 558us/step - loss: 0.0494

Epoch 232/400
160/160 [=====] - 0s 567us/step - loss: 0.0485
Epoch 233/400
160/160 [=====] - 0s 548us/step - loss: 0.0498
Epoch 234/400
160/160 [=====] - 0s 566us/step - loss: 0.0461
Epoch 235/400
160/160 [=====] - 0s 567us/step - loss: 0.0504
Epoch 236/400
160/160 [=====] - 0s 564us/step - loss: 0.0494
Epoch 237/400
160/160 [=====] - 0s 563us/step - loss: 0.0490
Epoch 238/400
160/160 [=====] - 0s 547us/step - loss: 0.0485
Epoch 239/400
160/160 [=====] - 0s 574us/step - loss: 0.0488
Epoch 240/400
160/160 [=====] - 0s 557us/step - loss: 0.0491
Epoch 241/400
160/160 [=====] - 0s 563us/step - loss: 0.0470
Epoch 242/400
160/160 [=====] - 0s 554us/step - loss: 0.0478
Epoch 243/400
160/160 [=====] - 0s 545us/step - loss: 0.0465
Epoch 244/400
160/160 [=====] - 0s 578us/step - loss: 0.0486
Epoch 245/400
160/160 [=====] - 0s 579us/step - loss: 0.0472
Epoch 246/400
160/160 [=====] - 0s 567us/step - loss: 0.0469
Epoch 247/400
160/160 [=====] - 0s 554us/step - loss: 0.0467
Epoch 248/400
160/160 [=====] - 0s 568us/step - loss: 0.0463
Epoch 249/400
160/160 [=====] - 0s 550us/step - loss: 0.0475
Epoch 250/400
160/160 [=====] - 0s 558us/step - loss: 0.0473
Epoch 251/400
160/160 [=====] - 0s 562us/step - loss: 0.0462
Epoch 252/400
160/160 [=====] - 0s 552us/step - loss: 0.0456
Epoch 253/400
160/160 [=====] - 0s 556us/step - loss: 0.0468
Epoch 254/400
160/160 [=====] - 0s 551us/step - loss: 0.0445
Epoch 255/400
160/160 [=====] - 0s 560us/step - loss: 0.0450

Epoch 256/400
160/160 [=====] - 0s 558us/step - loss: 0.0454
Epoch 257/400
160/160 [=====] - 0s 552us/step - loss: 0.0460
Epoch 258/400
160/160 [=====] - 0s 563us/step - loss: 0.0451
Epoch 259/400
160/160 [=====] - 0s 561us/step - loss: 0.0451
Epoch 260/400
160/160 [=====] - 0s 565us/step - loss: 0.0446
Epoch 261/400
160/160 [=====] - 0s 575us/step - loss: 0.0451
Epoch 262/400
160/160 [=====] - 0s 561us/step - loss: 0.0448
Epoch 263/400
160/160 [=====] - 0s 549us/step - loss: 0.0444
Epoch 264/400
160/160 [=====] - 0s 560us/step - loss: 0.0444
Epoch 265/400
160/160 [=====] - 0s 552us/step - loss: 0.0448
Epoch 266/400
160/160 [=====] - 0s 538us/step - loss: 0.0437
Epoch 267/400
160/160 [=====] - 0s 566us/step - loss: 0.0442
Epoch 268/400
160/160 [=====] - 0s 561us/step - loss: 0.0435
Epoch 269/400
160/160 [=====] - 0s 564us/step - loss: 0.0441
Epoch 270/400
160/160 [=====] - 0s 550us/step - loss: 0.0429
Epoch 271/400
160/160 [=====] - 0s 563us/step - loss: 0.0436
Epoch 272/400
160/160 [=====] - 0s 561us/step - loss: 0.0423
Epoch 273/400
160/160 [=====] - 0s 576us/step - loss: 0.0433
Epoch 274/400
160/160 [=====] - 0s 555us/step - loss: 0.0440
Epoch 275/400
160/160 [=====] - 0s 561us/step - loss: 0.0424
Epoch 276/400
160/160 [=====] - 0s 570us/step - loss: 0.0432
Epoch 277/400
160/160 [=====] - 0s 565us/step - loss: 0.0424
Epoch 278/400
160/160 [=====] - 0s 563us/step - loss: 0.0428
Epoch 279/400
160/160 [=====] - 0s 556us/step - loss: 0.0419

Epoch 280/400
160/160 [=====] - 0s 546us/step - loss: 0.0419
Epoch 281/400
160/160 [=====] - 0s 556us/step - loss: 0.0414
Epoch 282/400
160/160 [=====] - 0s 555us/step - loss: 0.0421
Epoch 283/400
160/160 [=====] - 0s 550us/step - loss: 0.0419
Epoch 284/400
160/160 [=====] - 0s 533us/step - loss: 0.0421
Epoch 285/400
160/160 [=====] - 0s 567us/step - loss: 0.0414
Epoch 286/400
160/160 [=====] - 0s 566us/step - loss: 0.0410
Epoch 287/400
160/160 [=====] - 0s 566us/step - loss: 0.0382
Epoch 288/400
160/160 [=====] - 0s 528us/step - loss: 0.0410
Epoch 289/400
160/160 [=====] - 0s 541us/step - loss: 0.0412
Epoch 290/400
160/160 [=====] - 0s 566us/step - loss: 0.0408
Epoch 291/400
160/160 [=====] - 0s 574us/step - loss: 0.0414
Epoch 292/400
160/160 [=====] - 0s 554us/step - loss: 0.0407
Epoch 293/400
160/160 [=====] - 0s 574us/step - loss: 0.0417
Epoch 294/400
160/160 [=====] - 0s 553us/step - loss: 0.0402
Epoch 295/400
160/160 [=====] - 0s 560us/step - loss: 0.0400
Epoch 296/400
160/160 [=====] - 0s 562us/step - loss: 0.0405
Epoch 297/400
160/160 [=====] - 0s 558us/step - loss: 0.0392
Epoch 298/400
160/160 [=====] - 0s 564us/step - loss: 0.0392
Epoch 299/400
160/160 [=====] - 0s 568us/step - loss: 0.0407
Epoch 300/400
160/160 [=====] - 0s 562us/step - loss: 0.0406
Epoch 301/400
160/160 [=====] - 0s 557us/step - loss: 0.0406
Epoch 302/400
160/160 [=====] - 0s 569us/step - loss: 0.0401
Epoch 303/400
160/160 [=====] - 0s 557us/step - loss: 0.0387

Epoch 304/400
160/160 [=====] - 0s 571us/step - loss: 0.0401
Epoch 305/400
160/160 [=====] - 0s 555us/step - loss: 0.0395
Epoch 306/400
160/160 [=====] - 0s 569us/step - loss: 0.0391
Epoch 307/400
160/160 [=====] - 0s 553us/step - loss: 0.0395
Epoch 308/400
160/160 [=====] - 0s 561us/step - loss: 0.0394
Epoch 309/400
160/160 [=====] - 0s 554us/step - loss: 0.0363
Epoch 310/400
160/160 [=====] - 0s 557us/step - loss: 0.0387
Epoch 311/400
160/160 [=====] - 0s 559us/step - loss: 0.0395
Epoch 312/400
160/160 [=====] - 0s 551us/step - loss: 0.0389
Epoch 313/400
160/160 [=====] - 0s 560us/step - loss: 0.0398
Epoch 314/400
160/160 [=====] - 0s 572us/step - loss: 0.0362
Epoch 315/400
160/160 [=====] - 0s 557us/step - loss: 0.0390
Epoch 316/400
160/160 [=====] - 0s 580us/step - loss: 0.0392
Epoch 317/400
160/160 [=====] - 0s 578us/step - loss: 0.0384
Epoch 318/400
160/160 [=====] - 0s 560us/step - loss: 0.0384
Epoch 319/400
160/160 [=====] - 0s 558us/step - loss: 0.0392
Epoch 320/400
160/160 [=====] - 0s 569us/step - loss: 0.0380
Epoch 321/400
160/160 [=====] - 0s 556us/step - loss: 0.0381
Epoch 322/400
160/160 [=====] - 0s 575us/step - loss: 0.0382
Epoch 323/400
160/160 [=====] - 0s 552us/step - loss: 0.0379
Epoch 324/400
160/160 [=====] - 0s 572us/step - loss: 0.0376
Epoch 325/400
160/160 [=====] - 0s 556us/step - loss: 0.0376
Epoch 326/400
160/160 [=====] - 0s 567us/step - loss: 0.0351
Epoch 327/400
160/160 [=====] - 0s 565us/step - loss: 0.0373

Epoch 328/400
160/160 [=====] - 0s 563us/step - loss: 0.0382
Epoch 329/400
160/160 [=====] - 0s 574us/step - loss: 0.0360
Epoch 330/400
160/160 [=====] - 0s 572us/step - loss: 0.0376
Epoch 331/400
160/160 [=====] - 0s 560us/step - loss: 0.0374
Epoch 332/400
160/160 [=====] - 0s 562us/step - loss: 0.0371
Epoch 333/400
160/160 [=====] - 0s 565us/step - loss: 0.0370
Epoch 334/400
160/160 [=====] - 0s 570us/step - loss: 0.0379
Epoch 335/400
160/160 [=====] - 0s 564us/step - loss: 0.0366
Epoch 336/400
160/160 [=====] - 0s 546us/step - loss: 0.0368
Epoch 337/400
160/160 [=====] - 0s 570us/step - loss: 0.0373
Epoch 338/400
160/160 [=====] - 0s 564us/step - loss: 0.0369
Epoch 339/400
160/160 [=====] - 0s 569us/step - loss: 0.0377
Epoch 340/400
160/160 [=====] - 0s 547us/step - loss: 0.0372
Epoch 341/400
160/160 [=====] - 0s 563us/step - loss: 0.0370
Epoch 342/400
160/160 [=====] - 0s 574us/step - loss: 0.0359
Epoch 343/400
160/160 [=====] - 0s 551us/step - loss: 0.0364
Epoch 344/400
160/160 [=====] - 0s 572us/step - loss: 0.0360
Epoch 345/400
160/160 [=====] - 0s 557us/step - loss: 0.0359
Epoch 346/400
160/160 [=====] - 0s 554us/step - loss: 0.0373
Epoch 347/400
160/160 [=====] - 0s 554us/step - loss: 0.0366
Epoch 348/400
160/160 [=====] - 0s 553us/step - loss: 0.0359
Epoch 349/400
160/160 [=====] - 0s 563us/step - loss: 0.0362
Epoch 350/400
160/160 [=====] - 0s 552us/step - loss: 0.0365
Epoch 351/400
160/160 [=====] - 0s 564us/step - loss: 0.0358

Epoch 352/400
160/160 [=====] - 0s 551us/step - loss: 0.0367
Epoch 353/400
160/160 [=====] - 0s 556us/step - loss: 0.0359
Epoch 354/400
160/160 [=====] - 0s 566us/step - loss: 0.0362
Epoch 355/400
160/160 [=====] - 0s 568us/step - loss: 0.0360
Epoch 356/400
160/160 [=====] - 0s 556us/step - loss: 0.0353
Epoch 357/400
160/160 [=====] - 0s 545us/step - loss: 0.0352
Epoch 358/400
160/160 [=====] - 0s 565us/step - loss: 0.0351
Epoch 359/400
160/160 [=====] - 0s 562us/step - loss: 0.0356
Epoch 360/400
160/160 [=====] - 0s 550us/step - loss: 0.0359
Epoch 361/400
160/160 [=====] - 0s 558us/step - loss: 0.0349
Epoch 362/400
160/160 [=====] - 0s 562us/step - loss: 0.0353
Epoch 363/400
160/160 [=====] - 0s 551us/step - loss: 0.0356
Epoch 364/400
160/160 [=====] - 0s 559us/step - loss: 0.0356
Epoch 365/400
160/160 [=====] - 0s 557us/step - loss: 0.0358
Epoch 366/400
160/160 [=====] - 0s 554us/step - loss: 0.0354
Epoch 367/400
160/160 [=====] - 0s 565us/step - loss: 0.0351
Epoch 368/400
160/160 [=====] - 0s 565us/step - loss: 0.0352
Epoch 369/400
160/160 [=====] - 0s 554us/step - loss: 0.0347
Epoch 370/400
160/160 [=====] - 0s 551us/step - loss: 0.0342
Epoch 371/400
160/160 [=====] - 0s 561us/step - loss: 0.0338
Epoch 372/400
160/160 [=====] - 0s 568us/step - loss: 0.0357
Epoch 373/400
160/160 [=====] - 0s 552us/step - loss: 0.0350
Epoch 374/400
160/160 [=====] - 0s 564us/step - loss: 0.0354
Epoch 375/400
160/160 [=====] - 0s 551us/step - loss: 0.0342

Epoch 376/400
160/160 [=====] - 0s 555us/step - loss: 0.0344
Epoch 377/400
160/160 [=====] - 0s 567us/step - loss: 0.0338
Epoch 378/400
160/160 [=====] - 0s 555us/step - loss: 0.0346
Epoch 379/400
160/160 [=====] - 0s 559us/step - loss: 0.0338
Epoch 380/400
160/160 [=====] - 0s 597us/step - loss: 0.0347
Epoch 381/400
160/160 [=====] - 0s 558us/step - loss: 0.0342
Epoch 382/400
160/160 [=====] - 0s 555us/step - loss: 0.0343
Epoch 383/400
160/160 [=====] - 0s 554us/step - loss: 0.0338
Epoch 384/400
160/160 [=====] - 0s 550us/step - loss: 0.0339
Epoch 385/400
160/160 [=====] - 0s 552us/step - loss: 0.0341
Epoch 386/400
160/160 [=====] - 0s 565us/step - loss: 0.0339
Epoch 387/400
160/160 [=====] - 0s 541us/step - loss: 0.0342
Epoch 388/400
160/160 [=====] - 0s 564us/step - loss: 0.0336
Epoch 389/400
160/160 [=====] - 0s 557us/step - loss: 0.0342
Epoch 390/400
160/160 [=====] - 0s 556us/step - loss: 0.0343
Epoch 391/400
160/160 [=====] - 0s 549us/step - loss: 0.0338
Epoch 392/400
160/160 [=====] - 0s 555us/step - loss: 0.0338
Epoch 393/400
160/160 [=====] - 0s 554us/step - loss: 0.0335
Epoch 394/400
160/160 [=====] - 0s 556us/step - loss: 0.0332
Epoch 395/400
160/160 [=====] - 0s 552us/step - loss: 0.0332
Epoch 396/400
160/160 [=====] - 0s 573us/step - loss: 0.0341
Epoch 397/400
160/160 [=====] - 0s 556us/step - loss: 0.0341
Epoch 398/400
160/160 [=====] - 0s 564us/step - loss: 0.0330
Epoch 399/400
160/160 [=====] - 0s 552us/step - loss: 0.0336

Epoch 400/400
160/160 [=====] - 0s 558us/step - loss: 0.0322
160/160 [=====] - 0s 1ms/step
Epoch 1/400
160/160 [=====] - 0s 3ms/step - loss: 0.7413
Epoch 2/400
160/160 [=====] - 0s 616us/step - loss: 0.7105
Epoch 3/400
160/160 [=====] - 0s 602us/step - loss: 0.7034
Epoch 4/400
160/160 [=====] - 0s 585us/step - loss: 0.6995
Epoch 5/400
160/160 [=====] - 0s 594us/step - loss: 0.6973
Epoch 6/400
160/160 [=====] - 0s 596us/step - loss: 0.6950
Epoch 7/400
160/160 [=====] - 0s 615us/step - loss: 0.6927
Epoch 8/400
160/160 [=====] - 0s 610us/step - loss: 0.6914
Epoch 9/400
160/160 [=====] - 0s 597us/step - loss: 0.6891
Epoch 10/400
160/160 [=====] - 0s 606us/step - loss: 0.6877
Epoch 11/400
160/160 [=====] - 0s 604us/step - loss: 0.6855
Epoch 12/400
160/160 [=====] - 0s 612us/step - loss: 0.6835
Epoch 13/400
160/160 [=====] - 0s 600us/step - loss: 0.6811
Epoch 14/400
160/160 [=====] - 0s 610us/step - loss: 0.6787
Epoch 15/400
160/160 [=====] - 0s 615us/step - loss: 0.6761
Epoch 16/400
160/160 [=====] - 0s 621us/step - loss: 0.6731
Epoch 17/400
160/160 [=====] - 0s 624us/step - loss: 0.6699
Epoch 18/400
160/160 [=====] - 0s 628us/step - loss: 0.6667
Epoch 19/400
160/160 [=====] - 0s 584us/step - loss: 0.6629
Epoch 20/400
160/160 [=====] - 0s 599us/step - loss: 0.6589
Epoch 21/400
160/160 [=====] - 0s 602us/step - loss: 0.6535
Epoch 22/400
160/160 [=====] - 0s 619us/step - loss: 0.6489
Epoch 23/400

160/160 [=====] - 0s 612us/step - loss: 0.6430
Epoch 24/400
160/160 [=====] - 0s 614us/step - loss: 0.6367
Epoch 25/400
160/160 [=====] - 0s 604us/step - loss: 0.6296
Epoch 26/400
160/160 [=====] - 0s 622us/step - loss: 0.6213
Epoch 27/400
160/160 [=====] - 0s 616us/step - loss: 0.6131
Epoch 28/400
160/160 [=====] - 0s 616us/step - loss: 0.6025
Epoch 29/400
160/160 [=====] - 0s 612us/step - loss: 0.5916
Epoch 30/400
160/160 [=====] - 0s 618us/step - loss: 0.5804
Epoch 31/400
160/160 [=====] - 0s 623us/step - loss: 0.5664
Epoch 32/400
160/160 [=====] - 0s 623us/step - loss: 0.5510
Epoch 33/400
160/160 [=====] - 0s 598us/step - loss: 0.5349
Epoch 34/400
160/160 [=====] - 0s 596us/step - loss: 0.5185
Epoch 35/400
160/160 [=====] - 0s 578us/step - loss: 0.5014
Epoch 36/400
160/160 [=====] - 0s 609us/step - loss: 0.4821
Epoch 37/400
160/160 [=====] - 0s 604us/step - loss: 0.4666
Epoch 38/400
160/160 [=====] - 0s 623us/step - loss: 0.4465
Epoch 39/400
160/160 [=====] - 0s 599us/step - loss: 0.4298
Epoch 40/400
160/160 [=====] - 0s 602us/step - loss: 0.4131
Epoch 41/400
160/160 [=====] - 0s 601us/step - loss: 0.3960
Epoch 42/400
160/160 [=====] - 0s 600us/step - loss: 0.3826
Epoch 43/400
160/160 [=====] - 0s 625us/step - loss: 0.3712
Epoch 44/400
160/160 [=====] - 0s 610us/step - loss: 0.3577
Epoch 45/400
160/160 [=====] - 0s 600us/step - loss: 0.3486
Epoch 46/400
160/160 [=====] - 0s 580us/step - loss: 0.3348
Epoch 47/400

160/160 [=====] - 0s 572us/step - loss: 0.3320
Epoch 48/400
160/160 [=====] - 0s 597us/step - loss: 0.3225
Epoch 49/400
160/160 [=====] - 0s 564us/step - loss: 0.3146
Epoch 50/400
160/160 [=====] - 0s 576us/step - loss: 0.3062
Epoch 51/400
160/160 [=====] - 0s 587us/step - loss: 0.3025
Epoch 52/400
160/160 [=====] - 0s 589us/step - loss: 0.2956
Epoch 53/400
160/160 [=====] - 0s 628us/step - loss: 0.2912
Epoch 54/400
160/160 [=====] - 0s 604us/step - loss: 0.2865
Epoch 55/400
160/160 [=====] - 0s 608us/step - loss: 0.2795
Epoch 56/400
160/160 [=====] - 0s 607us/step - loss: 0.2754
Epoch 57/400
160/160 [=====] - 0s 602us/step - loss: 0.2716
Epoch 58/400
160/160 [=====] - 0s 617us/step - loss: 0.2670
Epoch 59/400
160/160 [=====] - 0s 619us/step - loss: 0.2605
Epoch 60/400
160/160 [=====] - 0s 613us/step - loss: 0.2573
Epoch 61/400
160/160 [=====] - 0s 602us/step - loss: 0.2506
Epoch 62/400
160/160 [=====] - 0s 597us/step - loss: 0.2472
Epoch 63/400
160/160 [=====] - 0s 608us/step - loss: 0.2421
Epoch 64/400
160/160 [=====] - 0s 611us/step - loss: 0.2403
Epoch 65/400
160/160 [=====] - 0s 596us/step - loss: 0.2330
Epoch 66/400
160/160 [=====] - 0s 577us/step - loss: 0.2275
Epoch 67/400
160/160 [=====] - 0s 571us/step - loss: 0.2244
Epoch 68/400
160/160 [=====] - 0s 605us/step - loss: 0.2159
Epoch 69/400
160/160 [=====] - 0s 614us/step - loss: 0.2167
Epoch 70/400
160/160 [=====] - 0s 609us/step - loss: 0.2114
Epoch 71/400

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160/160 [=====] - 0s 569us/step - loss: 0.2063
Epoch 72/400
160/160 [=====] - 0s 574us/step - loss: 0.2018
Epoch 73/400
160/160 [=====] - 0s 600us/step - loss: 0.1991
Epoch 74/400
160/160 [=====] - 0s 616us/step - loss: 0.1918
Epoch 75/400
160/160 [=====] - 0s 602us/step - loss: 0.1866
Epoch 76/400
160/160 [=====] - 0s 637us/step - loss: 0.1840
Epoch 77/400
160/160 [=====] - 0s 599us/step - loss: 0.1761
Epoch 78/400
160/160 [=====] - 0s 597us/step - loss: 0.1733
Epoch 79/400
160/160 [=====] - 0s 633us/step - loss: 0.1685
Epoch 80/400
160/160 [=====] - 0s 589us/step - loss: 0.1685
Epoch 81/400
160/160 [=====] - 0s 616us/step - loss: 0.1628
Epoch 82/400
160/160 [=====] - 0s 596us/step - loss: 0.1635
Epoch 83/400
160/160 [=====] - 0s 598us/step - loss: 0.1549
Epoch 84/400
160/160 [=====] - 0s 602us/step - loss: 0.1531
Epoch 85/400
160/160 [=====] - 0s 607us/step - loss: 0.1479
Epoch 86/400
160/160 [=====] - 0s 587us/step - loss: 0.1413
Epoch 87/400
160/160 [=====] - 0s 617us/step - loss: 0.1441
Epoch 88/400
160/160 [=====] - 0s 618us/step - loss: 0.1368
Epoch 89/400
160/160 [=====] - 0s 597us/step - loss: 0.1347
Epoch 90/400
160/160 [=====] - 0s 607us/step - loss: 0.1255
Epoch 91/400
160/160 [=====] - 0s 599us/step - loss: 0.1263
Epoch 92/400
160/160 [=====] - 0s 609us/step - loss: 0.1255
Epoch 93/400
160/160 [=====] - 0s 612us/step - loss: 0.1236
Epoch 94/400
160/160 [=====] - 0s 603us/step - loss: 0.1195
Epoch 95/400

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160/160 [=====] - 0s 621us/step - loss: 0.1140
Epoch 96/400
160/160 [=====] - 0s 604us/step - loss: 0.1146
Epoch 97/400
160/160 [=====] - 0s 589us/step - loss: 0.1054
Epoch 98/400
160/160 [=====] - 0s 608us/step - loss: 0.1089
Epoch 99/400
160/160 [=====] - 0s 618us/step - loss: 0.1042
Epoch 100/400
160/160 [=====] - 0s 607us/step - loss: 0.1017
Epoch 101/400
160/160 [=====] - 0s 585us/step - loss: 0.0999
Epoch 102/400
160/160 [=====] - 0s 588us/step - loss: 0.0913
Epoch 103/400
160/160 [=====] - 0s 603us/step - loss: 0.0973
Epoch 104/400
160/160 [=====] - 0s 609us/step - loss: 0.0935
Epoch 105/400
160/160 [=====] - 0s 596us/step - loss: 0.0896
Epoch 106/400
160/160 [=====] - 0s 607us/step - loss: 0.0897
Epoch 107/400
160/160 [=====] - 0s 616us/step - loss: 0.0828
Epoch 108/400
160/160 [=====] - 0s 598us/step - loss: 0.0843
Epoch 109/400
160/160 [=====] - 0s 632us/step - loss: 0.0817
Epoch 110/400
160/160 [=====] - 0s 608us/step - loss: 0.0833
Epoch 111/400
160/160 [=====] - 0s 603us/step - loss: 0.0810
Epoch 112/400
160/160 [=====] - 0s 612us/step - loss: 0.0730
Epoch 113/400
160/160 [=====] - 0s 613us/step - loss: 0.0763
Epoch 114/400
160/160 [=====] - 0s 619us/step - loss: 0.0713
Epoch 115/400
160/160 [=====] - 0s 619us/step - loss: 0.0752
Epoch 116/400
160/160 [=====] - 0s 602us/step - loss: 0.0715
Epoch 117/400
160/160 [=====] - 0s 616us/step - loss: 0.0695
Epoch 118/400
160/160 [=====] - 0s 599us/step - loss: 0.0659
Epoch 119/400

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160/160 [=====] - 0s 589us/step - loss: 0.0702
Epoch 120/400
160/160 [=====] - 0s 569us/step - loss: 0.0648
Epoch 121/400
160/160 [=====] - 0s 590us/step - loss: 0.0622
Epoch 122/400
160/160 [=====] - 0s 615us/step - loss: 0.0682
Epoch 123/400
160/160 [=====] - 0s 615us/step - loss: 0.0649
Epoch 124/400
160/160 [=====] - 0s 627us/step - loss: 0.0620
Epoch 125/400
160/160 [=====] - 0s 613us/step - loss: 0.0643
Epoch 126/400
160/160 [=====] - 0s 592us/step - loss: 0.0609
Epoch 127/400
160/160 [=====] - 0s 598us/step - loss: 0.0647
Epoch 128/400
160/160 [=====] - 0s 591us/step - loss: 0.0635
Epoch 129/400
160/160 [=====] - 0s 609us/step - loss: 0.0618
Epoch 130/400
160/160 [=====] - 0s 638us/step - loss: 0.0592
Epoch 131/400
160/160 [=====] - 0s 600us/step - loss: 0.0565
Epoch 132/400
160/160 [=====] - 0s 611us/step - loss: 0.0624
Epoch 133/400
160/160 [=====] - 0s 619us/step - loss: 0.0516
Epoch 134/400
160/160 [=====] - 0s 596us/step - loss: 0.0609
Epoch 135/400
160/160 [=====] - 0s 601us/step - loss: 0.0581
Epoch 136/400
160/160 [=====] - 0s 619us/step - loss: 0.0563
Epoch 137/400
160/160 [=====] - 0s 611us/step - loss: 0.0568
Epoch 138/400
160/160 [=====] - 0s 617us/step - loss: 0.0562
Epoch 139/400
160/160 [=====] - 0s 599us/step - loss: 0.0584
Epoch 140/400
160/160 [=====] - 0s 620us/step - loss: 0.0550
Epoch 141/400
160/160 [=====] - 0s 611us/step - loss: 0.0572
Epoch 142/400
160/160 [=====] - 0s 603us/step - loss: 0.0525
Epoch 143/400

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160/160 [=====] - 0s 595us/step - loss: 0.0568
Epoch 144/400
160/160 [=====] - 0s 595us/step - loss: 0.0555
Epoch 145/400
160/160 [=====] - 0s 611us/step - loss: 0.0532
Epoch 146/400
160/160 [=====] - 0s 607us/step - loss: 0.0525
Epoch 147/400
160/160 [=====] - 0s 618us/step - loss: 0.0482
Epoch 148/400
160/160 [=====] - 0s 611us/step - loss: 0.0553
Epoch 149/400
160/160 [=====] - 0s 600us/step - loss: 0.0540
Epoch 150/400
160/160 [=====] - 0s 613us/step - loss: 0.0505
Epoch 151/400
160/160 [=====] - 0s 592us/step - loss: 0.0494
Epoch 152/400
160/160 [=====] - 0s 614us/step - loss: 0.0508
Epoch 153/400
160/160 [=====] - 0s 603us/step - loss: 0.0516
Epoch 154/400
160/160 [=====] - 0s 605us/step - loss: 0.0506
Epoch 155/400
160/160 [=====] - 0s 610us/step - loss: 0.0532
Epoch 156/400
160/160 [=====] - 0s 588us/step - loss: 0.0488
Epoch 157/400
160/160 [=====] - 0s 613us/step - loss: 0.0472
Epoch 158/400
160/160 [=====] - 0s 609us/step - loss: 0.0522
Epoch 159/400
160/160 [=====] - 0s 594us/step - loss: 0.0506
Epoch 160/400
160/160 [=====] - 0s 589us/step - loss: 0.0469
Epoch 161/400
160/160 [=====] - 0s 612us/step - loss: 0.0468
Epoch 162/400
160/160 [=====] - 0s 614us/step - loss: 0.0520
Epoch 163/400
160/160 [=====] - 0s 606us/step - loss: 0.0453
Epoch 164/400
160/160 [=====] - 0s 605us/step - loss: 0.0443
Epoch 165/400
160/160 [=====] - 0s 610us/step - loss: 0.0436
Epoch 166/400
160/160 [=====] - 0s 615us/step - loss: 0.0462
Epoch 167/400

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160/160 [=====] - 0s 610us/step - loss: 0.0517
Epoch 168/400
160/160 [=====] - 0s 619us/step - loss: 0.0484
Epoch 169/400
160/160 [=====] - 0s 617us/step - loss: 0.0512
Epoch 170/400
160/160 [=====] - 0s 595us/step - loss: 0.0491
Epoch 171/400
160/160 [=====] - 0s 618us/step - loss: 0.0521
Epoch 172/400
160/160 [=====] - 0s 613us/step - loss: 0.0496
Epoch 173/400
160/160 [=====] - 0s 612us/step - loss: 0.0517
Epoch 174/400
160/160 [=====] - 0s 607us/step - loss: 0.0426
Epoch 175/400
160/160 [=====] - 0s 602us/step - loss: 0.0450
Epoch 176/400
160/160 [=====] - 0s 609us/step - loss: 0.0489
Epoch 177/400
160/160 [=====] - 0s 595us/step - loss: 0.0426
Epoch 178/400
160/160 [=====] - 0s 597us/step - loss: 0.0431
Epoch 179/400
160/160 [=====] - 0s 625us/step - loss: 0.0432
Epoch 180/400
160/160 [=====] - 0s 594us/step - loss: 0.0470
Epoch 181/400
160/160 [=====] - 0s 616us/step - loss: 0.0461
Epoch 182/400
160/160 [=====] - 0s 579us/step - loss: 0.0460
Epoch 183/400
160/160 [=====] - 0s 576us/step - loss: 0.0436
Epoch 184/400
160/160 [=====] - 0s 601us/step - loss: 0.0508
Epoch 185/400
160/160 [=====] - 0s 705us/step - loss: 0.0495
Epoch 186/400
160/160 [=====] - 0s 679us/step - loss: 0.0408
Epoch 187/400
160/160 [=====] - 0s 637us/step - loss: 0.0461
Epoch 188/400
160/160 [=====] - 0s 626us/step - loss: 0.0342
Epoch 189/400
160/160 [=====] - 0s 616us/step - loss: 0.0480
Epoch 190/400
160/160 [=====] - 0s 601us/step - loss: 0.0470
Epoch 191/400

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160/160 [=====] - 0s 618us/step - loss: 0.0447
Epoch 192/400
160/160 [=====] - 0s 601us/step - loss: 0.0457
Epoch 193/400
160/160 [=====] - 0s 613us/step - loss: 0.0478
Epoch 194/400
160/160 [=====] - 0s 610us/step - loss: 0.0471
Epoch 195/400
160/160 [=====] - 0s 628us/step - loss: 0.0429
Epoch 196/400
160/160 [=====] - 0s 606us/step - loss: 0.0368
Epoch 197/400
160/160 [=====] - 0s 610us/step - loss: 0.0471
Epoch 198/400
160/160 [=====] - 0s 605us/step - loss: 0.0429
Epoch 199/400
160/160 [=====] - 0s 613us/step - loss: 0.0391
Epoch 200/400
160/160 [=====] - 0s 618us/step - loss: 0.0455
Epoch 201/400
160/160 [=====] - 0s 621us/step - loss: 0.0472
Epoch 202/400
160/160 [=====] - 0s 620us/step - loss: 0.0391
Epoch 203/400
160/160 [=====] - 0s 602us/step - loss: 0.0497
Epoch 204/400
160/160 [=====] - 0s 600us/step - loss: 0.0386
Epoch 205/400
160/160 [=====] - 0s 613us/step - loss: 0.0541
Epoch 206/400
160/160 [=====] - 0s 616us/step - loss: 0.0464
Epoch 207/400
160/160 [=====] - 0s 614us/step - loss: 0.0369
Epoch 208/400
160/160 [=====] - 0s 602us/step - loss: 0.0476
Epoch 209/400
160/160 [=====] - 0s 592us/step - loss: 0.0468
Epoch 210/400
160/160 [=====] - 0s 602us/step - loss: 0.0426
Epoch 211/400
160/160 [=====] - 0s 608us/step - loss: 0.0465
Epoch 212/400
160/160 [=====] - 0s 615us/step - loss: 0.0438
Epoch 213/400
160/160 [=====] - 0s 606us/step - loss: 0.0395
Epoch 214/400
160/160 [=====] - 0s 608us/step - loss: 0.0466
Epoch 215/400

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160/160 [=====] - 0s 598us/step - loss: 0.0366
Epoch 216/400
160/160 [=====] - 0s 607us/step - loss: 0.0438
Epoch 217/400
160/160 [=====] - 0s 574us/step - loss: 0.0445
Epoch 218/400
160/160 [=====] - 0s 584us/step - loss: 0.0441
Epoch 219/400
160/160 [=====] - 0s 605us/step - loss: 0.0384
Epoch 220/400
160/160 [=====] - 0s 593us/step - loss: 0.0420
Epoch 221/400
160/160 [=====] - 0s 605us/step - loss: 0.0381
Epoch 222/400
160/160 [=====] - 0s 625us/step - loss: 0.0498
Epoch 223/400
160/160 [=====] - 0s 606us/step - loss: 0.0399
Epoch 224/400
160/160 [=====] - 0s 613us/step - loss: 0.0475
Epoch 225/400
160/160 [=====] - 0s 623us/step - loss: 0.0493
Epoch 226/400
160/160 [=====] - 0s 627us/step - loss: 0.0417
Epoch 227/400
160/160 [=====] - 0s 617us/step - loss: 0.0430
Epoch 228/400
160/160 [=====] - 0s 634us/step - loss: 0.0463
Epoch 229/400
160/160 [=====] - 0s 614us/step - loss: 0.0425
Epoch 230/400
160/160 [=====] - 0s 618us/step - loss: 0.0449
Epoch 231/400
160/160 [=====] - 0s 606us/step - loss: 0.0499
Epoch 232/400
160/160 [=====] - 0s 595us/step - loss: 0.0489
Epoch 233/400
160/160 [=====] - 0s 601us/step - loss: 0.0427
Epoch 234/400
160/160 [=====] - 0s 609us/step - loss: 0.0415
Epoch 235/400
160/160 [=====] - 0s 602us/step - loss: 0.0391
Epoch 236/400
160/160 [=====] - 0s 605us/step - loss: 0.0455
Epoch 237/400
160/160 [=====] - 0s 613us/step - loss: 0.0491
Epoch 238/400
160/160 [=====] - 0s 616us/step - loss: 0.0488
Epoch 239/400

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160/160 [=====] - 0s 608us/step - loss: 0.0445
Epoch 240/400
160/160 [=====] - 0s 618us/step - loss: 0.0447
Epoch 241/400
160/160 [=====] - 0s 595us/step - loss: 0.0426
Epoch 242/400
160/160 [=====] - 0s 604us/step - loss: 0.0403
Epoch 243/400
160/160 [=====] - 0s 596us/step - loss: 0.0455
Epoch 244/400
160/160 [=====] - 0s 592us/step - loss: 0.0413
Epoch 245/400
160/160 [=====] - 0s 601us/step - loss: 0.0461
Epoch 246/400
160/160 [=====] - 0s 598us/step - loss: 0.0445
Epoch 247/400
160/160 [=====] - 0s 598us/step - loss: 0.0359
Epoch 248/400
160/160 [=====] - 0s 595us/step - loss: 0.0415
Epoch 249/400
160/160 [=====] - 0s 604us/step - loss: 0.0484
Epoch 250/400
160/160 [=====] - 0s 592us/step - loss: 0.0351
Epoch 251/400
160/160 [=====] - 0s 592us/step - loss: 0.0487
Epoch 252/400
160/160 [=====] - 0s 605us/step - loss: 0.0404
Epoch 253/400
160/160 [=====] - 0s 616us/step - loss: 0.0358
Epoch 254/400
160/160 [=====] - 0s 604us/step - loss: 0.0503
Epoch 255/400
160/160 [=====] - 0s 609us/step - loss: 0.0383
Epoch 256/400
160/160 [=====] - 0s 614us/step - loss: 0.0394
Epoch 257/400
160/160 [=====] - 0s 612us/step - loss: 0.0353
Epoch 258/400
160/160 [=====] - 0s 605us/step - loss: 0.0446
Epoch 259/400
160/160 [=====] - 0s 602us/step - loss: 0.0436
Epoch 260/400
160/160 [=====] - 0s 616us/step - loss: 0.0470
Epoch 261/400
160/160 [=====] - 0s 600us/step - loss: 0.0435
Epoch 262/400
160/160 [=====] - 0s 588us/step - loss: 0.0461
Epoch 263/400

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160/160 [=====] - 0s 603us/step - loss: 0.0483
Epoch 264/400
160/160 [=====] - 0s 609us/step - loss: 0.0426
Epoch 265/400
160/160 [=====] - 0s 612us/step - loss: 0.0354
Epoch 266/400
160/160 [=====] - 0s 611us/step - loss: 0.0521
Epoch 267/400
160/160 [=====] - 0s 607us/step - loss: 0.0465
Epoch 268/400
160/160 [=====] - 0s 606us/step - loss: 0.0463
Epoch 269/400
160/160 [=====] - 0s 595us/step - loss: 0.0399
Epoch 270/400
160/160 [=====] - 0s 616us/step - loss: 0.0502
Epoch 271/400
160/160 [=====] - 0s 623us/step - loss: 0.0308
Epoch 272/400
160/160 [=====] - 0s 618us/step - loss: 0.0453
Epoch 273/400
160/160 [=====] - 0s 612us/step - loss: 0.0405
Epoch 274/400
160/160 [=====] - 0s 615us/step - loss: 0.0346
Epoch 275/400
160/160 [=====] - 0s 615us/step - loss: 0.0381
Epoch 276/400
160/160 [=====] - 0s 615us/step - loss: 0.0384
Epoch 277/400
160/160 [=====] - 0s 613us/step - loss: 0.0424
Epoch 278/400
160/160 [=====] - 0s 601us/step - loss: 0.0422
Epoch 279/400
160/160 [=====] - 0s 598us/step - loss: 0.0438
Epoch 280/400
160/160 [=====] - 0s 598us/step - loss: 0.0403
Epoch 281/400
160/160 [=====] - 0s 599us/step - loss: 0.0478
Epoch 282/400
160/160 [=====] - 0s 621us/step - loss: 0.0406
Epoch 283/400
160/160 [=====] - 0s 612us/step - loss: 0.0424
Epoch 284/400
160/160 [=====] - 0s 586us/step - loss: 0.0448
Epoch 285/400
160/160 [=====] - 0s 617us/step - loss: 0.0472
Epoch 286/400
160/160 [=====] - 0s 613us/step - loss: 0.0397
Epoch 287/400

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160/160 [=====] - 0s 619us/step - loss: 0.0396
Epoch 288/400
160/160 [=====] - 0s 603us/step - loss: 0.0426
Epoch 289/400
160/160 [=====] - 0s 595us/step - loss: 0.0443
Epoch 290/400
160/160 [=====] - 0s 601us/step - loss: 0.0402
Epoch 291/400
160/160 [=====] - 0s 590us/step - loss: 0.0437
Epoch 292/400
160/160 [=====] - 0s 605us/step - loss: 0.0383
Epoch 293/400
160/160 [=====] - 0s 615us/step - loss: 0.0444
Epoch 294/400
160/160 [=====] - 0s 605us/step - loss: 0.0424
Epoch 295/400
160/160 [=====] - 0s 609us/step - loss: 0.0376
Epoch 296/400
160/160 [=====] - 0s 599us/step - loss: 0.0488
Epoch 297/400
160/160 [=====] - 0s 622us/step - loss: 0.0390
Epoch 298/400
160/160 [=====] - 0s 626us/step - loss: 0.0371
Epoch 299/400
160/160 [=====] - 0s 604us/step - loss: 0.0365
Epoch 300/400
160/160 [=====] - 0s 616us/step - loss: 0.0462
Epoch 301/400
160/160 [=====] - 0s 612us/step - loss: 0.0415
Epoch 302/400
160/160 [=====] - 0s 609us/step - loss: 0.0405
Epoch 303/400
160/160 [=====] - 0s 605us/step - loss: 0.0430
Epoch 304/400
160/160 [=====] - 0s 603us/step - loss: 0.0443
Epoch 305/400
160/160 [=====] - 0s 599us/step - loss: 0.0424
Epoch 306/400
160/160 [=====] - 0s 617us/step - loss: 0.0355
Epoch 307/400
160/160 [=====] - 0s 598us/step - loss: 0.0445
Epoch 308/400
160/160 [=====] - 0s 599us/step - loss: 0.0396
Epoch 309/400
160/160 [=====] - 0s 582us/step - loss: 0.0374
Epoch 310/400
160/160 [=====] - 0s 580us/step - loss: 0.0462
Epoch 311/400

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160/160 [=====] - 0s 597us/step - loss: 0.0362
 Epoch 312/400
 160/160 [=====] - 0s 613us/step - loss: 0.0455
 Epoch 313/400
 160/160 [=====] - 0s 610us/step - loss: 0.0429
 Epoch 314/400
 160/160 [=====] - 0s 608us/step - loss: 0.0464
 Epoch 315/400
 160/160 [=====] - 0s 616us/step - loss: 0.0433
 Epoch 316/400
 160/160 [=====] - 0s 612us/step - loss: 0.0334
 Epoch 317/400
 160/160 [=====] - 0s 603us/step - loss: 0.0461
 Epoch 318/400
 160/160 [=====] - 0s 615us/step - loss: 0.0430
 Epoch 319/400
 160/160 [=====] - 0s 632us/step - loss: 0.0383
 Epoch 320/400
 160/160 [=====] - 0s 597us/step - loss: 0.0380
 Epoch 321/400
 160/160 [=====] - 0s 588us/step - loss: 0.0465
 Epoch 322/400
 160/160 [=====] - 0s 615us/step - loss: 0.0463
 Epoch 323/400
 160/160 [=====] - 0s 618us/step - loss: 0.0465
 Epoch 324/400
 160/160 [=====] - 0s 615us/step - loss: 0.0417
 Epoch 325/400
 160/160 [=====] - 0s 608us/step - loss: 0.0450
 Epoch 326/400
 160/160 [=====] - 0s 598us/step - loss: 0.0411
 Epoch 327/400
 160/160 [=====] - 0s 598us/step - loss: 0.0322
 Epoch 328/400
 160/160 [=====] - 0s 625us/step - loss: 0.0455
 Epoch 329/400
 160/160 [=====] - 0s 601us/step - loss: 0.0424
 Epoch 330/400
 160/160 [=====] - 0s 613us/step - loss: 0.0330
 Epoch 331/400
 160/160 [=====] - 0s 581us/step - loss: 0.0418
 Epoch 332/400
 160/160 [=====] - 0s 605us/step - loss: 0.0399
 Epoch 333/400
 160/160 [=====] - 0s 576us/step - loss: 0.0403
 Epoch 334/400
 160/160 [=====] - 0s 616us/step - loss: 0.0370
 Epoch 335/400


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160/160 [=====] - 0s 591us/step - loss: 0.0357
Epoch 336/400
160/160 [=====] - 0s 613us/step - loss: 0.0410
Epoch 337/400
160/160 [=====] - 0s 601us/step - loss: 0.0330
Epoch 338/400
160/160 [=====] - 0s 582us/step - loss: 0.0388
Epoch 339/400
160/160 [=====] - 0s 598us/step - loss: 0.0456
Epoch 340/400
160/160 [=====] - 0s 615us/step - loss: 0.0377
Epoch 341/400
160/160 [=====] - 0s 612us/step - loss: 0.0386
Epoch 342/400
160/160 [=====] - 0s 625us/step - loss: 0.0409
Epoch 343/400
160/160 [=====] - 0s 613us/step - loss: 0.0380
Epoch 344/400
160/160 [=====] - 0s 606us/step - loss: 0.0365
Epoch 345/400
160/160 [=====] - 0s 618us/step - loss: 0.0352
Epoch 346/400
160/160 [=====] - 0s 604us/step - loss: 0.0339
Epoch 347/400
160/160 [=====] - 0s 592us/step - loss: 0.0446
Epoch 348/400
160/160 [=====] - 0s 595us/step - loss: 0.0376
Epoch 349/400
160/160 [=====] - 0s 619us/step - loss: 0.0356
Epoch 350/400
160/160 [=====] - 0s 603us/step - loss: 0.0414
Epoch 351/400
160/160 [=====] - 0s 597us/step - loss: 0.0358
Epoch 352/400
160/160 [=====] - 0s 632us/step - loss: 0.0424
Epoch 353/400
160/160 [=====] - 0s 610us/step - loss: 0.0344
Epoch 354/400
160/160 [=====] - 0s 601us/step - loss: 0.0437
Epoch 355/400
160/160 [=====] - 0s 618us/step - loss: 0.0403
Epoch 356/400
160/160 [=====] - 0s 613us/step - loss: 0.0379
Epoch 357/400
160/160 [=====] - 0s 624us/step - loss: 0.0463
Epoch 358/400
160/160 [=====] - 0s 617us/step - loss: 0.0391
Epoch 359/400

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160/160 [=====] - 0s 603us/step - loss: 0.0382
Epoch 360/400
160/160 [=====] - 0s 608us/step - loss: 0.0358
Epoch 361/400
160/160 [=====] - 0s 620us/step - loss: 0.0354
Epoch 362/400
160/160 [=====] - 0s 596us/step - loss: 0.0444
Epoch 363/400
160/160 [=====] - 0s 594us/step - loss: 0.0386
Epoch 364/400
160/160 [=====] - 0s 599us/step - loss: 0.0448
Epoch 365/400
160/160 [=====] - 0s 602us/step - loss: 0.0382
Epoch 366/400
160/160 [=====] - 0s 634us/step - loss: 0.0406
Epoch 367/400
160/160 [=====] - 0s 631us/step - loss: 0.0362
Epoch 368/400
160/160 [=====] - 0s 603us/step - loss: 0.0404
Epoch 369/400
160/160 [=====] - 0s 623us/step - loss: 0.0318
Epoch 370/400
160/160 [=====] - 0s 608us/step - loss: 0.0450
Epoch 371/400
160/160 [=====] - 0s 634us/step - loss: 0.0382
Epoch 372/400
160/160 [=====] - 0s 624us/step - loss: 0.0410
Epoch 373/400
160/160 [=====] - 0s 626us/step - loss: 0.0400
Epoch 374/400
160/160 [=====] - 0s 615us/step - loss: 0.0397
Epoch 375/400
160/160 [=====] - 0s 612us/step - loss: 0.0387
Epoch 376/400
160/160 [=====] - 0s 613us/step - loss: 0.0368
Epoch 377/400
160/160 [=====] - 0s 617us/step - loss: 0.0389
Epoch 378/400
160/160 [=====] - 0s 617us/step - loss: 0.0344
Epoch 379/400
160/160 [=====] - 0s 616us/step - loss: 0.0434
Epoch 380/400
160/160 [=====] - 0s 616us/step - loss: 0.0375
Epoch 381/400
160/160 [=====] - 0s 627us/step - loss: 0.0384
Epoch 382/400
160/160 [=====] - 0s 638us/step - loss: 0.0362
Epoch 383/400

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160/160 [=====] - 0s 604us/step - loss: 0.0333
Epoch 384/400
160/160 [=====] - 0s 614us/step - loss: 0.0366
Epoch 385/400
160/160 [=====] - 0s 620us/step - loss: 0.0392
Epoch 386/400
160/160 [=====] - 0s 626us/step - loss: 0.0387
Epoch 387/400
160/160 [=====] - 0s 606us/step - loss: 0.0371
Epoch 388/400
160/160 [=====] - 0s 621us/step - loss: 0.0375
Epoch 389/400
160/160 [=====] - 0s 608us/step - loss: 0.0424
Epoch 390/400
160/160 [=====] - 0s 616us/step - loss: 0.0359
Epoch 391/400
160/160 [=====] - 0s 610us/step - loss: 0.0420
Epoch 392/400
160/160 [=====] - 0s 603us/step - loss: 0.0361
Epoch 393/400
160/160 [=====] - 0s 606us/step - loss: 0.0403
Epoch 394/400
160/160 [=====] - 0s 616us/step - loss: 0.0388
Epoch 395/400
160/160 [=====] - 0s 616us/step - loss: 0.0349
Epoch 396/400
160/160 [=====] - 0s 610us/step - loss: 0.0454
Epoch 397/400
160/160 [=====] - 0s 602us/step - loss: 0.0344
Epoch 398/400
160/160 [=====] - 0s 616us/step - loss: 0.0348
Epoch 399/400
160/160 [=====] - 0s 619us/step - loss: 0.0414
Epoch 400/400
160/160 [=====] - 0s 642us/step - loss: 0.0384
160/160 [=====] - 0s 1ms/step
Epoch 1/400
160/160 [=====] - 0s 3ms/step - loss: 0.6942
Epoch 2/400
160/160 [=====] - 0s 688us/step - loss: 0.6931
Epoch 3/400
160/160 [=====] - 0s 681us/step - loss: 0.6922
Epoch 4/400
160/160 [=====] - 0s 669us/step - loss: 0.6920
Epoch 5/400
160/160 [=====] - 0s 669us/step - loss: 0.6924
Epoch 6/400
160/160 [=====] - 0s 686us/step - loss: 0.6933

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Epoch 7/400
160/160 [=====] - 0s 675us/step - loss: 0.6918
Epoch 8/400
160/160 [=====] - 0s 713us/step - loss: 0.6919
Epoch 9/400
160/160 [=====] - 0s 719us/step - loss: 0.6912
Epoch 10/400
160/160 [=====] - 0s 805us/step - loss: 0.6915
Epoch 11/400
160/160 [=====] - 0s 697us/step - loss: 0.6908
Epoch 12/400
160/160 [=====] - 0s 678us/step - loss: 0.6906
Epoch 13/400
160/160 [=====] - 0s 671us/step - loss: 0.6908
Epoch 14/400
160/160 [=====] - 0s 680us/step - loss: 0.6901
Epoch 15/400
160/160 [=====] - 0s 721us/step - loss: 0.6901
Epoch 16/400
160/160 [=====] - 0s 701us/step - loss: 0.6880
Epoch 17/400
160/160 [=====] - 0s 671us/step - loss: 0.6904
Epoch 18/400
160/160 [=====] - 0s 682us/step - loss: 0.6901
Epoch 19/400
160/160 [=====] - 0s 643us/step - loss: 0.6889
Epoch 20/400
160/160 [=====] - 0s 659us/step - loss: 0.6885
Epoch 21/400
160/160 [=====] - 0s 643us/step - loss: 0.6884
Epoch 22/400
160/160 [=====] - 0s 645us/step - loss: 0.6881
Epoch 23/400
160/160 [=====] - 0s 687us/step - loss: 0.6864
Epoch 24/400
160/160 [=====] - 0s 679us/step - loss: 0.6871
Epoch 25/400
160/160 [=====] - 0s 667us/step - loss: 0.6862
Epoch 26/400
160/160 [=====] - 0s 661us/step - loss: 0.6851
Epoch 27/400
160/160 [=====] - 0s 668us/step - loss: 0.6852
Epoch 28/400
160/160 [=====] - 0s 669us/step - loss: 0.6844
Epoch 29/400
160/160 [=====] - 0s 667us/step - loss: 0.6828
Epoch 30/400
160/160 [=====] - 0s 667us/step - loss: 0.6825

Epoch 31/400
160/160 [=====] - 0s 669us/step - loss: 0.6817
Epoch 32/400
160/160 [=====] - 0s 670us/step - loss: 0.6790
Epoch 33/400
160/160 [=====] - 0s 667us/step - loss: 0.6800
Epoch 34/400
160/160 [=====] - 0s 672us/step - loss: 0.6777
Epoch 35/400
160/160 [=====] - 0s 659us/step - loss: 0.6759
Epoch 36/400
160/160 [=====] - 0s 675us/step - loss: 0.6748
Epoch 37/400
160/160 [=====] - 0s 661us/step - loss: 0.6726
Epoch 38/400
160/160 [=====] - 0s 677us/step - loss: 0.6709
Epoch 39/400
160/160 [=====] - 0s 673us/step - loss: 0.6690
Epoch 40/400
160/160 [=====] - 0s 659us/step - loss: 0.6660
Epoch 41/400
160/160 [=====] - 0s 695us/step - loss: 0.6643
Epoch 42/400
160/160 [=====] - 0s 678us/step - loss: 0.6600
Epoch 43/400
160/160 [=====] - 0s 666us/step - loss: 0.6571
Epoch 44/400
160/160 [=====] - 0s 675us/step - loss: 0.6528
Epoch 45/400
160/160 [=====] - 0s 657us/step - loss: 0.6493
Epoch 46/400
160/160 [=====] - 0s 689us/step - loss: 0.6416
Epoch 47/400
160/160 [=====] - 0s 695us/step - loss: 0.6375
Epoch 48/400
160/160 [=====] - 0s 664us/step - loss: 0.6328
Epoch 49/400
160/160 [=====] - 0s 666us/step - loss: 0.6252
Epoch 50/400
160/160 [=====] - 0s 659us/step - loss: 0.6180
Epoch 51/400
160/160 [=====] - 0s 657us/step - loss: 0.6045
Epoch 52/400
160/160 [=====] - 0s 644us/step - loss: 0.5971
Epoch 53/400
160/160 [=====] - 0s 668us/step - loss: 0.5864
Epoch 54/400
160/160 [=====] - 0s 646us/step - loss: 0.5743

Epoch 55/400
160/160 [=====] - 0s 627us/step - loss: 0.5551
Epoch 56/400
160/160 [=====] - 0s 640us/step - loss: 0.5494
Epoch 57/400
160/160 [=====] - 0s 655us/step - loss: 0.5291
Epoch 58/400
160/160 [=====] - 0s 675us/step - loss: 0.5131
Epoch 59/400
160/160 [=====] - 0s 670us/step - loss: 0.4927
Epoch 60/400
160/160 [=====] - 0s 654us/step - loss: 0.4746
Epoch 61/400
160/160 [=====] - 0s 669us/step - loss: 0.4549
Epoch 62/400
160/160 [=====] - 0s 613us/step - loss: 0.4325
Epoch 63/400
160/160 [=====] - 0s 631us/step - loss: 0.4090
Epoch 64/400
160/160 [=====] - 0s 669us/step - loss: 0.3970
Epoch 65/400
160/160 [=====] - 0s 683us/step - loss: 0.3738
Epoch 66/400
160/160 [=====] - 0s 689us/step - loss: 0.3490
Epoch 67/400
160/160 [=====] - 0s 676us/step - loss: 0.3379
Epoch 68/400
160/160 [=====] - 0s 659us/step - loss: 0.3170
Epoch 69/400
160/160 [=====] - 0s 688us/step - loss: 0.3060
Epoch 70/400
160/160 [=====] - 0s 677us/step - loss: 0.2905
Epoch 71/400
160/160 [=====] - 0s 676us/step - loss: 0.2719
Epoch 72/400
160/160 [=====] - 0s 700us/step - loss: 0.2590
Epoch 73/400
160/160 [=====] - 0s 629us/step - loss: 0.2502
Epoch 74/400
160/160 [=====] - 0s 658us/step - loss: 0.2395
Epoch 75/400
160/160 [=====] - 0s 690us/step - loss: 0.2301
Epoch 76/400
160/160 [=====] - 0s 672us/step - loss: 0.2239
Epoch 77/400
160/160 [=====] - 0s 678us/step - loss: 0.2170
Epoch 78/400
160/160 [=====] - 0s 684us/step - loss: 0.2042

Epoch 79/400
160/160 [=====] - 0s 671us/step - loss: 0.2014
Epoch 80/400
160/160 [=====] - 0s 700us/step - loss: 0.2009
Epoch 81/400
160/160 [=====] - 0s 660us/step - loss: 0.1896
Epoch 82/400
160/160 [=====] - 0s 677us/step - loss: 0.1803
Epoch 83/400
160/160 [=====] - 0s 660us/step - loss: 0.1733
Epoch 84/400
160/160 [=====] - 0s 638us/step - loss: 0.1809
Epoch 85/400
160/160 [=====] - 0s 641us/step - loss: 0.1734
Epoch 86/400
160/160 [=====] - 0s 671us/step - loss: 0.1691
Epoch 87/400
160/160 [=====] - 0s 665us/step - loss: 0.1597
Epoch 88/400
160/160 [=====] - 0s 687us/step - loss: 0.1703
Epoch 89/400
160/160 [=====] - 0s 628us/step - loss: 0.1599
Epoch 90/400
160/160 [=====] - 0s 647us/step - loss: 0.1568
Epoch 91/400
160/160 [=====] - 0s 630us/step - loss: 0.1491
Epoch 92/400
160/160 [=====] - 0s 669us/step - loss: 0.1421
Epoch 93/400
160/160 [=====] - 0s 674us/step - loss: 0.1462
Epoch 94/400
160/160 [=====] - 0s 679us/step - loss: 0.1355
Epoch 95/400
160/160 [=====] - 0s 710us/step - loss: 0.1347
Epoch 96/400
160/160 [=====] - 0s 692us/step - loss: 0.1562
Epoch 97/400
160/160 [=====] - 0s 697us/step - loss: 0.1376
Epoch 98/400
160/160 [=====] - 0s 709us/step - loss: 0.1318
Epoch 99/400
160/160 [=====] - 0s 688us/step - loss: 0.1396
Epoch 100/400
160/160 [=====] - 0s 630us/step - loss: 0.1362
Epoch 101/400
160/160 [=====] - 0s 661us/step - loss: 0.1254
Epoch 102/400
160/160 [=====] - 0s 677us/step - loss: 0.1294

Epoch 103/400
160/160 [=====] - 0s 669us/step - loss: 0.1422
Epoch 104/400
160/160 [=====] - 0s 680us/step - loss: 0.1178
Epoch 105/400
160/160 [=====] - 0s 666us/step - loss: 0.1270
Epoch 106/400
160/160 [=====] - 0s 679us/step - loss: 0.1355
Epoch 107/400
160/160 [=====] - 0s 659us/step - loss: 0.1364
Epoch 108/400
160/160 [=====] - 0s 672us/step - loss: 0.1252
Epoch 109/400
160/160 [=====] - 0s 658us/step - loss: 0.1183
Epoch 110/400
160/160 [=====] - 0s 686us/step - loss: 0.1397
Epoch 111/400
160/160 [=====] - 0s 665us/step - loss: 0.1209
Epoch 112/400
160/160 [=====] - 0s 689us/step - loss: 0.1271
Epoch 113/400
160/160 [=====] - 0s 681us/step - loss: 0.1139
Epoch 114/400
160/160 [=====] - 0s 684us/step - loss: 0.1041
Epoch 115/400
160/160 [=====] - 0s 662us/step - loss: 0.1279
Epoch 116/400
160/160 [=====] - 0s 658us/step - loss: 0.1143
Epoch 117/400
160/160 [=====] - 0s 647us/step - loss: 0.1230
Epoch 118/400
160/160 [=====] - 0s 657us/step - loss: 0.0979
Epoch 119/400
160/160 [=====] - 0s 636us/step - loss: 0.1180
Epoch 120/400
160/160 [=====] - 0s 662us/step - loss: 0.1095
Epoch 121/400
160/160 [=====] - 0s 677us/step - loss: 0.1159
Epoch 122/400
160/160 [=====] - 0s 677us/step - loss: 0.1054
Epoch 123/400
160/160 [=====] - 0s 653us/step - loss: 0.0946
Epoch 124/400
160/160 [=====] - 0s 667us/step - loss: 0.1286
Epoch 125/400
160/160 [=====] - 0s 648us/step - loss: 0.1135
Epoch 126/400
160/160 [=====] - 0s 666us/step - loss: 0.1091

Epoch 127/400
160/160 [=====] - 0s 660us/step - loss: 0.1254
Epoch 128/400
160/160 [=====] - 0s 658us/step - loss: 0.1092
Epoch 129/400
160/160 [=====] - 0s 671us/step - loss: 0.1323
Epoch 130/400
160/160 [=====] - 0s 679us/step - loss: 0.1013
Epoch 131/400
160/160 [=====] - 0s 681us/step - loss: 0.1052
Epoch 132/400
160/160 [=====] - 0s 653us/step - loss: 0.0914
Epoch 133/400
160/160 [=====] - 0s 676us/step - loss: 0.0978
Epoch 134/400
160/160 [=====] - 0s 642us/step - loss: 0.0928
Epoch 135/400
160/160 [=====] - 0s 675us/step - loss: 0.0976
Epoch 136/400
160/160 [=====] - 0s 669us/step - loss: 0.0913
Epoch 137/400
160/160 [=====] - 0s 642us/step - loss: 0.1048
Epoch 138/400
160/160 [=====] - 0s 639us/step - loss: 0.0882
Epoch 139/400
160/160 [=====] - 0s 623us/step - loss: 0.1096
Epoch 140/400
160/160 [=====] - 0s 684us/step - loss: 0.1172
Epoch 141/400
160/160 [=====] - 0s 645us/step - loss: 0.0968
Epoch 142/400
160/160 [=====] - 0s 676us/step - loss: 0.1247
Epoch 143/400
160/160 [=====] - 0s 657us/step - loss: 0.0802
Epoch 144/400
160/160 [=====] - 0s 671us/step - loss: 0.0813
Epoch 145/400
160/160 [=====] - 0s 667us/step - loss: 0.1140
Epoch 146/400
160/160 [=====] - 0s 657us/step - loss: 0.0921
Epoch 147/400
160/160 [=====] - 0s 634us/step - loss: 0.0874
Epoch 148/400
160/160 [=====] - 0s 607us/step - loss: 0.1026
Epoch 149/400
160/160 [=====] - 0s 612us/step - loss: 0.0914
Epoch 150/400
160/160 [=====] - 0s 633us/step - loss: 0.1130

Epoch 151/400
160/160 [=====] - 0s 620us/step - loss: 0.1072
Epoch 152/400
160/160 [=====] - 0s 613us/step - loss: 0.0994
Epoch 153/400
160/160 [=====] - 0s 658us/step - loss: 0.0812
Epoch 154/400
160/160 [=====] - 0s 644us/step - loss: 0.0701
Epoch 155/400
160/160 [=====] - 0s 636us/step - loss: 0.0850
Epoch 156/400
160/160 [=====] - 0s 662us/step - loss: 0.0941
Epoch 157/400
160/160 [=====] - 0s 659us/step - loss: 0.0915
Epoch 158/400
160/160 [=====] - 0s 638us/step - loss: 0.0916
Epoch 159/400
160/160 [=====] - 0s 632us/step - loss: 0.0931
Epoch 160/400
160/160 [=====] - 0s 678us/step - loss: 0.0869
Epoch 161/400
160/160 [=====] - 0s 659us/step - loss: 0.0918
Epoch 162/400
160/160 [=====] - 0s 674us/step - loss: 0.0762
Epoch 163/400
160/160 [=====] - 0s 658us/step - loss: 0.1025
Epoch 164/400
160/160 [=====] - 0s 655us/step - loss: 0.0821
Epoch 165/400
160/160 [=====] - 0s 686us/step - loss: 0.0835
Epoch 166/400
160/160 [=====] - 0s 673us/step - loss: 0.0674
Epoch 167/400
160/160 [=====] - 0s 677us/step - loss: 0.0798
Epoch 168/400
160/160 [=====] - 0s 664us/step - loss: 0.0880
Epoch 169/400
160/160 [=====] - 0s 672us/step - loss: 0.0795
Epoch 170/400
160/160 [=====] - 0s 656us/step - loss: 0.0671
Epoch 171/400
160/160 [=====] - 0s 681us/step - loss: 0.0922
Epoch 172/400
160/160 [=====] - 0s 655us/step - loss: 0.0725
Epoch 173/400
160/160 [=====] - 0s 673us/step - loss: 0.0797
Epoch 174/400
160/160 [=====] - 0s 658us/step - loss: 0.0844

Epoch 175/400
160/160 [=====] - 0s 667us/step - loss: 0.0794
Epoch 176/400
160/160 [=====] - 0s 663us/step - loss: 0.0839
Epoch 177/400
160/160 [=====] - 0s 633us/step - loss: 0.0673
Epoch 178/400
160/160 [=====] - 0s 658us/step - loss: 0.0862
Epoch 179/400
160/160 [=====] - 0s 671us/step - loss: 0.0846
Epoch 180/400
160/160 [=====] - 0s 671us/step - loss: 0.0759
Epoch 181/400
160/160 [=====] - 0s 683us/step - loss: 0.0645
Epoch 182/400
160/160 [=====] - 0s 651us/step - loss: 0.0601
Epoch 183/400
160/160 [=====] - 0s 667us/step - loss: 0.0744
Epoch 184/400
160/160 [=====] - 0s 670us/step - loss: 0.0788
Epoch 185/400
160/160 [=====] - 0s 689us/step - loss: 0.0674
Epoch 186/400
160/160 [=====] - 0s 642us/step - loss: 0.0699
Epoch 187/400
160/160 [=====] - 0s 657us/step - loss: 0.0707
Epoch 188/400
160/160 [=====] - 0s 659us/step - loss: 0.0554
Epoch 189/400
160/160 [=====] - 0s 658us/step - loss: 0.0746
Epoch 190/400
160/160 [=====] - 0s 675us/step - loss: 0.0673
Epoch 191/400
160/160 [=====] - 0s 660us/step - loss: 0.0732
Epoch 192/400
160/160 [=====] - 0s 657us/step - loss: 0.0722
Epoch 193/400
160/160 [=====] - 0s 661us/step - loss: 0.0640
Epoch 194/400
160/160 [=====] - 0s 679us/step - loss: 0.0692
Epoch 195/400
160/160 [=====] - 0s 678us/step - loss: 0.0802
Epoch 196/400
160/160 [=====] - 0s 661us/step - loss: 0.0711
Epoch 197/400
160/160 [=====] - 0s 682us/step - loss: 0.0602
Epoch 198/400
160/160 [=====] - 0s 666us/step - loss: 0.0490

Epoch 199/400
160/160 [=====] - 0s 656us/step - loss: 0.0577
Epoch 200/400
160/160 [=====] - 0s 617us/step - loss: 0.0661
Epoch 201/400
160/160 [=====] - 0s 620us/step - loss: 0.0803
Epoch 202/400
160/160 [=====] - 0s 625us/step - loss: 0.0576
Epoch 203/400
160/160 [=====] - 0s 617us/step - loss: 0.0492
Epoch 204/400
160/160 [=====] - 0s 718us/step - loss: 0.0934
Epoch 205/400
160/160 [=====] - 0s 678us/step - loss: 0.0727
Epoch 206/400
160/160 [=====] - 0s 638us/step - loss: 0.0688
Epoch 207/400
160/160 [=====] - 0s 626us/step - loss: 0.0554
Epoch 208/400
160/160 [=====] - 0s 622us/step - loss: 0.0900
Epoch 209/400
160/160 [=====] - 0s 633us/step - loss: 0.0540
Epoch 210/400
160/160 [=====] - 0s 652us/step - loss: 0.0697
Epoch 211/400
160/160 [=====] - 0s 642us/step - loss: 0.0696
Epoch 212/400
160/160 [=====] - 0s 667us/step - loss: 0.0668
Epoch 213/400
160/160 [=====] - 0s 647us/step - loss: 0.0609
Epoch 214/400
160/160 [=====] - 0s 626us/step - loss: 0.0587
Epoch 215/400
160/160 [=====] - 0s 659us/step - loss: 0.0585
Epoch 216/400
160/160 [=====] - 0s 673us/step - loss: 0.0643
Epoch 217/400
160/160 [=====] - 0s 673us/step - loss: 0.0684
Epoch 218/400
160/160 [=====] - 0s 665us/step - loss: 0.0543
Epoch 219/400
160/160 [=====] - 0s 646us/step - loss: 0.0544
Epoch 220/400
160/160 [=====] - 0s 674us/step - loss: 0.0740
Epoch 221/400
160/160 [=====] - 0s 675us/step - loss: 0.0586
Epoch 222/400
160/160 [=====] - 0s 645us/step - loss: 0.0697

Epoch 223/400
160/160 [=====] - 0s 669us/step - loss: 0.0446
Epoch 224/400
160/160 [=====] - 0s 649us/step - loss: 0.0824
Epoch 225/400
160/160 [=====] - 0s 676us/step - loss: 0.0756
Epoch 226/400
160/160 [=====] - 0s 677us/step - loss: 0.0611
Epoch 227/400
160/160 [=====] - 0s 641us/step - loss: 0.0548
Epoch 228/400
160/160 [=====] - 0s 658us/step - loss: 0.0600
Epoch 229/400
160/160 [=====] - 0s 630us/step - loss: 0.0423
Epoch 230/400
160/160 [=====] - 0s 644us/step - loss: 0.0659
Epoch 231/400
160/160 [=====] - 0s 662us/step - loss: 0.0666
Epoch 232/400
160/160 [=====] - 0s 668us/step - loss: 0.0432
Epoch 233/400
160/160 [=====] - 0s 646us/step - loss: 0.0828
Epoch 234/400
160/160 [=====] - 0s 662us/step - loss: 0.0470
Epoch 235/400
160/160 [=====] - 0s 687us/step - loss: 0.0790
Epoch 236/400
160/160 [=====] - 0s 644us/step - loss: 0.0652
Epoch 237/400
160/160 [=====] - 0s 642us/step - loss: 0.0742
Epoch 238/400
160/160 [=====] - 0s 662us/step - loss: 0.0574
Epoch 239/400
160/160 [=====] - 0s 667us/step - loss: 0.0504
Epoch 240/400
160/160 [=====] - 0s 680us/step - loss: 0.0805
Epoch 241/400
160/160 [=====] - 0s 640us/step - loss: 0.0588
Epoch 242/400
160/160 [=====] - 0s 647us/step - loss: 0.0526
Epoch 243/400
160/160 [=====] - 0s 635us/step - loss: 0.0550
Epoch 244/400
160/160 [=====] - 0s 626us/step - loss: 0.0601
Epoch 245/400
160/160 [=====] - 0s 665us/step - loss: 0.0446
Epoch 246/400
160/160 [=====] - 0s 637us/step - loss: 0.0534

Epoch 247/400
160/160 [=====] - 0s 663us/step - loss: 0.0842
Epoch 248/400
160/160 [=====] - 0s 643us/step - loss: 0.0593
Epoch 249/400
160/160 [=====] - 0s 667us/step - loss: 0.0673
Epoch 250/400
160/160 [=====] - 0s 687us/step - loss: 0.0583
Epoch 251/400
160/160 [=====] - 0s 668us/step - loss: 0.0574
Epoch 252/400
160/160 [=====] - 0s 671us/step - loss: 0.0836
Epoch 253/400
160/160 [=====] - 0s 661us/step - loss: 0.0814
Epoch 254/400
160/160 [=====] - 0s 668us/step - loss: 0.0650
Epoch 255/400
160/160 [=====] - 0s 656us/step - loss: 0.0588
Epoch 256/400
160/160 [=====] - 0s 690us/step - loss: 0.0557
Epoch 257/400
160/160 [=====] - 0s 673us/step - loss: 0.0444
Epoch 258/400
160/160 [=====] - 0s 655us/step - loss: 0.0529
Epoch 259/400
160/160 [=====] - 0s 630us/step - loss: 0.0769
Epoch 260/400
160/160 [=====] - 0s 655us/step - loss: 0.0524
Epoch 261/400
160/160 [=====] - 0s 663us/step - loss: 0.0734
Epoch 262/400
160/160 [=====] - 0s 673us/step - loss: 0.0555
Epoch 263/400
160/160 [=====] - 0s 662us/step - loss: 0.0508
Epoch 264/400
160/160 [=====] - 0s 656us/step - loss: 0.0600
Epoch 265/400
160/160 [=====] - 0s 671us/step - loss: 0.0518
Epoch 266/400
160/160 [=====] - 0s 640us/step - loss: 0.0468
Epoch 267/400
160/160 [=====] - 0s 647us/step - loss: 0.0522
Epoch 268/400
160/160 [=====] - 0s 638us/step - loss: 0.0594
Epoch 269/400
160/160 [=====] - 0s 652us/step - loss: 0.0586
Epoch 270/400
160/160 [=====] - 0s 661us/step - loss: 0.0622

Epoch 271/400
160/160 [=====] - 0s 672us/step - loss: 0.0763
Epoch 272/400
160/160 [=====] - 0s 665us/step - loss: 0.0562
Epoch 273/400
160/160 [=====] - 0s 665us/step - loss: 0.0507
Epoch 274/400
160/160 [=====] - 0s 655us/step - loss: 0.0516
Epoch 275/400
160/160 [=====] - 0s 684us/step - loss: 0.0453
Epoch 276/400
160/160 [=====] - 0s 663us/step - loss: 0.0566
Epoch 277/400
160/160 [=====] - 0s 657us/step - loss: 0.0475
Epoch 278/400
160/160 [=====] - 0s 663us/step - loss: 0.0444
Epoch 279/400
160/160 [=====] - 0s 643us/step - loss: 0.0539
Epoch 280/400
160/160 [=====] - 0s 671us/step - loss: 0.0519
Epoch 281/400
160/160 [=====] - 0s 670us/step - loss: 0.0614
Epoch 282/400
160/160 [=====] - 0s 663us/step - loss: 0.0658
Epoch 283/400
160/160 [=====] - 0s 677us/step - loss: 0.0495
Epoch 284/400
160/160 [=====] - 0s 676us/step - loss: 0.0449
Epoch 285/400
160/160 [=====] - 0s 678us/step - loss: 0.0742
Epoch 286/400
160/160 [=====] - 0s 646us/step - loss: 0.0479
Epoch 287/400
160/160 [=====] - 0s 674us/step - loss: 0.0371
Epoch 288/400
160/160 [=====] - 0s 659us/step - loss: 0.0556
Epoch 289/400
160/160 [=====] - 0s 671us/step - loss: 0.0509
Epoch 290/400
160/160 [=====] - 0s 661us/step - loss: 0.0466
Epoch 291/400
160/160 [=====] - 0s 646us/step - loss: 0.0413
Epoch 292/400
160/160 [=====] - 0s 682us/step - loss: 0.0525
Epoch 293/400
160/160 [=====] - 0s 660us/step - loss: 0.0400
Epoch 294/400
160/160 [=====] - 0s 682us/step - loss: 0.0531

Epoch 295/400
160/160 [=====] - 0s 665us/step - loss: 0.0478
Epoch 296/400
160/160 [=====] - 0s 663us/step - loss: 0.0521
Epoch 297/400
160/160 [=====] - 0s 656us/step - loss: 0.0491
Epoch 298/400
160/160 [=====] - 0s 638us/step - loss: 0.0565
Epoch 299/400
160/160 [=====] - 0s 666us/step - loss: 0.0423
Epoch 300/400
160/160 [=====] - 0s 672us/step - loss: 0.0469
Epoch 301/400
160/160 [=====] - 0s 639us/step - loss: 0.0387
Epoch 302/400
160/160 [=====] - 0s 674us/step - loss: 0.0412
Epoch 303/400
160/160 [=====] - 0s 676us/step - loss: 0.0557
Epoch 304/400
160/160 [=====] - 0s 679us/step - loss: 0.0475
Epoch 305/400
160/160 [=====] - 0s 661us/step - loss: 0.0576
Epoch 306/400
160/160 [=====] - 0s 637us/step - loss: 0.0591
Epoch 307/400
160/160 [=====] - 0s 670us/step - loss: 0.0461
Epoch 308/400
160/160 [=====] - 0s 644us/step - loss: 0.0546
Epoch 309/400
160/160 [=====] - 0s 671us/step - loss: 0.0438
Epoch 310/400
160/160 [=====] - 0s 688us/step - loss: 0.0586
Epoch 311/400
160/160 [=====] - 0s 671us/step - loss: 0.0409
Epoch 312/400
160/160 [=====] - 0s 658us/step - loss: 0.0526
Epoch 313/400
160/160 [=====] - 0s 628us/step - loss: 0.0504
Epoch 314/400
160/160 [=====] - 0s 666us/step - loss: 0.0408
Epoch 315/400
160/160 [=====] - 0s 658us/step - loss: 0.0540
Epoch 316/400
160/160 [=====] - 0s 660us/step - loss: 0.0523
Epoch 317/400
160/160 [=====] - 0s 666us/step - loss: 0.0407
Epoch 318/400
160/160 [=====] - 0s 661us/step - loss: 0.0486

Epoch 319/400
160/160 [=====] - 0s 667us/step - loss: 0.0541
Epoch 320/400
160/160 [=====] - 0s 653us/step - loss: 0.0525
Epoch 321/400
160/160 [=====] - 0s 657us/step - loss: 0.0450
Epoch 322/400
160/160 [=====] - 0s 659us/step - loss: 0.0460
Epoch 323/400
160/160 [=====] - 0s 656us/step - loss: 0.0430
Epoch 324/400
160/160 [=====] - 0s 658us/step - loss: 0.0346
Epoch 325/400
160/160 [=====] - 0s 680us/step - loss: 0.0326
Epoch 326/400
160/160 [=====] - 0s 657us/step - loss: 0.0654
Epoch 327/400
160/160 [=====] - 0s 669us/step - loss: 0.0382
Epoch 328/400
160/160 [=====] - 0s 654us/step - loss: 0.0488
Epoch 329/400
160/160 [=====] - 0s 638us/step - loss: 0.0591
Epoch 330/400
160/160 [=====] - 0s 652us/step - loss: 0.0534
Epoch 331/400
160/160 [=====] - 0s 662us/step - loss: 0.0413
Epoch 332/400
160/160 [=====] - 0s 633us/step - loss: 0.0489
Epoch 333/400
160/160 [=====] - 0s 644us/step - loss: 0.0411
Epoch 334/400
160/160 [=====] - 0s 672us/step - loss: 0.0363
Epoch 335/400
160/160 [=====] - 0s 663us/step - loss: 0.0506
Epoch 336/400
160/160 [=====] - 0s 671us/step - loss: 0.0348
Epoch 337/400
160/160 [=====] - 0s 642us/step - loss: 0.0422
Epoch 338/400
160/160 [=====] - 0s 640us/step - loss: 0.0392
Epoch 339/400
160/160 [=====] - 0s 647us/step - loss: 0.0432
Epoch 340/400
160/160 [=====] - 0s 657us/step - loss: 0.0484
Epoch 341/400
160/160 [=====] - 0s 655us/step - loss: 0.0487
Epoch 342/400
160/160 [=====] - 0s 674us/step - loss: 0.0501

Epoch 343/400
160/160 [=====] - 0s 664us/step - loss: 0.0482
Epoch 344/400
160/160 [=====] - 0s 655us/step - loss: 0.0386
Epoch 345/400
160/160 [=====] - 0s 668us/step - loss: 0.0467
Epoch 346/400
160/160 [=====] - 0s 655us/step - loss: 0.0459
Epoch 347/400
160/160 [=====] - 0s 646us/step - loss: 0.0596
Epoch 348/400
160/160 [=====] - 0s 671us/step - loss: 0.0423
Epoch 349/400
160/160 [=====] - 0s 733us/step - loss: 0.0421
Epoch 350/400
160/160 [=====] - 0s 711us/step - loss: 0.0371
Epoch 351/400
160/160 [=====] - 0s 758us/step - loss: 0.0325
Epoch 352/400
160/160 [=====] - 0s 675us/step - loss: 0.0383
Epoch 353/400
160/160 [=====] - 0s 631us/step - loss: 0.0339
Epoch 354/400
160/160 [=====] - 0s 671us/step - loss: 0.0806
Epoch 355/400
160/160 [=====] - 0s 642us/step - loss: 0.0462
Epoch 356/400
160/160 [=====] - 0s 679us/step - loss: 0.0320
Epoch 357/400
160/160 [=====] - 0s 650us/step - loss: 0.0482
Epoch 358/400
160/160 [=====] - 0s 736us/step - loss: 0.0662
Epoch 359/400
160/160 [=====] - 0s 677us/step - loss: 0.0409
Epoch 360/400
160/160 [=====] - 0s 667us/step - loss: 0.0585
Epoch 361/400
160/160 [=====] - 0s 668us/step - loss: 0.0411
Epoch 362/400
160/160 [=====] - 0s 673us/step - loss: 0.0473
Epoch 363/400
160/160 [=====] - 0s 686us/step - loss: 0.0444
Epoch 364/400
160/160 [=====] - 0s 683us/step - loss: 0.0420
Epoch 365/400
160/160 [=====] - 0s 665us/step - loss: 0.0393
Epoch 366/400
160/160 [=====] - 0s 667us/step - loss: 0.0331

Epoch 367/400
160/160 [=====] - 0s 659us/step - loss: 0.0386
Epoch 368/400
160/160 [=====] - 0s 687us/step - loss: 0.0448
Epoch 369/400
160/160 [=====] - 0s 701us/step - loss: 0.0494
Epoch 370/400
160/160 [=====] - 0s 675us/step - loss: 0.0610
Epoch 371/400
160/160 [=====] - 0s 655us/step - loss: 0.0470
Epoch 372/400
160/160 [=====] - 0s 629us/step - loss: 0.0489
Epoch 373/400
160/160 [=====] - 0s 630us/step - loss: 0.0484
Epoch 374/400
160/160 [=====] - 0s 671us/step - loss: 0.0581
Epoch 375/400
160/160 [=====] - 0s 672us/step - loss: 0.0445
Epoch 376/400
160/160 [=====] - 0s 679us/step - loss: 0.0375
Epoch 377/400
160/160 [=====] - 0s 637us/step - loss: 0.0349
Epoch 378/400
160/160 [=====] - 0s 633us/step - loss: 0.0354
Epoch 379/400
160/160 [=====] - 0s 647us/step - loss: 0.0492
Epoch 380/400
160/160 [=====] - 0s 686us/step - loss: 0.0530
Epoch 381/400
160/160 [=====] - 0s 662us/step - loss: 0.0427
Epoch 382/400
160/160 [=====] - 0s 657us/step - loss: 0.0272
Epoch 383/400
160/160 [=====] - 0s 638us/step - loss: 0.0401
Epoch 384/400
160/160 [=====] - 0s 671us/step - loss: 0.0448
Epoch 385/400
160/160 [=====] - 0s 685us/step - loss: 0.0810
Epoch 386/400
160/160 [=====] - 0s 650us/step - loss: 0.0464
Epoch 387/400
160/160 [=====] - 0s 670us/step - loss: 0.0394
Epoch 388/400
160/160 [=====] - 0s 655us/step - loss: 0.0364
Epoch 389/400
160/160 [=====] - 0s 662us/step - loss: 0.0441
Epoch 390/400
160/160 [=====] - 0s 642us/step - loss: 0.0389

```

Epoch 391/400
160/160 [=====] - 0s 624us/step - loss: 0.0435
Epoch 392/400
160/160 [=====] - 0s 603us/step - loss: 0.0405
Epoch 393/400
160/160 [=====] - 0s 657us/step - loss: 0.0359
Epoch 394/400
160/160 [=====] - 0s 695us/step - loss: 0.0409
Epoch 395/400
160/160 [=====] - 0s 682us/step - loss: 0.0329
Epoch 396/400
160/160 [=====] - 0s 677us/step - loss: 0.0404
Epoch 397/400
160/160 [=====] - 0s 648us/step - loss: 0.0466
Epoch 398/400
160/160 [=====] - 0s 676us/step - loss: 0.0422
Epoch 399/400
160/160 [=====] - 0s 689us/step - loss: 0.0328
Epoch 400/400
160/160 [=====] - 0s 636us/step - loss: 0.0390
160/160 [=====] - 0s 1ms/step

```

```

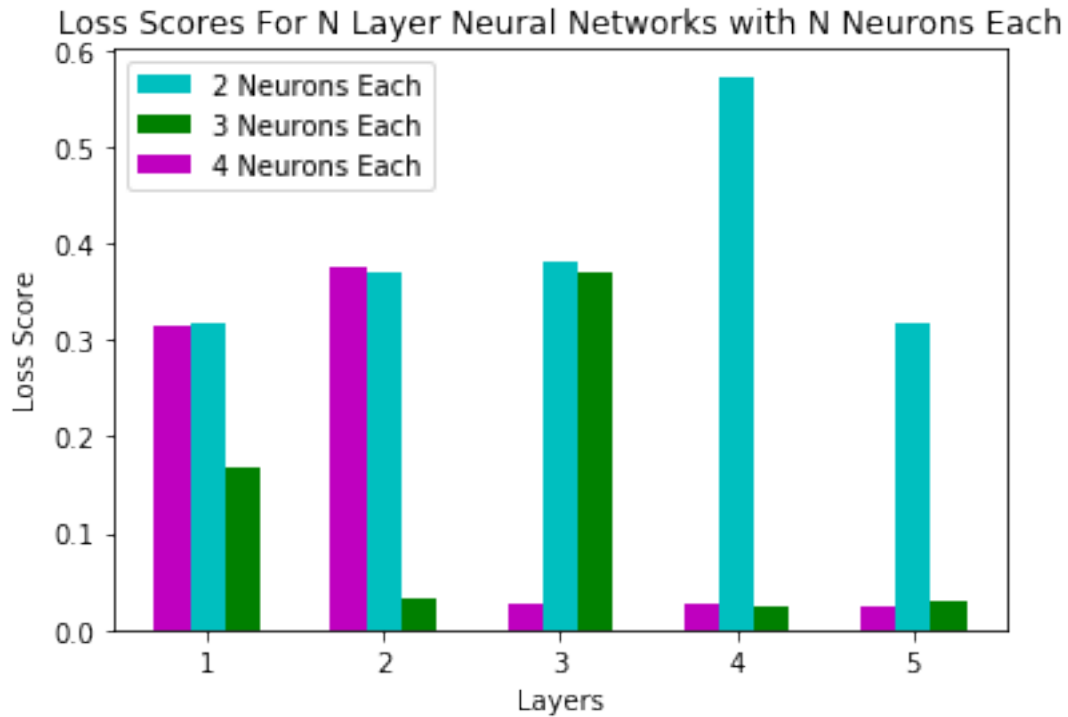
In [23]: layers3 = np.arange(1.2,6.2,1)
        layers4 = np.arange(.8,5.8,1)

```

```

plt.bar(layers, scores, width = .2, color = 'c', label = '2 Neurons Each', align = 'c')
plt.bar(layers3, scores3, width = .2, color = 'g', label = '3 Neurons Each', align = 'c')
plt.bar(layers4, scores4, width = .2, color = 'm', label = '4 Neurons Each', align = 'c')
plt.xlabel('Layers')
plt.ylabel('Loss Score')
plt.title('Loss Scores For N Layer Neural Networks with N Neurons Each')
plt.legend(loc="best")
plt.show()

```



Looking at the above graph, the 5 Layer Neural Network with 4 Neurons at each layer performs the best

1.1.3 Part 1.3

```
In [24]: ### Tanh ###
scores = []

model = Sequential()

model.add(Dense(4, input_dim=2, activation='tanh')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='tanh'))
model.add(Dense(4, input_dim = 4, activation='tanh'))
model.add(Dense(4, input_dim = 4, activation='tanh'))
model.add(Dense(4, input_dim = 4, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))
```

```

# evaluate the model
scores.append(model.evaluate(X, y))

### Sigmoid ###

model = Sequential()

model.add(Dense(4, input_dim=2, activation='sigmoid')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### relu ###

model = Sequential()

model.add(Dense(4, input_dim=2, activation='relu')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='relu'))
model.add(Dense(4, input_dim = 4, activation='relu'))
model.add(Dense(4, input_dim = 4, activation='relu'))
model.add(Dense(4, input_dim = 4, activation='relu'))
model.add(Dense(1, activation='relu'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

```

```
### softplus ###
```

```
model = Sequential()
```

```
model.add(Dense(4, input_dim=2, activation='softplus')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='softplus'))
model.add(Dense(4, input_dim = 4, activation='softplus'))
model.add(Dense(4, input_dim = 4, activation='softplus'))
model.add(Dense(4, input_dim = 4, activation='softplus'))
model.add(Dense(1, activation='softplus'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))
```

```
sgd = SGD(lr=0.1)
```

```
model.compile(loss='binary_crossentropy', optimizer='sgd')
```

```
model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))
```

```
# evaluate the model
```

```
scores.append(model.evaluate(X, y))
```

```
### exponential ###
```

```
model = Sequential()
```

```
model.add(Dense(4, input_dim=2, activation='exponential')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='exponential'))
model.add(Dense(4, input_dim = 4, activation='exponential'))
model.add(Dense(4, input_dim = 4, activation='exponential'))
model.add(Dense(4, input_dim = 4, activation='exponential'))
model.add(Dense(1, activation='exponential'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))
```

```
sgd = SGD(lr=0.1)
```

```
model.compile(loss='binary_crossentropy', optimizer='sgd')
```

```
model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))
```

```
# evaluate the model
```

```
scores.append(model.evaluate(X, y))
```

Epoch 1/400

160/160 [=====] - 0s 3ms/step - loss: 1.1993

Epoch 2/400

160/160 [=====] - 0s 684us/step - loss: 0.6560
Epoch 3/400
160/160 [=====] - 0s 673us/step - loss: 0.6190
Epoch 4/400
160/160 [=====] - 0s 693us/step - loss: 0.5894
Epoch 5/400
160/160 [=====] - 0s 710us/step - loss: 0.5153
Epoch 6/400
160/160 [=====] - 0s 711us/step - loss: 0.5125
Epoch 7/400
160/160 [=====] - 0s 716us/step - loss: 0.4757
Epoch 8/400
160/160 [=====] - 0s 746us/step - loss: 0.3987
Epoch 9/400
160/160 [=====] - 0s 709us/step - loss: 0.3826
Epoch 10/400
160/160 [=====] - 0s 718us/step - loss: 0.5702
Epoch 11/400
160/160 [=====] - 0s 720us/step - loss: 0.5126
Epoch 12/400
160/160 [=====] - 0s 706us/step - loss: 0.7957
Epoch 13/400
160/160 [=====] - 0s 733us/step - loss: 0.6192
Epoch 14/400
160/160 [=====] - 0s 756us/step - loss: 0.6849
Epoch 15/400
160/160 [=====] - 0s 764us/step - loss: 0.5884
Epoch 16/400
160/160 [=====] - 0s 729us/step - loss: 0.6657
Epoch 17/400
160/160 [=====] - 0s 715us/step - loss: 0.6320
Epoch 18/400
160/160 [=====] - 0s 783us/step - loss: 0.5293
Epoch 19/400
160/160 [=====] - 0s 779us/step - loss: 0.4136
Epoch 20/400
160/160 [=====] - 0s 721us/step - loss: 0.3598
Epoch 21/400
160/160 [=====] - 0s 690us/step - loss: 0.4399
Epoch 22/400
160/160 [=====] - 0s 664us/step - loss: 0.4416
Epoch 23/400
160/160 [=====] - 0s 673us/step - loss: 0.7641
Epoch 24/400
160/160 [=====] - 0s 694us/step - loss: 0.7291
Epoch 25/400
160/160 [=====] - 0s 645us/step - loss: 0.5479
Epoch 26/400

160/160 [=====] - 0s 691us/step - loss: 0.4889
Epoch 27/400
160/160 [=====] - 0s 680us/step - loss: 0.4122
Epoch 28/400
160/160 [=====] - 0s 666us/step - loss: 0.5181
Epoch 29/400
160/160 [=====] - 0s 647us/step - loss: 0.7992
Epoch 30/400
160/160 [=====] - 0s 734us/step - loss: 0.5125
Epoch 31/400
160/160 [=====] - 0s 676us/step - loss: 0.6497
Epoch 32/400
160/160 [=====] - 0s 610us/step - loss: 0.7312
Epoch 33/400
160/160 [=====] - 0s 633us/step - loss: 0.6328
Epoch 34/400
160/160 [=====] - 0s 651us/step - loss: 0.6732
Epoch 35/400
160/160 [=====] - 0s 622us/step - loss: 0.6568
Epoch 36/400
160/160 [=====] - 0s 624us/step - loss: 1.0008
Epoch 37/400
160/160 [=====] - 0s 643us/step - loss: 0.7300
Epoch 38/400
160/160 [=====] - 0s 603us/step - loss: 0.7039
Epoch 39/400
160/160 [=====] - 0s 723us/step - loss: 0.7043
Epoch 40/400
160/160 [=====] - 0s 704us/step - loss: 0.7082
Epoch 41/400
160/160 [=====] - 0s 711us/step - loss: 0.7137
Epoch 42/400
160/160 [=====] - 0s 726us/step - loss: 0.7086
Epoch 43/400
160/160 [=====] - 0s 750us/step - loss: 0.7128
Epoch 44/400
160/160 [=====] - 0s 711us/step - loss: 0.7151
Epoch 45/400
160/160 [=====] - 0s 699us/step - loss: 0.7079
Epoch 46/400
160/160 [=====] - 0s 748us/step - loss: 0.7190
Epoch 47/400
160/160 [=====] - 0s 657us/step - loss: 0.7005
Epoch 48/400
160/160 [=====] - 0s 671us/step - loss: 0.7084
Epoch 49/400
160/160 [=====] - 0s 707us/step - loss: 0.7100
Epoch 50/400

```

160/160 [=====] - 0s 714us/step - loss: 0.7059
Epoch 51/400
160/160 [=====] - 0s 724us/step - loss: 0.7138
Epoch 52/400
160/160 [=====] - 0s 719us/step - loss: 0.7060
Epoch 53/400
160/160 [=====] - 0s 762us/step - loss: 0.7105
Epoch 54/400
160/160 [=====] - 0s 721us/step - loss: 0.7051
Epoch 55/400
160/160 [=====] - 0s 699us/step - loss: 0.7094
Epoch 56/400
160/160 [=====] - 0s 699us/step - loss: 0.7099
Epoch 57/400
160/160 [=====] - 0s 680us/step - loss: 0.7002
Epoch 58/400
160/160 [=====] - 0s 707us/step - loss: 0.7056
Epoch 59/400
160/160 [=====] - 0s 702us/step - loss: 0.7129
Epoch 60/400
160/160 [=====] - 0s 694us/step - loss: 0.7082
Epoch 61/400
160/160 [=====] - 0s 680us/step - loss: 0.7127
Epoch 62/400
160/160 [=====] - 0s 696us/step - loss: 0.7082
Epoch 63/400
160/160 [=====] - 0s 696us/step - loss: 0.7055
Epoch 64/400
160/160 [=====] - 0s 682us/step - loss: 0.7116
Epoch 65/400
160/160 [=====] - 0s 672us/step - loss: 0.7092
Epoch 66/400
160/160 [=====] - 0s 670us/step - loss: 0.7079
Epoch 67/400
160/160 [=====] - 0s 711us/step - loss: 0.6957
Epoch 68/400
160/160 [=====] - 0s 691us/step - loss: 0.7060
Epoch 69/400
160/160 [=====] - 0s 704us/step - loss: 0.6996
Epoch 70/400
160/160 [=====] - 0s 702us/step - loss: 0.7087
Epoch 71/400
160/160 [=====] - 0s 716us/step - loss: 0.6981
Epoch 72/400
160/160 [=====] - 0s 703us/step - loss: 0.7009
Epoch 73/400
160/160 [=====] - 0s 704us/step - loss: 0.7056
Epoch 74/400

```

160/160 [=====] - 0s 696us/step - loss: 0.7005
Epoch 75/400
160/160 [=====] - 0s 669us/step - loss: 0.6978
Epoch 76/400
160/160 [=====] - 0s 618us/step - loss: 0.7053
Epoch 77/400
160/160 [=====] - 0s 643us/step - loss: 0.7051
Epoch 78/400
160/160 [=====] - 0s 710us/step - loss: 0.7035
Epoch 79/400
160/160 [=====] - 0s 694us/step - loss: 0.7041
Epoch 80/400
160/160 [=====] - 0s 703us/step - loss: 0.6906
Epoch 81/400
160/160 [=====] - 0s 704us/step - loss: 0.7047
Epoch 82/400
160/160 [=====] - 0s 701us/step - loss: 0.6956
Epoch 83/400
160/160 [=====] - 0s 686us/step - loss: 0.6973
Epoch 84/400
160/160 [=====] - 0s 681us/step - loss: 0.6943
Epoch 85/400
160/160 [=====] - 0s 709us/step - loss: 0.6835
Epoch 86/400
160/160 [=====] - 0s 715us/step - loss: 0.6808
Epoch 87/400
160/160 [=====] - 0s 755us/step - loss: 0.6822
Epoch 88/400
160/160 [=====] - 0s 743us/step - loss: 0.6761
Epoch 89/400
160/160 [=====] - 0s 720us/step - loss: 0.6702
Epoch 90/400
160/160 [=====] - 0s 707us/step - loss: 0.6661
Epoch 91/400
160/160 [=====] - 0s 710us/step - loss: 0.6620
Epoch 92/400
160/160 [=====] - 0s 708us/step - loss: 0.6392
Epoch 93/400
160/160 [=====] - 0s 708us/step - loss: 0.6430
Epoch 94/400
160/160 [=====] - 0s 685us/step - loss: 0.6401
Epoch 95/400
160/160 [=====] - 0s 706us/step - loss: 0.6324
Epoch 96/400
160/160 [=====] - 0s 738us/step - loss: 0.6274
Epoch 97/400
160/160 [=====] - 0s 726us/step - loss: 0.6186
Epoch 98/400

```

160/160 [=====] - 0s 722us/step - loss: 0.6165
Epoch 99/400
160/160 [=====] - 0s 678us/step - loss: 0.6129
Epoch 100/400
160/160 [=====] - 0s 692us/step - loss: 0.6027
Epoch 101/400
160/160 [=====] - 0s 674us/step - loss: 0.6171
Epoch 102/400
160/160 [=====] - 0s 691us/step - loss: 0.6057
Epoch 103/400
160/160 [=====] - 0s 675us/step - loss: 0.6112
Epoch 104/400
160/160 [=====] - 0s 699us/step - loss: 0.5985
Epoch 105/400
160/160 [=====] - 0s 675us/step - loss: 0.5964
Epoch 106/400
160/160 [=====] - 0s 666us/step - loss: 0.6026
Epoch 107/400
160/160 [=====] - 0s 674us/step - loss: 0.6019
Epoch 108/400
160/160 [=====] - 0s 677us/step - loss: 0.5970
Epoch 109/400
160/160 [=====] - 0s 714us/step - loss: 0.5974
Epoch 110/400
160/160 [=====] - 0s 698us/step - loss: 0.5937
Epoch 111/400
160/160 [=====] - 0s 656us/step - loss: 0.5973
Epoch 112/400
160/160 [=====] - 0s 681us/step - loss: 0.5929
Epoch 113/400
160/160 [=====] - 0s 675us/step - loss: 0.5877
Epoch 114/400
160/160 [=====] - 0s 676us/step - loss: 0.6027
Epoch 115/400
160/160 [=====] - 0s 683us/step - loss: 0.5968
Epoch 116/400
160/160 [=====] - 0s 676us/step - loss: 0.5903
Epoch 117/400
160/160 [=====] - 0s 702us/step - loss: 0.5938
Epoch 118/400
160/160 [=====] - 0s 690us/step - loss: 0.5901
Epoch 119/400
160/160 [=====] - 0s 684us/step - loss: 0.5783
Epoch 120/400
160/160 [=====] - 0s 682us/step - loss: 0.5819
Epoch 121/400
160/160 [=====] - 0s 674us/step - loss: 0.5730
Epoch 122/400

```

```

160/160 [=====] - 0s 695us/step - loss: 0.5367
Epoch 123/400
160/160 [=====] - 0s 654us/step - loss: 0.5346
Epoch 124/400
160/160 [=====] - 0s 656us/step - loss: 0.5100
Epoch 125/400
160/160 [=====] - 0s 604us/step - loss: 0.5553
Epoch 126/400
160/160 [=====] - 0s 609us/step - loss: 0.5924
Epoch 127/400
160/160 [=====] - 0s 617us/step - loss: 0.5779
Epoch 128/400
160/160 [=====] - 0s 619us/step - loss: 0.5323
Epoch 129/400
160/160 [=====] - 0s 680us/step - loss: 0.4949
Epoch 130/400
160/160 [=====] - 0s 651us/step - loss: 0.5857
Epoch 131/400
160/160 [=====] - 0s 684us/step - loss: 1.1697
Epoch 132/400
160/160 [=====] - 0s 682us/step - loss: 0.6113
Epoch 133/400
160/160 [=====] - 0s 681us/step - loss: 0.5176
Epoch 134/400
160/160 [=====] - 0s 687us/step - loss: 0.6810
Epoch 135/400
160/160 [=====] - 0s 675us/step - loss: 0.4120
Epoch 136/400
160/160 [=====] - 0s 682us/step - loss: 0.5604
Epoch 137/400
160/160 [=====] - 0s 678us/step - loss: 0.4988
Epoch 138/400
160/160 [=====] - 0s 682us/step - loss: 0.3897
Epoch 139/400
160/160 [=====] - 0s 677us/step - loss: 0.4291
Epoch 140/400
160/160 [=====] - 0s 677us/step - loss: 0.6721
Epoch 141/400
160/160 [=====] - 0s 683us/step - loss: 0.5557
Epoch 142/400
160/160 [=====] - 0s 683us/step - loss: 1.2056
Epoch 143/400
160/160 [=====] - 0s 689us/step - loss: 0.7564
Epoch 144/400
160/160 [=====] - 0s 679us/step - loss: 0.7190
Epoch 145/400
160/160 [=====] - 0s 676us/step - loss: 0.7077
Epoch 146/400

```

160/160 [=====] - 0s 678us/step - loss: 0.7042
 Epoch 147/400
 160/160 [=====] - 0s 674us/step - loss: 0.7143
 Epoch 148/400
 160/160 [=====] - 0s 755us/step - loss: 0.7089
 Epoch 149/400
 160/160 [=====] - 0s 673us/step - loss: 0.7176
 Epoch 150/400
 160/160 [=====] - 0s 674us/step - loss: 0.7140
 Epoch 151/400
 160/160 [=====] - 0s 693us/step - loss: 0.7053
 Epoch 152/400
 160/160 [=====] - 0s 673us/step - loss: 0.7024
 Epoch 153/400
 160/160 [=====] - 0s 683us/step - loss: 0.7074
 Epoch 154/400
 160/160 [=====] - 0s 683us/step - loss: 0.7108
 Epoch 155/400
 160/160 [=====] - 0s 668us/step - loss: 0.7091
 Epoch 156/400
 160/160 [=====] - 0s 685us/step - loss: 0.7147
 Epoch 157/400
 160/160 [=====] - 0s 666us/step - loss: 0.7010
 Epoch 158/400
 160/160 [=====] - 0s 686us/step - loss: 0.7095
 Epoch 159/400
 160/160 [=====] - 0s 685us/step - loss: 0.7108
 Epoch 160/400
 160/160 [=====] - 0s 673us/step - loss: 0.7005
 Epoch 161/400
 160/160 [=====] - 0s 687us/step - loss: 0.7029
 Epoch 162/400
 160/160 [=====] - 0s 674us/step - loss: 0.7092
 Epoch 163/400
 160/160 [=====] - 0s 690us/step - loss: 0.7083
 Epoch 164/400
 160/160 [=====] - 0s 675us/step - loss: 0.7074
 Epoch 165/400
 160/160 [=====] - 0s 683us/step - loss: 0.7097
 Epoch 166/400
 160/160 [=====] - 0s 669us/step - loss: 0.7083
 Epoch 167/400
 160/160 [=====] - 0s 673us/step - loss: 0.7056
 Epoch 168/400
 160/160 [=====] - 0s 665us/step - loss: 0.7071
 Epoch 169/400
 160/160 [=====] - 0s 685us/step - loss: 0.7054
 Epoch 170/400

160/160 [=====] - 0s 693us/step - loss: 0.7123
Epoch 171/400
160/160 [=====] - 0s 681us/step - loss: 0.7048
Epoch 172/400
160/160 [=====] - 0s 694us/step - loss: 0.7190
Epoch 173/400
160/160 [=====] - 0s 691us/step - loss: 0.7015
Epoch 174/400
160/160 [=====] - 0s 671us/step - loss: 0.7101
Epoch 175/400
160/160 [=====] - 0s 677us/step - loss: 0.7129
Epoch 176/400
160/160 [=====] - 0s 672us/step - loss: 0.7100
Epoch 177/400
160/160 [=====] - 0s 674us/step - loss: 0.7133
Epoch 178/400
160/160 [=====] - 0s 688us/step - loss: 0.7091
Epoch 179/400
160/160 [=====] - 0s 672us/step - loss: 0.7116
Epoch 180/400
160/160 [=====] - 0s 683us/step - loss: 0.7008
Epoch 181/400
160/160 [=====] - 0s 689us/step - loss: 0.7047
Epoch 182/400
160/160 [=====] - 0s 670us/step - loss: 0.7061
Epoch 183/400
160/160 [=====] - 0s 638us/step - loss: 0.7126
Epoch 184/400
160/160 [=====] - 0s 634us/step - loss: 0.7118
Epoch 185/400
160/160 [=====] - 0s 615us/step - loss: 0.7031
Epoch 186/400
160/160 [=====] - 0s 680us/step - loss: 0.7006
Epoch 187/400
160/160 [=====] - 0s 686us/step - loss: 0.7090
Epoch 188/400
160/160 [=====] - 0s 697us/step - loss: 0.6968
Epoch 189/400
160/160 [=====] - 0s 681us/step - loss: 0.7073
Epoch 190/400
160/160 [=====] - 0s 689us/step - loss: 0.7134
Epoch 191/400
160/160 [=====] - 0s 695us/step - loss: 0.6844
Epoch 192/400
160/160 [=====] - 0s 705us/step - loss: 0.7002
Epoch 193/400
160/160 [=====] - 0s 673us/step - loss: 0.7147
Epoch 194/400

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160/160 [=====] - 0s 674us/step - loss: 0.7112
Epoch 195/400
160/160 [=====] - 0s 663us/step - loss: 0.7093
Epoch 196/400
160/160 [=====] - 0s 695us/step - loss: 0.7047
Epoch 197/400
160/160 [=====] - 0s 688us/step - loss: 0.7051
Epoch 198/400
160/160 [=====] - 0s 655us/step - loss: 0.7128
Epoch 199/400
160/160 [=====] - 0s 666us/step - loss: 0.7075
Epoch 200/400
160/160 [=====] - 0s 684us/step - loss: 0.7101
Epoch 201/400
160/160 [=====] - 0s 666us/step - loss: 0.7112
Epoch 202/400
160/160 [=====] - 0s 684us/step - loss: 0.7109
Epoch 203/400
160/160 [=====] - 0s 681us/step - loss: 0.7066
Epoch 204/400
160/160 [=====] - 0s 679us/step - loss: 0.7093
Epoch 205/400
160/160 [=====] - 0s 679us/step - loss: 0.7062
Epoch 206/400
160/160 [=====] - 0s 695us/step - loss: 0.7089
Epoch 207/400
160/160 [=====] - 0s 683us/step - loss: 0.7041
Epoch 208/400
160/160 [=====] - 0s 672us/step - loss: 0.7000
Epoch 209/400
160/160 [=====] - 0s 679us/step - loss: 0.7124
Epoch 210/400
160/160 [=====] - 0s 662us/step - loss: 0.7120
Epoch 211/400
160/160 [=====] - 0s 682us/step - loss: 0.7086
Epoch 212/400
160/160 [=====] - 0s 661us/step - loss: 0.6977
Epoch 213/400
160/160 [=====] - 0s 668us/step - loss: 0.7114
Epoch 214/400
160/160 [=====] - 0s 681us/step - loss: 0.7065
Epoch 215/400
160/160 [=====] - 0s 671us/step - loss: 0.7114
Epoch 216/400
160/160 [=====] - 0s 664us/step - loss: 0.7084
Epoch 217/400
160/160 [=====] - 0s 669us/step - loss: 0.7100
Epoch 218/400

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160/160 [=====] - 0s 633us/step - loss: 0.7026
Epoch 219/400
160/160 [=====] - 0s 637us/step - loss: 0.7184
Epoch 220/400
160/160 [=====] - 0s 672us/step - loss: 0.7003
Epoch 221/400
160/160 [=====] - 0s 680us/step - loss: 0.7053
Epoch 222/400
160/160 [=====] - 0s 679us/step - loss: 0.7092
Epoch 223/400
160/160 [=====] - 0s 670us/step - loss: 0.7120
Epoch 224/400
160/160 [=====] - 0s 677us/step - loss: 0.7037
Epoch 225/400
160/160 [=====] - 0s 664us/step - loss: 0.7111
Epoch 226/400
160/160 [=====] - 0s 690us/step - loss: 0.7064
Epoch 227/400
160/160 [=====] - 0s 646us/step - loss: 0.7148
Epoch 228/400
160/160 [=====] - 0s 686us/step - loss: 0.7108
Epoch 229/400
160/160 [=====] - 0s 679us/step - loss: 0.6985
Epoch 230/400
160/160 [=====] - 0s 690us/step - loss: 0.7089
Epoch 231/400
160/160 [=====] - 0s 682us/step - loss: 0.7140
Epoch 232/400
160/160 [=====] - 0s 669us/step - loss: 0.7069
Epoch 233/400
160/160 [=====] - 0s 692us/step - loss: 0.7136
Epoch 234/400
160/160 [=====] - 0s 667us/step - loss: 0.7062
Epoch 235/400
160/160 [=====] - 0s 669us/step - loss: 0.7090
Epoch 236/400
160/160 [=====] - 0s 667us/step - loss: 0.7064
Epoch 237/400
160/160 [=====] - 0s 679us/step - loss: 0.7121
Epoch 238/400
160/160 [=====] - 0s 679us/step - loss: 0.7143
Epoch 239/400
160/160 [=====] - 0s 687us/step - loss: 0.7123
Epoch 240/400
160/160 [=====] - 0s 667us/step - loss: 0.7117
Epoch 241/400
160/160 [=====] - 0s 671us/step - loss: 0.7075
Epoch 242/400

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160/160 [=====] - 0s 656us/step - loss: 0.7093
Epoch 243/400
160/160 [=====] - 0s 691us/step - loss: 0.7040
Epoch 244/400
160/160 [=====] - 0s 678us/step - loss: 0.7110
Epoch 245/400
160/160 [=====] - 0s 682us/step - loss: 0.7108
Epoch 246/400
160/160 [=====] - 0s 677us/step - loss: 0.6996
Epoch 247/400
160/160 [=====] - 0s 689us/step - loss: 0.7062
Epoch 248/400
160/160 [=====] - 0s 688us/step - loss: 0.7071
Epoch 249/400
160/160 [=====] - 0s 672us/step - loss: 0.6898
Epoch 250/400
160/160 [=====] - 0s 677us/step - loss: 0.7077
Epoch 251/400
160/160 [=====] - 0s 652us/step - loss: 0.7064
Epoch 252/400
160/160 [=====] - 0s 679us/step - loss: 0.7046
Epoch 253/400
160/160 [=====] - 0s 669us/step - loss: 0.7136
Epoch 254/400
160/160 [=====] - 0s 679us/step - loss: 0.7037
Epoch 255/400
160/160 [=====] - 0s 679us/step - loss: 0.7041
Epoch 256/400
160/160 [=====] - 0s 685us/step - loss: 0.6928
Epoch 257/400
160/160 [=====] - 0s 658us/step - loss: 0.7102
Epoch 258/400
160/160 [=====] - 0s 676us/step - loss: 0.7032
Epoch 259/400
160/160 [=====] - 0s 653us/step - loss: 0.7075
Epoch 260/400
160/160 [=====] - 0s 688us/step - loss: 0.7130
Epoch 261/400
160/160 [=====] - 0s 680us/step - loss: 0.7132
Epoch 262/400
160/160 [=====] - 0s 664us/step - loss: 0.7120
Epoch 263/400
160/160 [=====] - 0s 674us/step - loss: 0.7105
Epoch 264/400
160/160 [=====] - 0s 683us/step - loss: 0.7036
Epoch 265/400
160/160 [=====] - 0s 679us/step - loss: 0.7146
Epoch 266/400

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160/160 [=====] - 0s 694us/step - loss: 0.7097
Epoch 267/400
160/160 [=====] - 0s 710us/step - loss: 0.6996
Epoch 268/400
160/160 [=====] - 0s 680us/step - loss: 0.7084
Epoch 269/400
160/160 [=====] - 0s 680us/step - loss: 0.7054
Epoch 270/400
160/160 [=====] - 0s 719us/step - loss: 0.7070
Epoch 271/400
160/160 [=====] - 0s 711us/step - loss: 0.7055
Epoch 272/400
160/160 [=====] - 0s 668us/step - loss: 0.7080
Epoch 273/400
160/160 [=====] - 0s 653us/step - loss: 0.7074
Epoch 274/400
160/160 [=====] - 0s 653us/step - loss: 0.7070
Epoch 275/400
160/160 [=====] - 0s 682us/step - loss: 0.7006
Epoch 276/400
160/160 [=====] - 0s 677us/step - loss: 0.7047
Epoch 277/400
160/160 [=====] - 0s 674us/step - loss: 0.7097
Epoch 278/400
160/160 [=====] - 0s 653us/step - loss: 0.7110
Epoch 279/400
160/160 [=====] - 0s 669us/step - loss: 0.7090
Epoch 280/400
160/160 [=====] - 0s 656us/step - loss: 0.7070
Epoch 281/400
160/160 [=====] - 0s 658us/step - loss: 0.6994
Epoch 282/400
160/160 [=====] - 0s 682us/step - loss: 0.7110
Epoch 283/400
160/160 [=====] - 0s 678us/step - loss: 0.7147
Epoch 284/400
160/160 [=====] - 0s 679us/step - loss: 0.7077
Epoch 285/400
160/160 [=====] - 0s 684us/step - loss: 0.6952
Epoch 286/400
160/160 [=====] - 0s 672us/step - loss: 0.7129
Epoch 287/400
160/160 [=====] - 0s 681us/step - loss: 0.7130
Epoch 288/400
160/160 [=====] - 0s 668us/step - loss: 0.7073
Epoch 289/400
160/160 [=====] - 0s 674us/step - loss: 0.7038
Epoch 290/400

160/160 [=====] - 0s 653us/step - loss: 0.7018
Epoch 291/400
160/160 [=====] - 0s 685us/step - loss: 0.7115
Epoch 292/400
160/160 [=====] - 0s 648us/step - loss: 0.7049
Epoch 293/400
160/160 [=====] - 0s 633us/step - loss: 0.6998
Epoch 294/400
160/160 [=====] - 0s 644us/step - loss: 0.7017
Epoch 295/400
160/160 [=====] - 0s 672us/step - loss: 0.7030
Epoch 296/400
160/160 [=====] - 0s 671us/step - loss: 0.7128
Epoch 297/400
160/160 [=====] - 0s 673us/step - loss: 0.7094
Epoch 298/400
160/160 [=====] - 0s 671us/step - loss: 0.7056
Epoch 299/400
160/160 [=====] - 0s 659us/step - loss: 0.7134
Epoch 300/400
160/160 [=====] - 0s 657us/step - loss: 0.7074
Epoch 301/400
160/160 [=====] - 0s 657us/step - loss: 0.7088
Epoch 302/400
160/160 [=====] - 0s 699us/step - loss: 0.7034
Epoch 303/400
160/160 [=====] - 0s 656us/step - loss: 0.7120
Epoch 304/400
160/160 [=====] - 0s 675us/step - loss: 0.7079
Epoch 305/400
160/160 [=====] - 0s 669us/step - loss: 0.6987
Epoch 306/400
160/160 [=====] - 0s 670us/step - loss: 0.7092
Epoch 307/400
160/160 [=====] - 0s 645us/step - loss: 0.7063
Epoch 308/400
160/160 [=====] - 0s 680us/step - loss: 0.7073
Epoch 309/400
160/160 [=====] - 0s 666us/step - loss: 0.6983
Epoch 310/400
160/160 [=====] - 0s 684us/step - loss: 0.7125
Epoch 311/400
160/160 [=====] - 0s 688us/step - loss: 0.7113
Epoch 312/400
160/160 [=====] - 0s 661us/step - loss: 0.7024
Epoch 313/400
160/160 [=====] - 0s 654us/step - loss: 0.7056
Epoch 314/400

160/160 [=====] - 0s 658us/step - loss: 0.7100
 Epoch 315/400
 160/160 [=====] - 0s 678us/step - loss: 0.7105
 Epoch 316/400
 160/160 [=====] - 0s 650us/step - loss: 0.7123
 Epoch 317/400
 160/160 [=====] - 0s 685us/step - loss: 0.7101
 Epoch 318/400
 160/160 [=====] - 0s 687us/step - loss: 0.7068
 Epoch 319/400
 160/160 [=====] - 0s 666us/step - loss: 0.7038
 Epoch 320/400
 160/160 [=====] - 0s 652us/step - loss: 0.7085
 Epoch 321/400
 160/160 [=====] - 0s 635us/step - loss: 0.7123
 Epoch 322/400
 160/160 [=====] - 0s 665us/step - loss: 0.7108
 Epoch 323/400
 160/160 [=====] - 0s 666us/step - loss: 0.7067
 Epoch 324/400
 160/160 [=====] - 0s 680us/step - loss: 0.7047
 Epoch 325/400
 160/160 [=====] - 0s 665us/step - loss: 0.7119
 Epoch 326/400
 160/160 [=====] - 0s 668us/step - loss: 0.7083
 Epoch 327/400
 160/160 [=====] - 0s 646us/step - loss: 0.7096
 Epoch 328/400
 160/160 [=====] - 0s 653us/step - loss: 0.7065
 Epoch 329/400
 160/160 [=====] - 0s 690us/step - loss: 0.7055
 Epoch 330/400
 160/160 [=====] - 0s 667us/step - loss: 0.7142
 Epoch 331/400
 160/160 [=====] - 0s 636us/step - loss: 0.6977
 Epoch 332/400
 160/160 [=====] - 0s 623us/step - loss: 0.7048
 Epoch 333/400
 160/160 [=====] - 0s 638us/step - loss: 0.7014
 Epoch 334/400
 160/160 [=====] - 0s 641us/step - loss: 0.7086
 Epoch 335/400
 160/160 [=====] - 0s 616us/step - loss: 0.7064
 Epoch 336/400
 160/160 [=====] - 0s 661us/step - loss: 0.7096
 Epoch 337/400
 160/160 [=====] - 0s 682us/step - loss: 0.7039
 Epoch 338/400

160/160 [=====] - 0s 678us/step - loss: 0.7096
Epoch 339/400
160/160 [=====] - 0s 677us/step - loss: 0.6874
Epoch 340/400
160/160 [=====] - 0s 666us/step - loss: 0.7146
Epoch 341/400
160/160 [=====] - 0s 674us/step - loss: 0.7068
Epoch 342/400
160/160 [=====] - 0s 662us/step - loss: 0.7048
Epoch 343/400
160/160 [=====] - 0s 672us/step - loss: 0.6959
Epoch 344/400
160/160 [=====] - 0s 661us/step - loss: 0.7064
Epoch 345/400
160/160 [=====] - 0s 674us/step - loss: 0.7099
Epoch 346/400
160/160 [=====] - 0s 669us/step - loss: 0.7107
Epoch 347/400
160/160 [=====] - 0s 681us/step - loss: 0.7090
Epoch 348/400
160/160 [=====] - 0s 669us/step - loss: 0.7113
Epoch 349/400
160/160 [=====] - 0s 673us/step - loss: 0.7040
Epoch 350/400
160/160 [=====] - 0s 657us/step - loss: 0.7131
Epoch 351/400
160/160 [=====] - 0s 649us/step - loss: 0.7090
Epoch 352/400
160/160 [=====] - 0s 675us/step - loss: 0.7015
Epoch 353/400
160/160 [=====] - 0s 678us/step - loss: 0.6957
Epoch 354/400
160/160 [=====] - 0s 673us/step - loss: 0.7080
Epoch 355/400
160/160 [=====] - 0s 664us/step - loss: 0.7044
Epoch 356/400
160/160 [=====] - 0s 675us/step - loss: 0.7119
Epoch 357/400
160/160 [=====] - 0s 657us/step - loss: 0.7122
Epoch 358/400
160/160 [=====] - 0s 686us/step - loss: 0.7048
Epoch 359/400
160/160 [=====] - 0s 666us/step - loss: 0.7136
Epoch 360/400
160/160 [=====] - 0s 671us/step - loss: 0.7089
Epoch 361/400
160/160 [=====] - 0s 665us/step - loss: 0.7146
Epoch 362/400

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160/160 [=====] - 0s 671us/step - loss: 0.7053
Epoch 363/400
160/160 [=====] - 0s 663us/step - loss: 0.6834
Epoch 364/400
160/160 [=====] - 0s 667us/step - loss: 0.7043
Epoch 365/400
160/160 [=====] - 0s 669us/step - loss: 0.7115
Epoch 366/400
160/160 [=====] - 0s 657us/step - loss: 0.7134
Epoch 367/400
160/160 [=====] - 0s 663us/step - loss: 0.7130
Epoch 368/400
160/160 [=====] - 0s 677us/step - loss: 0.7022
Epoch 369/400
160/160 [=====] - 0s 667us/step - loss: 0.7125
Epoch 370/400
160/160 [=====] - 0s 656us/step - loss: 0.7104
Epoch 371/400
160/160 [=====] - 0s 655us/step - loss: 0.7077
Epoch 372/400
160/160 [=====] - 0s 682us/step - loss: 0.6991
Epoch 373/400
160/160 [=====] - 0s 665us/step - loss: 0.6945
Epoch 374/400
160/160 [=====] - 0s 676us/step - loss: 0.7070
Epoch 375/400
160/160 [=====] - 0s 659us/step - loss: 0.7111
Epoch 376/400
160/160 [=====] - 0s 680us/step - loss: 0.7023
Epoch 377/400
160/160 [=====] - 0s 656us/step - loss: 0.7068
Epoch 378/400
160/160 [=====] - 0s 692us/step - loss: 0.7115
Epoch 379/400
160/160 [=====] - 0s 648us/step - loss: 0.7010
Epoch 380/400
160/160 [=====] - 0s 671us/step - loss: 0.7096
Epoch 381/400
160/160 [=====] - 0s 678us/step - loss: 0.7052
Epoch 382/400
160/160 [=====] - 0s 683us/step - loss: 0.7062
Epoch 383/400
160/160 [=====] - 0s 654us/step - loss: 0.7073
Epoch 384/400
160/160 [=====] - 0s 674us/step - loss: 0.7101
Epoch 385/400
160/160 [=====] - 0s 678us/step - loss: 0.7076
Epoch 386/400

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160/160 [=====] - 0s 672us/step - loss: 0.7079
Epoch 387/400
160/160 [=====] - 0s 658us/step - loss: 0.6951
Epoch 388/400
160/160 [=====] - 0s 672us/step - loss: 0.7047
Epoch 389/400
160/160 [=====] - 0s 660us/step - loss: 0.7094
Epoch 390/400
160/160 [=====] - 0s 662us/step - loss: 0.7120
Epoch 391/400
160/160 [=====] - 0s 675us/step - loss: 0.7073
Epoch 392/400
160/160 [=====] - 0s 634us/step - loss: 0.7053
Epoch 393/400
160/160 [=====] - 0s 628us/step - loss: 0.7120
Epoch 394/400
160/160 [=====] - 0s 647us/step - loss: 0.7027
Epoch 395/400
160/160 [=====] - 0s 640us/step - loss: 0.7102
Epoch 396/400
160/160 [=====] - 0s 626us/step - loss: 0.7155
Epoch 397/400
160/160 [=====] - 0s 630us/step - loss: 0.7016
Epoch 398/400
160/160 [=====] - 0s 630us/step - loss: 0.7050
Epoch 399/400
160/160 [=====] - 0s 683us/step - loss: 0.7185
Epoch 400/400
160/160 [=====] - 0s 667us/step - loss: 0.7015
160/160 [=====] - 0s 1ms/step
Epoch 1/400
160/160 [=====] - 0s 3ms/step - loss: 0.6946
Epoch 2/400
160/160 [=====] - 0s 681us/step - loss: 0.6942
Epoch 3/400
160/160 [=====] - 0s 682us/step - loss: 0.6945
Epoch 4/400
160/160 [=====] - 0s 690us/step - loss: 0.6945
Epoch 5/400
160/160 [=====] - 0s 681us/step - loss: 0.6944
Epoch 6/400
160/160 [=====] - 0s 657us/step - loss: 0.6945
Epoch 7/400
160/160 [=====] - 0s 655us/step - loss: 0.6943
Epoch 8/400
160/160 [=====] - 0s 688us/step - loss: 0.6944
Epoch 9/400
160/160 [=====] - 0s 676us/step - loss: 0.6945

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Epoch 10/400
160/160 [=====] - 0s 679us/step - loss: 0.6945
Epoch 11/400
160/160 [=====] - 0s 673us/step - loss: 0.6943
Epoch 12/400
160/160 [=====] - 0s 699us/step - loss: 0.6943
Epoch 13/400
160/160 [=====] - 0s 686us/step - loss: 0.6945
Epoch 14/400
160/160 [=====] - 0s 666us/step - loss: 0.6937
Epoch 15/400
160/160 [=====] - 0s 687us/step - loss: 0.6942
Epoch 16/400
160/160 [=====] - 0s 685us/step - loss: 0.6944
Epoch 17/400
160/160 [=====] - 0s 670us/step - loss: 0.6945
Epoch 18/400
160/160 [=====] - 0s 709us/step - loss: 0.6944
Epoch 19/400
160/160 [=====] - 0s 670us/step - loss: 0.6945
Epoch 20/400
160/160 [=====] - 0s 685us/step - loss: 0.6943
Epoch 21/400
160/160 [=====] - 0s 692us/step - loss: 0.6943
Epoch 22/400
160/160 [=====] - 0s 679us/step - loss: 0.6945
Epoch 23/400
160/160 [=====] - 0s 695us/step - loss: 0.6946
Epoch 24/400
160/160 [=====] - 0s 680us/step - loss: 0.6945
Epoch 25/400
160/160 [=====] - 0s 684us/step - loss: 0.6945
Epoch 26/400
160/160 [=====] - 0s 685us/step - loss: 0.6947
Epoch 27/400
160/160 [=====] - 0s 674us/step - loss: 0.6943
Epoch 28/400
160/160 [=====] - 0s 695us/step - loss: 0.6944
Epoch 29/400
160/160 [=====] - 0s 673us/step - loss: 0.6945
Epoch 30/400
160/160 [=====] - 0s 679us/step - loss: 0.6942
Epoch 31/400
160/160 [=====] - 0s 687us/step - loss: 0.6944
Epoch 32/400
160/160 [=====] - 0s 676us/step - loss: 0.6943
Epoch 33/400
160/160 [=====] - 0s 686us/step - loss: 0.6948

Epoch 34/400
160/160 [=====] - 0s 678us/step - loss: 0.6946
Epoch 35/400
160/160 [=====] - 0s 685us/step - loss: 0.6947
Epoch 36/400
160/160 [=====] - 0s 689us/step - loss: 0.6942
Epoch 37/400
160/160 [=====] - 0s 668us/step - loss: 0.6945
Epoch 38/400
160/160 [=====] - 0s 698us/step - loss: 0.6943
Epoch 39/400
160/160 [=====] - 0s 678us/step - loss: 0.6943
Epoch 40/400
160/160 [=====] - 0s 735us/step - loss: 0.6944
Epoch 41/400
160/160 [=====] - 0s 672us/step - loss: 0.6944
Epoch 42/400
160/160 [=====] - 0s 698us/step - loss: 0.6946
Epoch 43/400
160/160 [=====] - 0s 674us/step - loss: 0.6944
Epoch 44/400
160/160 [=====] - 0s 679us/step - loss: 0.6946
Epoch 45/400
160/160 [=====] - 0s 681us/step - loss: 0.6944
Epoch 46/400
160/160 [=====] - 0s 672us/step - loss: 0.6943
Epoch 47/400
160/160 [=====] - 0s 695us/step - loss: 0.6942
Epoch 48/400
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Epoch 58/400
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Epoch 82/400
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160/160 [=====] - 0s 681us/step - loss: 0.6943
Epoch 321/400
160/160 [=====] - 0s 680us/step - loss: 0.6942

Epoch 322/400
160/160 [=====] - 0s 687us/step - loss: 0.6943
Epoch 323/400
160/160 [=====] - 0s 682us/step - loss: 0.6943
Epoch 324/400
160/160 [=====] - 0s 685us/step - loss: 0.6947
Epoch 325/400
160/160 [=====] - 0s 690us/step - loss: 0.6944
Epoch 326/400
160/160 [=====] - 0s 703us/step - loss: 0.6943
Epoch 327/400
160/160 [=====] - 0s 692us/step - loss: 0.6945
Epoch 328/400
160/160 [=====] - 0s 681us/step - loss: 0.6944
Epoch 329/400
160/160 [=====] - 0s 682us/step - loss: 0.6944
Epoch 330/400
160/160 [=====] - 0s 688us/step - loss: 0.6944
Epoch 331/400
160/160 [=====] - 0s 718us/step - loss: 0.6943
Epoch 332/400
160/160 [=====] - 0s 692us/step - loss: 0.6945
Epoch 333/400
160/160 [=====] - 0s 673us/step - loss: 0.6945
Epoch 334/400
160/160 [=====] - 0s 706us/step - loss: 0.6942
Epoch 335/400
160/160 [=====] - 0s 693us/step - loss: 0.6945
Epoch 336/400
160/160 [=====] - 0s 679us/step - loss: 0.6943
Epoch 337/400
160/160 [=====] - 0s 682us/step - loss: 0.6946
Epoch 338/400
160/160 [=====] - 0s 706us/step - loss: 0.6945
Epoch 339/400
160/160 [=====] - 0s 683us/step - loss: 0.6942
Epoch 340/400
160/160 [=====] - 0s 700us/step - loss: 0.6946
Epoch 341/400
160/160 [=====] - 0s 686us/step - loss: 0.6945
Epoch 342/400
160/160 [=====] - 0s 667us/step - loss: 0.6945
Epoch 343/400
160/160 [=====] - 0s 694us/step - loss: 0.6945
Epoch 344/400
160/160 [=====] - 0s 684us/step - loss: 0.6945
Epoch 345/400
160/160 [=====] - 0s 688us/step - loss: 0.6944

Epoch 346/400
160/160 [=====] - 0s 696us/step - loss: 0.6942
Epoch 347/400
160/160 [=====] - 0s 728us/step - loss: 0.6944
Epoch 348/400
160/160 [=====] - 0s 700us/step - loss: 0.6943
Epoch 349/400
160/160 [=====] - 0s 679us/step - loss: 0.6945
Epoch 350/400
160/160 [=====] - 0s 699us/step - loss: 0.6945
Epoch 351/400
160/160 [=====] - 0s 700us/step - loss: 0.6944
Epoch 352/400
160/160 [=====] - 0s 690us/step - loss: 0.6943
Epoch 353/400
160/160 [=====] - 0s 710us/step - loss: 0.6941
Epoch 354/400
160/160 [=====] - 0s 860us/step - loss: 0.6943
Epoch 355/400
160/160 [=====] - 0s 690us/step - loss: 0.6944
Epoch 356/400
160/160 [=====] - 0s 691us/step - loss: 0.6945
Epoch 357/400
160/160 [=====] - 0s 685us/step - loss: 0.6946
Epoch 358/400
160/160 [=====] - 0s 671us/step - loss: 0.6943
Epoch 359/400
160/160 [=====] - 0s 661us/step - loss: 0.6942
Epoch 360/400
160/160 [=====] - 0s 626us/step - loss: 0.6941
Epoch 361/400
160/160 [=====] - 0s 638us/step - loss: 0.6943
Epoch 362/400
160/160 [=====] - 0s 620us/step - loss: 0.6943
Epoch 363/400
160/160 [=====] - 0s 621us/step - loss: 0.6944
Epoch 364/400
160/160 [=====] - 0s 633us/step - loss: 0.6944
Epoch 365/400
160/160 [=====] - 0s 672us/step - loss: 0.6944
Epoch 366/400
160/160 [=====] - 0s 636us/step - loss: 0.6944
Epoch 367/400
160/160 [=====] - 0s 653us/step - loss: 0.6945
Epoch 368/400
160/160 [=====] - 0s 653us/step - loss: 0.6945
Epoch 369/400
160/160 [=====] - 0s 665us/step - loss: 0.6942

Epoch 370/400
160/160 [=====] - 0s 691us/step - loss: 0.6944
Epoch 371/400
160/160 [=====] - 0s 687us/step - loss: 0.6946
Epoch 372/400
160/160 [=====] - 0s 680us/step - loss: 0.6942
Epoch 373/400
160/160 [=====] - 0s 676us/step - loss: 0.6940
Epoch 374/400
160/160 [=====] - 0s 698us/step - loss: 0.6945
Epoch 375/400
160/160 [=====] - 0s 685us/step - loss: 0.6941
Epoch 376/400
160/160 [=====] - 0s 693us/step - loss: 0.6944
Epoch 377/400
160/160 [=====] - 0s 676us/step - loss: 0.6944
Epoch 378/400
160/160 [=====] - 0s 673us/step - loss: 0.6944
Epoch 379/400
160/160 [=====] - 0s 693us/step - loss: 0.6946
Epoch 380/400
160/160 [=====] - 0s 700us/step - loss: 0.6942
Epoch 381/400
160/160 [=====] - 0s 696us/step - loss: 0.6943
Epoch 382/400
160/160 [=====] - 0s 679us/step - loss: 0.6946
Epoch 383/400
160/160 [=====] - 0s 705us/step - loss: 0.6944
Epoch 384/400
160/160 [=====] - 0s 670us/step - loss: 0.6946
Epoch 385/400
160/160 [=====] - 0s 686us/step - loss: 0.6946
Epoch 386/400
160/160 [=====] - 0s 710us/step - loss: 0.6943
Epoch 387/400
160/160 [=====] - 0s 669us/step - loss: 0.6943
Epoch 388/400
160/160 [=====] - 0s 683us/step - loss: 0.6943
Epoch 389/400
160/160 [=====] - 0s 708us/step - loss: 0.6943
Epoch 390/400
160/160 [=====] - 0s 679us/step - loss: 0.6944
Epoch 391/400
160/160 [=====] - 0s 680us/step - loss: 0.6946
Epoch 392/400
160/160 [=====] - 0s 670us/step - loss: 0.6947
Epoch 393/400
160/160 [=====] - 0s 687us/step - loss: 0.6942

Epoch 394/400
160/160 [=====] - 0s 684us/step - loss: 0.6945
Epoch 395/400
160/160 [=====] - 0s 689us/step - loss: 0.6944
Epoch 396/400
160/160 [=====] - 0s 678us/step - loss: 0.6945
Epoch 397/400
160/160 [=====] - 0s 680us/step - loss: 0.6946
Epoch 398/400
160/160 [=====] - 0s 693us/step - loss: 0.6944
Epoch 399/400
160/160 [=====] - 0s 687us/step - loss: 0.6943
Epoch 400/400
160/160 [=====] - 0s 689us/step - loss: 0.6944
160/160 [=====] - 0s 2ms/step
Epoch 1/400
160/160 [=====] - 1s 3ms/step - loss: 0.9617
Epoch 2/400
160/160 [=====] - 0s 684us/step - loss: 0.7294
Epoch 3/400
160/160 [=====] - 0s 672us/step - loss: 0.7106
Epoch 4/400
160/160 [=====] - 0s 689us/step - loss: 0.7016
Epoch 5/400
160/160 [=====] - 0s 641us/step - loss: 0.7020
Epoch 6/400
160/160 [=====] - 0s 667us/step - loss: 0.6952
Epoch 7/400
160/160 [=====] - 0s 691us/step - loss: 0.6863
Epoch 8/400
160/160 [=====] - 0s 714us/step - loss: 0.6646
Epoch 9/400
160/160 [=====] - 0s 673us/step - loss: 0.6462
Epoch 10/400
160/160 [=====] - 0s 680us/step - loss: 0.6346
Epoch 11/400
160/160 [=====] - 0s 690us/step - loss: 0.6131
Epoch 12/400
160/160 [=====] - 0s 683us/step - loss: 0.5932
Epoch 13/400
160/160 [=====] - 0s 689us/step - loss: 0.5732
Epoch 14/400
160/160 [=====] - 0s 687us/step - loss: 0.6904
Epoch 15/400
160/160 [=====] - 0s 690us/step - loss: 0.6248
Epoch 16/400
160/160 [=====] - 0s 686us/step - loss: 0.7247
Epoch 17/400

160/160 [=====] - 0s 691us/step - loss: 0.7057
Epoch 18/400
160/160 [=====] - 0s 678us/step - loss: 0.7096
Epoch 19/400
160/160 [=====] - 0s 685us/step - loss: 0.6946
Epoch 20/400
160/160 [=====] - 0s 700us/step - loss: 0.7067
Epoch 21/400
160/160 [=====] - 0s 670us/step - loss: 0.7090
Epoch 22/400
160/160 [=====] - 0s 691us/step - loss: 0.6988
Epoch 23/400
160/160 [=====] - 0s 687us/step - loss: 0.7066
Epoch 24/400
160/160 [=====] - 0s 681us/step - loss: 0.6962
Epoch 25/400
160/160 [=====] - 0s 700us/step - loss: 0.7057
Epoch 26/400
160/160 [=====] - 0s 684us/step - loss: 0.6963
Epoch 27/400
160/160 [=====] - 0s 682us/step - loss: 0.7065
Epoch 28/400
160/160 [=====] - 0s 703us/step - loss: 0.7026
Epoch 29/400
160/160 [=====] - 0s 678us/step - loss: 0.6995
Epoch 30/400
160/160 [=====] - 0s 681us/step - loss: 0.7016
Epoch 31/400
160/160 [=====] - 0s 659us/step - loss: 0.6978
Epoch 32/400
160/160 [=====] - 0s 671us/step - loss: 0.6988
Epoch 33/400
160/160 [=====] - 0s 695us/step - loss: 0.6991
Epoch 34/400
160/160 [=====] - 0s 680us/step - loss: 0.6939
Epoch 35/400
160/160 [=====] - 0s 705us/step - loss: 0.6965
Epoch 36/400
160/160 [=====] - 0s 705us/step - loss: 0.6945
Epoch 37/400
160/160 [=====] - 0s 662us/step - loss: 0.6905
Epoch 38/400
160/160 [=====] - 0s 698us/step - loss: 0.6935
Epoch 39/400
160/160 [=====] - 0s 711us/step - loss: 0.6912
Epoch 40/400
160/160 [=====] - 0s 732us/step - loss: 0.6923
Epoch 41/400

160/160 [=====] - 0s 745us/step - loss: 0.6881
Epoch 42/400
160/160 [=====] - 0s 730us/step - loss: 0.6820
Epoch 43/400
160/160 [=====] - 0s 719us/step - loss: 0.6725
Epoch 44/400
160/160 [=====] - 0s 726us/step - loss: 0.6678
Epoch 45/400
160/160 [=====] - 0s 694us/step - loss: 0.6616
Epoch 46/400
160/160 [=====] - 0s 693us/step - loss: 0.6509
Epoch 47/400
160/160 [=====] - 0s 672us/step - loss: 0.6390
Epoch 48/400
160/160 [=====] - 0s 690us/step - loss: 0.6285
Epoch 49/400
160/160 [=====] - 0s 675us/step - loss: 0.5995
Epoch 50/400
160/160 [=====] - 0s 697us/step - loss: 0.5778
Epoch 51/400
160/160 [=====] - 0s 694us/step - loss: 0.5474
Epoch 52/400
160/160 [=====] - 0s 680us/step - loss: 0.5612
Epoch 53/400
160/160 [=====] - 0s 675us/step - loss: 0.5385
Epoch 54/400
160/160 [=====] - 0s 690us/step - loss: 0.5463
Epoch 55/400
160/160 [=====] - 0s 681us/step - loss: 0.5250
Epoch 56/400
160/160 [=====] - 0s 694us/step - loss: 0.5556
Epoch 57/400
160/160 [=====] - 0s 772us/step - loss: 0.5359
Epoch 58/400
160/160 [=====] - 0s 691us/step - loss: 4.9467
Epoch 59/400
160/160 [=====] - 0s 716us/step - loss: 8.0590
Epoch 60/400
160/160 [=====] - 0s 685us/step - loss: 8.0590
Epoch 61/400
160/160 [=====] - 0s 695us/step - loss: 8.0590
Epoch 62/400
160/160 [=====] - 0s 701us/step - loss: 8.0590
Epoch 63/400
160/160 [=====] - 0s 699us/step - loss: 8.0590
Epoch 64/400
160/160 [=====] - 0s 673us/step - loss: 8.0590
Epoch 65/400

160/160 [=====] - 0s 701us/step - loss: 8.0590
Epoch 66/400
160/160 [=====] - 0s 673us/step - loss: 8.0590
Epoch 67/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 68/400
160/160 [=====] - 0s 677us/step - loss: 8.0590
Epoch 69/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 70/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 71/400
160/160 [=====] - 0s 692us/step - loss: 8.0590
Epoch 72/400
160/160 [=====] - 0s 688us/step - loss: 8.0590
Epoch 73/400
160/160 [=====] - 0s 681us/step - loss: 8.0590
Epoch 74/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 75/400
160/160 [=====] - 0s 672us/step - loss: 8.0590
Epoch 76/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 77/400
160/160 [=====] - 0s 683us/step - loss: 8.0590
Epoch 78/400
160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 79/400
160/160 [=====] - 0s 685us/step - loss: 8.0590
Epoch 80/400
160/160 [=====] - 0s 683us/step - loss: 8.0590
Epoch 81/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 82/400
160/160 [=====] - 0s 672us/step - loss: 8.0590
Epoch 83/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 84/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
Epoch 85/400
160/160 [=====] - 0s 676us/step - loss: 8.0590
Epoch 86/400
160/160 [=====] - 0s 676us/step - loss: 8.0590
Epoch 87/400
160/160 [=====] - 0s 659us/step - loss: 8.0590
Epoch 88/400
160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 89/400

160/160 [=====] - 0s 637us/step - loss: 8.0590
Epoch 90/400
160/160 [=====] - 0s 638us/step - loss: 8.0590
Epoch 91/400
160/160 [=====] - 0s 625us/step - loss: 8.0590
Epoch 92/400
160/160 [=====] - 0s 655us/step - loss: 8.0590
Epoch 93/400
160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 94/400
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Epoch 111/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 112/400
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Epoch 113/400

160/160 [=====] - 0s 695us/step - loss: 8.0590
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Epoch 136/400
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Epoch 137/400

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Epoch 138/400
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Epoch 161/400

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Epoch 185/400

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Epoch 191/400
160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 192/400
160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 193/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 194/400
160/160 [=====] - 0s 685us/step - loss: 8.0590
Epoch 195/400
160/160 [=====] - 0s 680us/step - loss: 8.0590
Epoch 196/400
160/160 [=====] - 0s 676us/step - loss: 8.0590
Epoch 197/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 198/400
160/160 [=====] - 0s 714us/step - loss: 8.0590
Epoch 199/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 200/400
160/160 [=====] - 0s 668us/step - loss: 8.0590
Epoch 201/400
160/160 [=====] - 0s 709us/step - loss: 8.0590
Epoch 202/400
160/160 [=====] - 0s 706us/step - loss: 8.0590
Epoch 203/400
160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 204/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 205/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 206/400
160/160 [=====] - 0s 688us/step - loss: 8.0590
Epoch 207/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 208/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 209/400

160/160 [=====] - 0s 682us/step - loss: 8.0590
Epoch 210/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 211/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 212/400
160/160 [=====] - 0s 641us/step - loss: 8.0590
Epoch 213/400
160/160 [=====] - 0s 709us/step - loss: 8.0590
Epoch 214/400
160/160 [=====] - 0s 674us/step - loss: 8.0590
Epoch 215/400
160/160 [=====] - 0s 701us/step - loss: 8.0590
Epoch 216/400
160/160 [=====] - 0s 704us/step - loss: 8.0590
Epoch 217/400
160/160 [=====] - 0s 677us/step - loss: 8.0590
Epoch 218/400
160/160 [=====] - 0s 688us/step - loss: 8.0590
Epoch 219/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 220/400
160/160 [=====] - 0s 692us/step - loss: 8.0590
Epoch 221/400
160/160 [=====] - 0s 700us/step - loss: 8.0590
Epoch 222/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 223/400
160/160 [=====] - 0s 692us/step - loss: 8.0590
Epoch 224/400
160/160 [=====] - 0s 695us/step - loss: 8.0590
Epoch 225/400
160/160 [=====] - 0s 688us/step - loss: 8.0590
Epoch 226/400
160/160 [=====] - 0s 692us/step - loss: 8.0590
Epoch 227/400
160/160 [=====] - 0s 673us/step - loss: 8.0590
Epoch 228/400
160/160 [=====] - 0s 692us/step - loss: 8.0590
Epoch 229/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 230/400
160/160 [=====] - 0s 695us/step - loss: 8.0590
Epoch 231/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 232/400
160/160 [=====] - 0s 696us/step - loss: 8.0590
Epoch 233/400

160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 234/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 235/400
160/160 [=====] - 0s 711us/step - loss: 8.0590
Epoch 236/400
160/160 [=====] - 0s 753us/step - loss: 8.0590
Epoch 237/400
160/160 [=====] - 0s 750us/step - loss: 8.0590
Epoch 238/400
160/160 [=====] - 0s 837us/step - loss: 8.0590
Epoch 239/400
160/160 [=====] - 0s 712us/step - loss: 8.0590
Epoch 240/400
160/160 [=====] - 0s 692us/step - loss: 8.0590
Epoch 241/400
160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 242/400
160/160 [=====] - 0s 727us/step - loss: 8.0590
Epoch 243/400
160/160 [=====] - 0s 682us/step - loss: 8.0590
Epoch 244/400
160/160 [=====] - 0s 696us/step - loss: 8.0590
Epoch 245/400
160/160 [=====] - 0s 679us/step - loss: 8.0590
Epoch 246/400
160/160 [=====] - 0s 635us/step - loss: 8.0590
Epoch 247/400
160/160 [=====] - 0s 670us/step - loss: 8.0590
Epoch 248/400
160/160 [=====] - 0s 712us/step - loss: 8.0590
Epoch 249/400
160/160 [=====] - 0s 705us/step - loss: 8.0590
Epoch 250/400
160/160 [=====] - 0s 711us/step - loss: 8.0590
Epoch 251/400
160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 252/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 253/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 254/400
160/160 [=====] - 0s 672us/step - loss: 8.0590
Epoch 255/400
160/160 [=====] - 0s 754us/step - loss: 8.0590
Epoch 256/400
160/160 [=====] - 0s 709us/step - loss: 8.0590
Epoch 257/400

160/160 [=====] - 0s 707us/step - loss: 8.0590
Epoch 258/400
160/160 [=====] - 0s 702us/step - loss: 8.0590
Epoch 259/400
160/160 [=====] - 0s 712us/step - loss: 8.0590
Epoch 260/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 261/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 262/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 263/400
160/160 [=====] - 0s 676us/step - loss: 8.0590
Epoch 264/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
Epoch 265/400
160/160 [=====] - 0s 664us/step - loss: 8.0590
Epoch 266/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 267/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 268/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 269/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
Epoch 270/400
160/160 [=====] - 0s 655us/step - loss: 8.0590
Epoch 271/400
160/160 [=====] - 0s 703us/step - loss: 8.0590
Epoch 272/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 273/400
160/160 [=====] - 0s 671us/step - loss: 8.0590
Epoch 274/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 275/400
160/160 [=====] - 0s 659us/step - loss: 8.0590
Epoch 276/400
160/160 [=====] - 0s 696us/step - loss: 8.0590
Epoch 277/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 278/400
160/160 [=====] - 0s 720us/step - loss: 8.0590
Epoch 279/400
160/160 [=====] - 0s 670us/step - loss: 8.0590
Epoch 280/400
160/160 [=====] - 0s 700us/step - loss: 8.0590
Epoch 281/400

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160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 282/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 283/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 284/400
160/160 [=====] - 0s 669us/step - loss: 8.0590
Epoch 285/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 286/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 287/400
160/160 [=====] - 0s 679us/step - loss: 8.0590
Epoch 288/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 289/400
160/160 [=====] - 0s 668us/step - loss: 8.0590
Epoch 290/400
160/160 [=====] - 0s 708us/step - loss: 8.0590
Epoch 291/400
160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 292/400
160/160 [=====] - 0s 672us/step - loss: 8.0590
Epoch 293/400
160/160 [=====] - 0s 679us/step - loss: 8.0590
Epoch 294/400
160/160 [=====] - 0s 661us/step - loss: 8.0590
Epoch 295/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 296/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
Epoch 297/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 298/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 299/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 300/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 301/400
160/160 [=====] - 0s 682us/step - loss: 8.0590
Epoch 302/400
160/160 [=====] - 0s 678us/step - loss: 8.0590
Epoch 303/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 304/400
160/160 [=====] - 0s 702us/step - loss: 8.0590
Epoch 305/400

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160/160 [=====] - 0s 676us/step - loss: 8.0590
Epoch 306/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
Epoch 307/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 308/400
160/160 [=====] - 0s 671us/step - loss: 8.0590
Epoch 309/400
160/160 [=====] - 0s 703us/step - loss: 8.0590
Epoch 310/400
160/160 [=====] - 0s 680us/step - loss: 8.0590
Epoch 311/400
160/160 [=====] - 0s 700us/step - loss: 8.0590
Epoch 312/400
160/160 [=====] - 0s 682us/step - loss: 8.0590
Epoch 313/400
160/160 [=====] - 0s 669us/step - loss: 8.0590
Epoch 314/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 315/400
160/160 [=====] - 0s 724us/step - loss: 8.0590
Epoch 316/400
160/160 [=====] - 0s 692us/step - loss: 8.0590
Epoch 317/400
160/160 [=====] - 0s 669us/step - loss: 8.0590
Epoch 318/400
160/160 [=====] - 0s 699us/step - loss: 8.0590
Epoch 319/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 320/400
160/160 [=====] - 0s 682us/step - loss: 8.0590
Epoch 321/400
160/160 [=====] - 0s 699us/step - loss: 8.0590
Epoch 322/400
160/160 [=====] - 0s 695us/step - loss: 8.0590
Epoch 323/400
160/160 [=====] - 0s 688us/step - loss: 8.0590
Epoch 324/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
Epoch 325/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 326/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 327/400
160/160 [=====] - 0s 681us/step - loss: 8.0590
Epoch 328/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 329/400

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160/160 [=====] - 0s 677us/step - loss: 8.0590
Epoch 330/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 331/400
160/160 [=====] - 0s 705us/step - loss: 8.0590
Epoch 332/400
160/160 [=====] - 0s 692us/step - loss: 8.0590
Epoch 333/400
160/160 [=====] - 0s 688us/step - loss: 8.0590
Epoch 334/400
160/160 [=====] - 0s 699us/step - loss: 8.0590
Epoch 335/400
160/160 [=====] - 0s 688us/step - loss: 8.0590
Epoch 336/400
160/160 [=====] - 0s 715us/step - loss: 8.0590
Epoch 337/400
160/160 [=====] - 0s 677us/step - loss: 8.0590
Epoch 338/400
160/160 [=====] - 0s 660us/step - loss: 8.0590
Epoch 339/400
160/160 [=====] - 0s 640us/step - loss: 8.0590
Epoch 340/400
160/160 [=====] - 0s 677us/step - loss: 8.0590
Epoch 341/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 342/400
160/160 [=====] - 0s 696us/step - loss: 8.0590
Epoch 343/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 344/400
160/160 [=====] - 0s 677us/step - loss: 8.0590
Epoch 345/400
160/160 [=====] - 0s 683us/step - loss: 8.0590
Epoch 346/400
160/160 [=====] - 0s 683us/step - loss: 8.0590
Epoch 347/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 348/400
160/160 [=====] - 0s 681us/step - loss: 8.0590
Epoch 349/400
160/160 [=====] - 0s 679us/step - loss: 8.0590
Epoch 350/400
160/160 [=====] - 0s 675us/step - loss: 8.0590
Epoch 351/400
160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 352/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 353/400

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160/160 [=====] - 0s 678us/step - loss: 8.0590
Epoch 354/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 355/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 356/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 357/400
160/160 [=====] - 0s 680us/step - loss: 8.0590
Epoch 358/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 359/400
160/160 [=====] - 0s 679us/step - loss: 8.0590
Epoch 360/400
160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 361/400
160/160 [=====] - 0s 676us/step - loss: 8.0590
Epoch 362/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
Epoch 363/400
160/160 [=====] - 0s 688us/step - loss: 8.0590
Epoch 364/400
160/160 [=====] - 0s 666us/step - loss: 8.0590
Epoch 365/400
160/160 [=====] - 0s 695us/step - loss: 8.0590
Epoch 366/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 367/400
160/160 [=====] - 0s 679us/step - loss: 8.0590
Epoch 368/400
160/160 [=====] - 0s 685us/step - loss: 8.0590
Epoch 369/400
160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 370/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
Epoch 371/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 372/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 373/400
160/160 [=====] - 0s 679us/step - loss: 8.0590
Epoch 374/400
160/160 [=====] - 0s 669us/step - loss: 8.0590
Epoch 375/400
160/160 [=====] - 0s 640us/step - loss: 8.0590
Epoch 376/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 377/400


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160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 378/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 379/400
160/160 [=====] - 0s 666us/step - loss: 8.0590
Epoch 380/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 381/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 382/400
160/160 [=====] - 0s 682us/step - loss: 8.0590
Epoch 383/400
160/160 [=====] - 0s 699us/step - loss: 8.0590
Epoch 384/400
160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 385/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 386/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 387/400
160/160 [=====] - 0s 679us/step - loss: 8.0590
Epoch 388/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 389/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 390/400
160/160 [=====] - 0s 675us/step - loss: 8.0590
Epoch 391/400
160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 392/400
160/160 [=====] - 0s 679us/step - loss: 8.0590
Epoch 393/400
160/160 [=====] - 0s 669us/step - loss: 8.0590
Epoch 394/400
160/160 [=====] - 0s 699us/step - loss: 8.0590
Epoch 395/400
160/160 [=====] - 0s 685us/step - loss: 8.0590
Epoch 396/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 397/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 398/400
160/160 [=====] - 0s 678us/step - loss: 8.0590
Epoch 399/400
160/160 [=====] - 0s 703us/step - loss: 8.0590
Epoch 400/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
160/160 [=====] - 0s 2ms/step

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Epoch 1/400
160/160 [=====] - 1s 3ms/step - loss: 0.7035
Epoch 2/400
160/160 [=====] - 0s 710us/step - loss: 0.6945
Epoch 3/400
160/160 [=====] - 0s 702us/step - loss: 0.6986
Epoch 4/400
160/160 [=====] - 0s 693us/step - loss: 0.6970
Epoch 5/400
160/160 [=====] - 0s 705us/step - loss: 0.6958
Epoch 6/400
160/160 [=====] - 0s 700us/step - loss: 0.6963
Epoch 7/400
160/160 [=====] - 0s 689us/step - loss: 0.6959
Epoch 8/400
160/160 [=====] - 0s 683us/step - loss: 0.6972
Epoch 9/400
160/160 [=====] - 0s 703us/step - loss: 0.6930
Epoch 10/400
160/160 [=====] - 0s 712us/step - loss: 0.6966
Epoch 11/400
160/160 [=====] - 0s 697us/step - loss: 0.6972
Epoch 12/400
160/160 [=====] - 0s 697us/step - loss: 0.6971
Epoch 13/400
160/160 [=====] - 0s 706us/step - loss: 0.6954
Epoch 14/400
160/160 [=====] - 0s 725us/step - loss: 0.6964
Epoch 15/400
160/160 [=====] - 0s 693us/step - loss: 0.6958
Epoch 16/400
160/160 [=====] - 0s 691us/step - loss: 0.6947
Epoch 17/400
160/160 [=====] - 0s 708us/step - loss: 0.6958
Epoch 18/400
160/160 [=====] - 0s 699us/step - loss: 0.6952
Epoch 19/400
160/160 [=====] - 0s 696us/step - loss: 0.6958
Epoch 20/400
160/160 [=====] - 0s 695us/step - loss: 0.6968
Epoch 21/400
160/160 [=====] - 0s 697us/step - loss: 0.6959
Epoch 22/400
160/160 [=====] - 0s 678us/step - loss: 0.6963
Epoch 23/400
160/160 [=====] - 0s 624us/step - loss: 0.6952
Epoch 24/400
160/160 [=====] - 0s 658us/step - loss: 0.6953

Epoch 25/400
160/160 [=====] - 0s 683us/step - loss: 0.6954
Epoch 26/400
160/160 [=====] - 0s 705us/step - loss: 0.6966
Epoch 27/400
160/160 [=====] - 0s 706us/step - loss: 0.6952
Epoch 28/400
160/160 [=====] - 0s 690us/step - loss: 0.6954
Epoch 29/400
160/160 [=====] - 0s 702us/step - loss: 0.6960
Epoch 30/400
160/160 [=====] - 0s 712us/step - loss: 0.6949
Epoch 31/400
160/160 [=====] - 0s 695us/step - loss: 0.6951
Epoch 32/400
160/160 [=====] - 0s 710us/step - loss: 0.6960
Epoch 33/400
160/160 [=====] - 0s 690us/step - loss: 0.6956
Epoch 34/400
160/160 [=====] - 0s 706us/step - loss: 0.6944
Epoch 35/400
160/160 [=====] - 0s 695us/step - loss: 0.6951
Epoch 36/400
160/160 [=====] - 0s 694us/step - loss: 0.6956
Epoch 37/400
160/160 [=====] - 0s 698us/step - loss: 0.6946
Epoch 38/400
160/160 [=====] - 0s 711us/step - loss: 0.6955
Epoch 39/400
160/160 [=====] - 0s 704us/step - loss: 0.6954
Epoch 40/400
160/160 [=====] - 0s 690us/step - loss: 0.6958
Epoch 41/400
160/160 [=====] - 0s 689us/step - loss: 0.6958
Epoch 42/400
160/160 [=====] - 0s 702us/step - loss: 0.6950
Epoch 43/400
160/160 [=====] - 0s 727us/step - loss: 0.6952
Epoch 44/400
160/160 [=====] - 0s 702us/step - loss: 0.6959
Epoch 45/400
160/160 [=====] - 0s 684us/step - loss: 0.6941
Epoch 46/400
160/160 [=====] - 0s 697us/step - loss: 0.6947
Epoch 47/400
160/160 [=====] - 0s 698us/step - loss: 0.6957
Epoch 48/400
160/160 [=====] - 0s 679us/step - loss: 0.6955

Epoch 49/400
160/160 [=====] - 0s 692us/step - loss: 0.6952
Epoch 50/400
160/160 [=====] - 0s 695us/step - loss: 0.6949
Epoch 51/400
160/160 [=====] - 0s 695us/step - loss: 0.6937
Epoch 52/400
160/160 [=====] - 0s 692us/step - loss: 0.6953
Epoch 53/400
160/160 [=====] - 0s 697us/step - loss: 0.6949
Epoch 54/400
160/160 [=====] - 0s 674us/step - loss: 0.6958
Epoch 55/400
160/160 [=====] - 0s 703us/step - loss: 0.6954
Epoch 56/400
160/160 [=====] - 0s 694us/step - loss: 0.6939
Epoch 57/400
160/160 [=====] - 0s 687us/step - loss: 0.6940
Epoch 58/400
160/160 [=====] - 0s 677us/step - loss: 0.6945
Epoch 59/400
160/160 [=====] - 0s 714us/step - loss: 0.6941
Epoch 60/400
160/160 [=====] - 0s 699us/step - loss: 0.6953
Epoch 61/400
160/160 [=====] - 0s 703us/step - loss: 0.6950
Epoch 62/400
160/160 [=====] - 0s 695us/step - loss: 0.6942
Epoch 63/400
160/160 [=====] - 0s 702us/step - loss: 0.6942
Epoch 64/400
160/160 [=====] - 0s 699us/step - loss: 0.6947
Epoch 65/400
160/160 [=====] - 0s 717us/step - loss: 0.6936
Epoch 66/400
160/160 [=====] - 0s 672us/step - loss: 0.6944
Epoch 67/400
160/160 [=====] - 0s 691us/step - loss: 0.6954
Epoch 68/400
160/160 [=====] - 0s 704us/step - loss: 0.6949
Epoch 69/400
160/160 [=====] - 0s 687us/step - loss: 0.6943
Epoch 70/400
160/160 [=====] - 0s 691us/step - loss: 0.6947
Epoch 71/400
160/160 [=====] - 0s 714us/step - loss: 0.6939
Epoch 72/400
160/160 [=====] - 0s 700us/step - loss: 0.6940

Epoch 73/400
160/160 [=====] - 0s 697us/step - loss: 0.6933
Epoch 74/400
160/160 [=====] - 0s 691us/step - loss: 0.6940
Epoch 75/400
160/160 [=====] - 0s 704us/step - loss: 0.6939
Epoch 76/400
160/160 [=====] - 0s 705us/step - loss: 0.6938
Epoch 77/400
160/160 [=====] - 0s 696us/step - loss: 0.6937
Epoch 78/400
160/160 [=====] - 0s 689us/step - loss: 0.6940
Epoch 79/400
160/160 [=====] - 0s 705us/step - loss: 0.6927
Epoch 80/400
160/160 [=====] - 0s 706us/step - loss: 0.6936
Epoch 81/400
160/160 [=====] - 0s 700us/step - loss: 0.6940
Epoch 82/400
160/160 [=====] - 0s 706us/step - loss: 0.6929
Epoch 83/400
160/160 [=====] - 0s 696us/step - loss: 0.6937
Epoch 84/400
160/160 [=====] - 0s 695us/step - loss: 0.6933
Epoch 85/400
160/160 [=====] - 0s 693us/step - loss: 0.6935
Epoch 86/400
160/160 [=====] - 0s 688us/step - loss: 0.6936
Epoch 87/400
160/160 [=====] - 0s 709us/step - loss: 0.6937
Epoch 88/400
160/160 [=====] - 0s 696us/step - loss: 0.6932
Epoch 89/400
160/160 [=====] - 0s 711us/step - loss: 0.6933
Epoch 90/400
160/160 [=====] - 0s 686us/step - loss: 0.6940
Epoch 91/400
160/160 [=====] - 0s 707us/step - loss: 0.6934
Epoch 92/400
160/160 [=====] - 0s 716us/step - loss: 0.6940
Epoch 93/400
160/160 [=====] - 0s 686us/step - loss: 0.6929
Epoch 94/400
160/160 [=====] - 0s 688us/step - loss: 0.6934
Epoch 95/400
160/160 [=====] - 0s 704us/step - loss: 0.6935
Epoch 96/400
160/160 [=====] - 0s 703us/step - loss: 0.6934

Epoch 97/400
160/160 [=====] - 0s 701us/step - loss: 0.6931
Epoch 98/400
160/160 [=====] - 0s 682us/step - loss: 0.6931
Epoch 99/400
160/160 [=====] - 0s 717us/step - loss: 0.6928
Epoch 100/400
160/160 [=====] - 0s 691us/step - loss: 0.6919
Epoch 101/400
160/160 [=====] - 0s 697us/step - loss: 0.6925
Epoch 102/400
160/160 [=====] - 0s 685us/step - loss: 0.6938
Epoch 103/400
160/160 [=====] - 0s 706us/step - loss: 0.6937
Epoch 104/400
160/160 [=====] - 0s 695us/step - loss: 0.6924
Epoch 105/400
160/160 [=====] - 0s 701us/step - loss: 0.6930
Epoch 106/400
160/160 [=====] - 0s 706us/step - loss: 0.6930
Epoch 107/400
160/160 [=====] - 0s 702us/step - loss: 0.6928
Epoch 108/400
160/160 [=====] - 0s 699us/step - loss: 0.6930
Epoch 109/400
160/160 [=====] - 0s 697us/step - loss: 0.6924
Epoch 110/400
160/160 [=====] - 0s 678us/step - loss: 0.6925
Epoch 111/400
160/160 [=====] - 0s 710us/step - loss: 0.6915
Epoch 112/400
160/160 [=====] - 0s 700us/step - loss: 0.6932
Epoch 113/400
160/160 [=====] - 0s 705us/step - loss: 0.6920
Epoch 114/400
160/160 [=====] - 0s 685us/step - loss: 0.6920
Epoch 115/400
160/160 [=====] - 0s 702us/step - loss: 0.6915
Epoch 116/400
160/160 [=====] - 0s 707us/step - loss: 0.6913
Epoch 117/400
160/160 [=====] - 0s 717us/step - loss: 0.6924
Epoch 118/400
160/160 [=====] - 0s 712us/step - loss: 0.6922
Epoch 119/400
160/160 [=====] - 0s 685us/step - loss: 0.6918
Epoch 120/400
160/160 [=====] - 0s 701us/step - loss: 0.6915

Epoch 121/400
160/160 [=====] - 0s 706us/step - loss: 0.6922
Epoch 122/400
160/160 [=====] - 0s 703us/step - loss: 0.6924
Epoch 123/400
160/160 [=====] - 0s 689us/step - loss: 0.6912
Epoch 124/400
160/160 [=====] - 0s 705us/step - loss: 0.6924
Epoch 125/400
160/160 [=====] - 0s 698us/step - loss: 0.6903
Epoch 126/400
160/160 [=====] - 0s 720us/step - loss: 0.6924
Epoch 127/400
160/160 [=====] - 0s 699us/step - loss: 0.6898
Epoch 128/400
160/160 [=====] - 0s 684us/step - loss: 0.6908
Epoch 129/400
160/160 [=====] - 0s 694us/step - loss: 0.6907
Epoch 130/400
160/160 [=====] - 0s 711us/step - loss: 0.6910
Epoch 131/400
160/160 [=====] - 0s 696us/step - loss: 0.6909
Epoch 132/400
160/160 [=====] - 0s 711us/step - loss: 0.6899
Epoch 133/400
160/160 [=====] - 0s 704us/step - loss: 0.6904
Epoch 134/400
160/160 [=====] - 0s 689us/step - loss: 0.6906
Epoch 135/400
160/160 [=====] - 0s 710us/step - loss: 0.6905
Epoch 136/400
160/160 [=====] - 0s 697us/step - loss: 0.6899
Epoch 137/400
160/160 [=====] - 0s 693us/step - loss: 0.6896
Epoch 138/400
160/160 [=====] - 0s 696us/step - loss: 0.6896
Epoch 139/400
160/160 [=====] - 0s 706us/step - loss: 0.6894
Epoch 140/400
160/160 [=====] - 0s 690us/step - loss: 0.6897
Epoch 141/400
160/160 [=====] - 0s 688us/step - loss: 0.6894
Epoch 142/400
160/160 [=====] - 0s 689us/step - loss: 0.6890
Epoch 143/400
160/160 [=====] - 0s 710us/step - loss: 0.6891
Epoch 144/400
160/160 [=====] - 0s 697us/step - loss: 0.6895

Epoch 145/400
160/160 [=====] - 0s 694us/step - loss: 0.6890
Epoch 146/400
160/160 [=====] - 0s 695us/step - loss: 0.6894
Epoch 147/400
160/160 [=====] - 0s 696us/step - loss: 0.6882
Epoch 148/400
160/160 [=====] - 0s 694us/step - loss: 0.6887
Epoch 149/400
160/160 [=====] - 0s 705us/step - loss: 0.6880
Epoch 150/400
160/160 [=====] - 0s 707us/step - loss: 0.6885
Epoch 151/400
160/160 [=====] - 0s 663us/step - loss: 0.6874
Epoch 152/400
160/160 [=====] - 0s 664us/step - loss: 0.6878
Epoch 153/400
160/160 [=====] - 0s 684us/step - loss: 0.6876
Epoch 154/400
160/160 [=====] - 0s 691us/step - loss: 0.6870
Epoch 155/400
160/160 [=====] - 0s 704us/step - loss: 0.6869
Epoch 156/400
160/160 [=====] - 0s 693us/step - loss: 0.6857
Epoch 157/400
160/160 [=====] - 0s 689us/step - loss: 0.6875
Epoch 158/400
160/160 [=====] - 0s 691us/step - loss: 0.6851
Epoch 159/400
160/160 [=====] - 0s 706us/step - loss: 0.6850
Epoch 160/400
160/160 [=====] - 0s 678us/step - loss: 0.6844
Epoch 161/400
160/160 [=====] - 0s 690us/step - loss: 0.6855
Epoch 162/400
160/160 [=====] - 0s 709us/step - loss: 0.6846
Epoch 163/400
160/160 [=====] - 0s 695us/step - loss: 0.6806
Epoch 164/400
160/160 [=====] - 0s 701us/step - loss: 0.6835
Epoch 165/400
160/160 [=====] - 0s 686us/step - loss: 0.6826
Epoch 166/400
160/160 [=====] - 0s 698us/step - loss: 0.6830
Epoch 167/400
160/160 [=====] - 0s 681us/step - loss: 0.6822
Epoch 168/400
160/160 [=====] - 0s 707us/step - loss: 0.6816

Epoch 169/400
160/160 [=====] - 0s 699us/step - loss: 0.6806
Epoch 170/400
160/160 [=====] - 0s 696us/step - loss: 0.6790
Epoch 171/400
160/160 [=====] - 0s 685us/step - loss: 0.6788
Epoch 172/400
160/160 [=====] - 0s 699us/step - loss: 0.6766
Epoch 173/400
160/160 [=====] - 0s 699us/step - loss: 0.6776
Epoch 174/400
160/160 [=====] - 0s 696us/step - loss: 0.6755
Epoch 175/400
160/160 [=====] - 0s 699us/step - loss: 0.6735
Epoch 176/400
160/160 [=====] - 0s 691us/step - loss: 0.6735
Epoch 177/400
160/160 [=====] - 0s 706us/step - loss: 0.6709
Epoch 178/400
160/160 [=====] - 0s 675us/step - loss: 0.6700
Epoch 179/400
160/160 [=====] - 0s 696us/step - loss: 0.6655
Epoch 180/400
160/160 [=====] - 0s 716us/step - loss: 0.6641
Epoch 181/400
160/160 [=====] - 0s 705us/step - loss: 0.6611
Epoch 182/400
160/160 [=====] - 0s 693us/step - loss: 0.6561
Epoch 183/400
160/160 [=====] - 0s 679us/step - loss: 0.6510
Epoch 184/400
160/160 [=====] - 0s 716us/step - loss: 0.6407
Epoch 185/400
160/160 [=====] - 0s 692us/step - loss: 0.6368
Epoch 186/400
160/160 [=====] - 0s 700us/step - loss: 0.6193
Epoch 187/400
160/160 [=====] - 0s 687us/step - loss: 0.6222
Epoch 188/400
160/160 [=====] - 0s 704us/step - loss: 0.6141
Epoch 189/400
160/160 [=====] - 0s 700us/step - loss: 0.5997
Epoch 190/400
160/160 [=====] - 0s 707us/step - loss: 0.5876
Epoch 191/400
160/160 [=====] - 0s 690us/step - loss: 0.5733
Epoch 192/400
160/160 [=====] - 0s 702us/step - loss: 0.5609

Epoch 193/400
160/160 [=====] - 0s 698us/step - loss: 0.5253
Epoch 194/400
160/160 [=====] - 0s 688us/step - loss: 0.4744
Epoch 195/400
160/160 [=====] - 0s 690us/step - loss: 0.5370
Epoch 196/400
160/160 [=====] - 0s 707us/step - loss: 0.5013
Epoch 197/400
160/160 [=====] - 0s 698us/step - loss: 0.4323
Epoch 198/400
160/160 [=====] - 0s 692us/step - loss: 0.4600
Epoch 199/400
160/160 [=====] - 0s 698us/step - loss: 0.4345
Epoch 200/400
160/160 [=====] - 0s 709us/step - loss: 0.5179
Epoch 201/400
160/160 [=====] - 0s 689us/step - loss: 0.4227
Epoch 202/400
160/160 [=====] - 0s 689us/step - loss: 3.5217
Epoch 203/400
160/160 [=====] - 0s 688us/step - loss: 8.0590
Epoch 204/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 205/400
160/160 [=====] - 0s 696us/step - loss: 8.0590
Epoch 206/400
160/160 [=====] - 0s 680us/step - loss: 8.0590
Epoch 207/400
160/160 [=====] - 0s 681us/step - loss: 8.0590
Epoch 208/400
160/160 [=====] - 0s 643us/step - loss: 8.0590
Epoch 209/400
160/160 [=====] - 0s 670us/step - loss: 8.0590
Epoch 210/400
160/160 [=====] - 0s 664us/step - loss: 8.0590
Epoch 211/400
160/160 [=====] - 0s 662us/step - loss: 8.0590
Epoch 212/400
160/160 [=====] - 0s 631us/step - loss: 8.0590
Epoch 213/400
160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 214/400
160/160 [=====] - 0s 686us/step - loss: 8.0590
Epoch 215/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 216/400
160/160 [=====] - 0s 700us/step - loss: 8.0590

Epoch 217/400
160/160 [=====] - 0s 652us/step - loss: 8.0590
Epoch 218/400
160/160 [=====] - 0s 635us/step - loss: 8.0590
Epoch 219/400
160/160 [=====] - 0s 672us/step - loss: 8.0590
Epoch 220/400
160/160 [=====] - 0s 704us/step - loss: 8.0590
Epoch 221/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 222/400
160/160 [=====] - 0s 709us/step - loss: 8.0590
Epoch 223/400
160/160 [=====] - 0s 706us/step - loss: 8.0590
Epoch 224/400
160/160 [=====] - 0s 705us/step - loss: 8.0590
Epoch 225/400
160/160 [=====] - 0s 702us/step - loss: 8.0590
Epoch 226/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 227/400
160/160 [=====] - 0s 704us/step - loss: 8.0590
Epoch 228/400
160/160 [=====] - 0s 702us/step - loss: 8.0590
Epoch 229/400
160/160 [=====] - 0s 703us/step - loss: 8.0590
Epoch 230/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 231/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 232/400
160/160 [=====] - 0s 705us/step - loss: 8.0590
Epoch 233/400
160/160 [=====] - 0s 701us/step - loss: 8.0590
Epoch 234/400
160/160 [=====] - 0s 699us/step - loss: 8.0590
Epoch 235/400
160/160 [=====] - 0s 683us/step - loss: 8.0590
Epoch 236/400
160/160 [=====] - 0s 661us/step - loss: 8.0590
Epoch 237/400
160/160 [=====] - 0s 683us/step - loss: 8.0590
Epoch 238/400
160/160 [=====] - 0s 719us/step - loss: 8.0590
Epoch 239/400
160/160 [=====] - 0s 701us/step - loss: 8.0590
Epoch 240/400
160/160 [=====] - 0s 707us/step - loss: 8.0590

Epoch 241/400
160/160 [=====] - 0s 700us/step - loss: 8.0590
Epoch 242/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 243/400
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Epoch 250/400
160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 251/400
160/160 [=====] - 0s 732us/step - loss: 8.0590
Epoch 252/400
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Epoch 253/400
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Epoch 255/400
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Epoch 256/400
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Epoch 257/400
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Epoch 258/400
160/160 [=====] - 0s 699us/step - loss: 8.0590
Epoch 259/400
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Epoch 260/400
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Epoch 262/400
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Epoch 263/400
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Epoch 264/400
160/160 [=====] - 0s 718us/step - loss: 8.0590

Epoch 265/400
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Epoch 266/400
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Epoch 267/400
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Epoch 268/400
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Epoch 275/400
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Epoch 276/400
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Epoch 277/400
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Epoch 278/400
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Epoch 279/400
160/160 [=====] - 0s 682us/step - loss: 8.0590
Epoch 280/400
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Epoch 281/400
160/160 [=====] - 0s 667us/step - loss: 8.0590
Epoch 282/400
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Epoch 289/400
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Epoch 296/400
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Epoch 311/400
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Epoch 313/400
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Epoch 316/400
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Epoch 317/400
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Epoch 318/400
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160/160 [=====] - 0s 702us/step - loss: 8.0590
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160/160 [=====] - 0s 703us/step - loss: 8.0590
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160/160 [=====] - 0s 689us/step - loss: 8.0590
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Epoch 335/400
160/160 [=====] - 0s 687us/step - loss: 8.0590
Epoch 336/400
160/160 [=====] - 0s 678us/step - loss: 8.0590

Epoch 337/400
160/160 [=====] - 0s 674us/step - loss: 8.0590
Epoch 338/400
160/160 [=====] - 0s 714us/step - loss: 8.0590
Epoch 339/400
160/160 [=====] - 0s 693us/step - loss: 8.0590
Epoch 340/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 341/400
160/160 [=====] - 0s 714us/step - loss: 8.0590
Epoch 342/400
160/160 [=====] - 0s 701us/step - loss: 8.0590
Epoch 343/400
160/160 [=====] - 0s 680us/step - loss: 8.0590
Epoch 344/400
160/160 [=====] - 0s 700us/step - loss: 8.0590
Epoch 345/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 346/400
160/160 [=====] - 0s 698us/step - loss: 8.0590
Epoch 347/400
160/160 [=====] - 0s 696us/step - loss: 8.0590
Epoch 348/400
160/160 [=====] - 0s 689us/step - loss: 8.0590
Epoch 349/400
160/160 [=====] - 0s 700us/step - loss: 8.0590
Epoch 350/400
160/160 [=====] - 0s 696us/step - loss: 8.0590
Epoch 351/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 352/400
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Epoch 353/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 354/400
160/160 [=====] - 0s 682us/step - loss: 8.0590
Epoch 355/400
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Epoch 356/400
160/160 [=====] - 0s 701us/step - loss: 8.0590
Epoch 357/400
160/160 [=====] - 0s 682us/step - loss: 8.0590
Epoch 358/400
160/160 [=====] - 0s 705us/step - loss: 8.0590
Epoch 359/400
160/160 [=====] - 0s 702us/step - loss: 8.0590
Epoch 360/400
160/160 [=====] - 0s 778us/step - loss: 8.0590

Epoch 361/400
160/160 [=====] - 0s 753us/step - loss: 8.0590
Epoch 362/400
160/160 [=====] - 0s 692us/step - loss: 8.0590
Epoch 363/400
160/160 [=====] - 0s 701us/step - loss: 8.0590
Epoch 364/400
160/160 [=====] - 0s 714us/step - loss: 8.0590
Epoch 365/400
160/160 [=====] - 0s 696us/step - loss: 8.0590
Epoch 366/400
160/160 [=====] - 0s 697us/step - loss: 8.0590
Epoch 367/400
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Epoch 368/400
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Epoch 369/400
160/160 [=====] - 0s 696us/step - loss: 8.0590
Epoch 370/400
160/160 [=====] - 0s 701us/step - loss: 8.0590
Epoch 371/400
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Epoch 372/400
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Epoch 373/400
160/160 [=====] - 0s 681us/step - loss: 8.0590
Epoch 374/400
160/160 [=====] - 0s 667us/step - loss: 8.0590
Epoch 375/400
160/160 [=====] - 0s 680us/step - loss: 8.0590
Epoch 376/400
160/160 [=====] - 0s 647us/step - loss: 8.0590
Epoch 377/400
160/160 [=====] - 0s 690us/step - loss: 8.0590
Epoch 378/400
160/160 [=====] - 0s 666us/step - loss: 8.0590
Epoch 379/400
160/160 [=====] - 0s 685us/step - loss: 8.0590
Epoch 380/400
160/160 [=====] - 0s 684us/step - loss: 8.0590
Epoch 381/400
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Epoch 382/400
160/160 [=====] - 0s 694us/step - loss: 8.0590
Epoch 383/400
160/160 [=====] - 0s 681us/step - loss: 8.0590
Epoch 384/400
160/160 [=====] - 0s 703us/step - loss: 8.0590

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Epoch 385/400
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Epoch 386/400
160/160 [=====] - 0s 695us/step - loss: 8.0590
Epoch 387/400
160/160 [=====] - 0s 691us/step - loss: 8.0590
Epoch 388/400
160/160 [=====] - 0s 706us/step - loss: 8.0590
Epoch 389/400
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Epoch 392/400
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Epoch 393/400
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Epoch 394/400
160/160 [=====] - 0s 716us/step - loss: 8.0590
Epoch 395/400
160/160 [=====] - 0s 717us/step - loss: 8.0590
Epoch 396/400
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Epoch 397/400
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Epoch 398/400
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Epoch 399/400
160/160 [=====] - 0s 703us/step - loss: 8.0590
Epoch 400/400
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Epoch 1/400
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Epoch 2/400
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Epoch 3/400
160/160 [=====] - 0s 694us/step - loss: nan
Epoch 4/400
160/160 [=====] - 0s 710us/step - loss: nan
Epoch 5/400
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Epoch 6/400
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Epoch 7/400
160/160 [=====] - 0s 704us/step - loss: nan
Epoch 8/400

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160/160 [=====] - 0s 712us/step - loss: nan
Epoch 9/400
160/160 [=====] - 0s 703us/step - loss: nan
Epoch 10/400
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Epoch 11/400
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Epoch 12/400
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Epoch 13/400
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Epoch 14/400
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Epoch 15/400
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Epoch 16/400
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Epoch 17/400
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Epoch 24/400
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Epoch 25/400
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Epoch 42/400
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Epoch 43/400
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Epoch 44/400
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Epoch 46/400
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160/160 [=====] - 0s 671us/step - loss: nan
Epoch 238/400
160/160 [=====] - 0s 643us/step - loss: nan
Epoch 239/400
160/160 [=====] - 0s 701us/step - loss: nan
Epoch 240/400
160/160 [=====] - 0s 692us/step - loss: nan
Epoch 241/400
160/160 [=====] - 0s 715us/step - loss: nan
Epoch 242/400
160/160 [=====] - 0s 695us/step - loss: nan
Epoch 243/400
160/160 [=====] - 0s 709us/step - loss: nan
Epoch 244/400
160/160 [=====] - 0s 726us/step - loss: nan
Epoch 245/400
160/160 [=====] - 0s 713us/step - loss: nan
Epoch 246/400
160/160 [=====] - 0s 706us/step - loss: nan
Epoch 247/400
160/160 [=====] - 0s 693us/step - loss: nan
Epoch 248/400

160/160 [=====] - 0s 699us/step - loss: nan
Epoch 249/400
160/160 [=====] - 0s 705us/step - loss: nan
Epoch 250/400
160/160 [=====] - 0s 695us/step - loss: nan
Epoch 251/400
160/160 [=====] - 0s 701us/step - loss: nan
Epoch 252/400
160/160 [=====] - 0s 693us/step - loss: nan
Epoch 253/400
160/160 [=====] - 0s 681us/step - loss: nan
Epoch 254/400
160/160 [=====] - 0s 667us/step - loss: nan
Epoch 255/400
160/160 [=====] - 0s 713us/step - loss: nan
Epoch 256/400
160/160 [=====] - 0s 715us/step - loss: nan
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160/160 [=====] - 0s 691us/step - loss: nan
Epoch 258/400
160/160 [=====] - 0s 697us/step - loss: nan
Epoch 259/400
160/160 [=====] - 0s 697us/step - loss: nan
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Epoch 262/400
160/160 [=====] - 0s 694us/step - loss: nan
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160/160 [=====] - 0s 704us/step - loss: nan
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Epoch 265/400
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Epoch 266/400
160/160 [=====] - 0s 717us/step - loss: nan
Epoch 267/400
160/160 [=====] - 0s 728us/step - loss: nan
Epoch 268/400
160/160 [=====] - 0s 709us/step - loss: nan
Epoch 269/400
160/160 [=====] - 0s 704us/step - loss: nan
Epoch 270/400
160/160 [=====] - 0s 689us/step - loss: nan
Epoch 271/400
160/160 [=====] - 0s 712us/step - loss: nan
Epoch 272/400

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160/160 [=====] - 0s 700us/step - loss: nan
Epoch 273/400
160/160 [=====] - 0s 721us/step - loss: nan
Epoch 274/400
160/160 [=====] - 0s 705us/step - loss: nan
Epoch 275/400
160/160 [=====] - 0s 699us/step - loss: nan
Epoch 276/400
160/160 [=====] - 0s 702us/step - loss: nan
Epoch 277/400
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Epoch 278/400
160/160 [=====] - 0s 729us/step - loss: nan
Epoch 279/400
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160/160 [=====] - 0s 701us/step - loss: nan
Epoch 281/400
160/160 [=====] - 0s 697us/step - loss: nan
Epoch 282/400
160/160 [=====] - 0s 724us/step - loss: nan
Epoch 283/400
160/160 [=====] - 0s 679us/step - loss: nan
Epoch 284/400
160/160 [=====] - 0s 676us/step - loss: nan
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Epoch 286/400
160/160 [=====] - 0s 667us/step - loss: nan
Epoch 287/400
160/160 [=====] - 0s 662us/step - loss: nan
Epoch 288/400
160/160 [=====] - 0s 680us/step - loss: nan
Epoch 289/400
160/160 [=====] - 0s 711us/step - loss: nan
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160/160 [=====] - 0s 700us/step - loss: nan
Epoch 291/400
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160/160 [=====] - 0s 715us/step - loss: nan
Epoch 296/400

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160/160 [=====] - 0s 713us/step - loss: nan
Epoch 297/400
160/160 [=====] - 0s 698us/step - loss: nan
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160/160 [=====] - 0s 723us/step - loss: nan
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160/160 [=====] - 0s 713us/step - loss: nan
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160/160 [=====] - 0s 716us/step - loss: nan
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160/160 [=====] - 0s 705us/step - loss: nan
Epoch 311/400
160/160 [=====] - 0s 719us/step - loss: nan
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160/160 [=====] - 0s 723us/step - loss: nan
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160/160 [=====] - 0s 705us/step - loss: nan
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160/160 [=====] - 0s 732us/step - loss: nan
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160/160 [=====] - 0s 707us/step - loss: nan
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160/160 [=====] - 0s 683us/step - loss: nan
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160/160 [=====] - 0s 706us/step - loss: nan
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160/160 [=====] - 0s 694us/step - loss: nan
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160/160 [=====] - 0s 709us/step - loss: nan
Epoch 359/400
160/160 [=====] - 0s 707us/step - loss: nan
Epoch 360/400
160/160 [=====] - 0s 705us/step - loss: nan
Epoch 361/400
160/160 [=====] - 0s 718us/step - loss: nan
Epoch 362/400
160/160 [=====] - 0s 719us/step - loss: nan
Epoch 363/400
160/160 [=====] - 0s 704us/step - loss: nan
Epoch 364/400
160/160 [=====] - 0s 675us/step - loss: nan
Epoch 365/400
160/160 [=====] - 0s 683us/step - loss: nan
Epoch 366/400
160/160 [=====] - 0s 676us/step - loss: nan
Epoch 367/400
160/160 [=====] - 0s 690us/step - loss: nan
Epoch 368/400

160/160 [=====] - 0s 716us/step - loss: nan
Epoch 369/400
160/160 [=====] - 0s 691us/step - loss: nan
Epoch 370/400
160/160 [=====] - 0s 702us/step - loss: nan
Epoch 371/400
160/160 [=====] - 0s 705us/step - loss: nan
Epoch 372/400
160/160 [=====] - 0s 700us/step - loss: nan
Epoch 373/400
160/160 [=====] - 0s 711us/step - loss: nan
Epoch 374/400
160/160 [=====] - 0s 717us/step - loss: nan
Epoch 375/400
160/160 [=====] - 0s 701us/step - loss: nan
Epoch 376/400
160/160 [=====] - 0s 701us/step - loss: nan
Epoch 377/400
160/160 [=====] - 0s 710us/step - loss: nan
Epoch 378/400
160/160 [=====] - 0s 704us/step - loss: nan
Epoch 379/400
160/160 [=====] - 0s 714us/step - loss: nan
Epoch 380/400
160/160 [=====] - 0s 681us/step - loss: nan
Epoch 381/400
160/160 [=====] - 0s 677us/step - loss: nan
Epoch 382/400
160/160 [=====] - 0s 712us/step - loss: nan
Epoch 383/400
160/160 [=====] - 0s 718us/step - loss: nan
Epoch 384/400
160/160 [=====] - 0s 737us/step - loss: nan
Epoch 385/400
160/160 [=====] - 0s 707us/step - loss: nan
Epoch 386/400
160/160 [=====] - 0s 696us/step - loss: nan
Epoch 387/400
160/160 [=====] - 0s 704us/step - loss: nan
Epoch 388/400
160/160 [=====] - 0s 678us/step - loss: nan
Epoch 389/400
160/160 [=====] - 0s 675us/step - loss: nan
Epoch 390/400
160/160 [=====] - 0s 623us/step - loss: nan
Epoch 391/400
160/160 [=====] - 0s 643us/step - loss: nan
Epoch 392/400

```

160/160 [=====] - 0s 630us/step - loss: nan
Epoch 393/400
160/160 [=====] - 0s 675us/step - loss: nan
Epoch 394/400
160/160 [=====] - 0s 674us/step - loss: nan
Epoch 395/400
160/160 [=====] - 0s 713us/step - loss: nan
Epoch 396/400
160/160 [=====] - 0s 727us/step - loss: nan
Epoch 397/400
160/160 [=====] - 0s 692us/step - loss: nan
Epoch 398/400
160/160 [=====] - 0s 714us/step - loss: nan
Epoch 399/400
160/160 [=====] - 0s 702us/step - loss: nan
Epoch 400/400
160/160 [=====] - 0s 705us/step - loss: nan
160/160 [=====] - 0s 2ms/step

```

```
In [26]: color = []
```

```

    for score in scores:
        if score == min(scores):
            color.append('limegreen')
        else:
            color.append('dodgerblue')

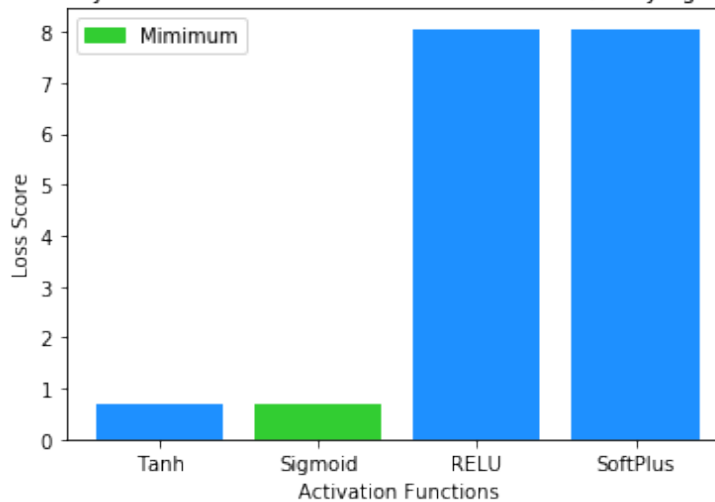
    patch1 = mpatches.Patch(color='limegreen', label='Minimum')
    plt.legend(handles=[patch1], loc = 'best')

    actives = ['Tanh', 'Sigmoid', 'RELU', 'SoftPlus', 'Exponential']

    plt.bar(actives, scores, width = .8, color = color)
    plt.xlabel('Activation Functions')
    plt.ylabel('Loss Score')
    plt.title('Loss Scores For 4 Layer Neural Networks with 5 Neurons Each, Varying Activation Functions')
    plt.show()

```

Loss Scores For 4 Layer Neural Networks with 5 Neurons Each, Varying Activation Functions



Looking at the above graph, the Sigmoid activation function slightly outperforms tanh. (exponential score returns nan values)

1.1.4 Part 1.4

In [27]: scores = []

```
### Stochastic Gradient Descent ###
```

```
model = Sequential()
```

```
model.add(Dense(4, input_dim=2, activation='sigmoid')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(1, activation='sigmoid'))
```

```
sgd = SGD(lr=0.1)
```

```
model.compile(loss='binary_crossentropy', optimizer=sgd)
```

```
model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))
```

```
# evaluate the model
```

```
scores.append(model.evaluate(X, y))
```

```
### RMSprop ###
```

```
from keras.optimizers import RMSprop
```

```

model = Sequential()

model.add(Dense(4, input_dim=2, activation='sigmoid')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(1, activation='sigmoid'))

RMSProp = RMSprop(learning_rate=0.001, rho=0.9)
model.compile(loss='binary_crossentropy', optimizer=RMSProp)

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Adadelta ###

model = Sequential()

model.add(Dense(4, input_dim=2, activation='sigmoid')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(1, activation='sigmoid'))

from keras.optimizers import Adadelta

adad = Adadelta(learning_rate=1.0, rho=0.95)

model.compile(loss='binary_crossentropy', optimizer=adad)

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Adamax ###

model = Sequential()

```

```

model.add(Dense(4, input_dim=2, activation='sigmoid')) #sigmoid, relu
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(4, input_dim = 4, activation='sigmoid'))
model.add(Dense(1, activation='sigmoid'))

from keras.optimizers import Adamax

amax = Adamax(learning_rate=0.002, beta_1=0.9, beta_2=0.999)

model.compile(loss='binary_crossentropy', optimizer=amax)

model.fit(X, y, batch_size=2, epochs=400) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

```

```

Epoch 1/400
160/160 [=====] - 1s 4ms/step - loss: 0.7042
Epoch 2/400
160/160 [=====] - 0s 732us/step - loss: 0.7017
Epoch 3/400
160/160 [=====] - 0s 811us/step - loss: 0.7018
Epoch 4/400
160/160 [=====] - 0s 773us/step - loss: 0.7017
Epoch 5/400
160/160 [=====] - 0s 716us/step - loss: 0.6995
Epoch 6/400
160/160 [=====] - 0s 721us/step - loss: 0.6987
Epoch 7/400
160/160 [=====] - 0s 734us/step - loss: 0.7030
Epoch 8/400
160/160 [=====] - 0s 722us/step - loss: 0.6997
Epoch 9/400
160/160 [=====] - 0s 720us/step - loss: 0.7016
Epoch 10/400
160/160 [=====] - 0s 769us/step - loss: 0.6978
Epoch 11/400
160/160 [=====] - 0s 794us/step - loss: 0.6979
Epoch 12/400
160/160 [=====] - 0s 767us/step - loss: 0.6981
Epoch 13/400
160/160 [=====] - 0s 778us/step - loss: 0.7029
Epoch 14/400
160/160 [=====] - 0s 754us/step - loss: 0.6990

```

Epoch 15/400
160/160 [=====] - 0s 733us/step - loss: 0.7002
Epoch 16/400
160/160 [=====] - 0s 733us/step - loss: 0.6997
Epoch 17/400
160/160 [=====] - 0s 746us/step - loss: 0.7019
Epoch 18/400
160/160 [=====] - 0s 747us/step - loss: 0.6993
Epoch 19/400
160/160 [=====] - 0s 775us/step - loss: 0.7003
Epoch 20/400
160/160 [=====] - 0s 785us/step - loss: 0.6962
Epoch 21/400
160/160 [=====] - 0s 754us/step - loss: 0.7005
Epoch 22/400
160/160 [=====] - 0s 728us/step - loss: 0.6996
Epoch 23/400
160/160 [=====] - 0s 751us/step - loss: 0.7004
Epoch 24/400
160/160 [=====] - 0s 769us/step - loss: 0.7030
Epoch 25/400
160/160 [=====] - 0s 758us/step - loss: 0.6952
Epoch 26/400
160/160 [=====] - 0s 738us/step - loss: 0.6995
Epoch 27/400
160/160 [=====] - 0s 741us/step - loss: 0.6964
Epoch 28/400
160/160 [=====] - 0s 766us/step - loss: 0.6950
Epoch 29/400
160/160 [=====] - 0s 726us/step - loss: 0.6998
Epoch 30/400
160/160 [=====] - 0s 722us/step - loss: 0.6978
Epoch 31/400
160/160 [=====] - 0s 699us/step - loss: 0.6994
Epoch 32/400
160/160 [=====] - 0s 752us/step - loss: 0.7029
Epoch 33/400
160/160 [=====] - 0s 742us/step - loss: 0.7012
Epoch 34/400
160/160 [=====] - 0s 713us/step - loss: 0.6973
Epoch 35/400
160/160 [=====] - 0s 711us/step - loss: 0.7020
Epoch 36/400
160/160 [=====] - 0s 751us/step - loss: 0.6962
Epoch 37/400
160/160 [=====] - 0s 741us/step - loss: 0.7008
Epoch 38/400
160/160 [=====] - 0s 742us/step - loss: 0.6986

Epoch 39/400
160/160 [=====] - 0s 769us/step - loss: 0.6955
Epoch 40/400
160/160 [=====] - 0s 748us/step - loss: 0.6998
Epoch 41/400
160/160 [=====] - 0s 809us/step - loss: 0.6933
Epoch 42/400
160/160 [=====] - 0s 714us/step - loss: 0.6988
Epoch 43/400
160/160 [=====] - 0s 743us/step - loss: 0.7015
Epoch 44/400
160/160 [=====] - 0s 781us/step - loss: 0.6992
Epoch 45/400
160/160 [=====] - 0s 791us/step - loss: 0.7009
Epoch 46/400
160/160 [=====] - 0s 745us/step - loss: 0.6970
Epoch 47/400
160/160 [=====] - 0s 754us/step - loss: 0.6978
Epoch 48/400
160/160 [=====] - 0s 739us/step - loss: 0.7018
Epoch 49/400
160/160 [=====] - 0s 778us/step - loss: 0.6963
Epoch 50/400
160/160 [=====] - 0s 776us/step - loss: 0.7034
Epoch 51/400
160/160 [=====] - 0s 771us/step - loss: 0.7015
Epoch 52/400
160/160 [=====] - 0s 775us/step - loss: 0.6991
Epoch 53/400
160/160 [=====] - 0s 775us/step - loss: 0.7000
Epoch 54/400
160/160 [=====] - 0s 705us/step - loss: 0.7005
Epoch 55/400
160/160 [=====] - 0s 698us/step - loss: 0.6994
Epoch 56/400
160/160 [=====] - 0s 709us/step - loss: 0.6987
Epoch 57/400
160/160 [=====] - 0s 729us/step - loss: 0.6994
Epoch 58/400
160/160 [=====] - 0s 738us/step - loss: 0.6959
Epoch 59/400
160/160 [=====] - 0s 698us/step - loss: 0.6999
Epoch 60/400
160/160 [=====] - 0s 727us/step - loss: 0.6988
Epoch 61/400
160/160 [=====] - 0s 709us/step - loss: 0.6989
Epoch 62/400
160/160 [=====] - 0s 756us/step - loss: 0.6999

Epoch 63/400
160/160 [=====] - 0s 709us/step - loss: 0.7000
Epoch 64/400
160/160 [=====] - 0s 719us/step - loss: 0.6971
Epoch 65/400
160/160 [=====] - 0s 714us/step - loss: 0.7023
Epoch 66/400
160/160 [=====] - 0s 705us/step - loss: 0.6993
Epoch 67/400
160/160 [=====] - 0s 724us/step - loss: 0.6989
Epoch 68/400
160/160 [=====] - 0s 686us/step - loss: 0.7016
Epoch 69/400
160/160 [=====] - 0s 699us/step - loss: 0.6977
Epoch 70/400
160/160 [=====] - 0s 706us/step - loss: 0.6981
Epoch 71/400
160/160 [=====] - 0s 705us/step - loss: 0.7014
Epoch 72/400
160/160 [=====] - 0s 716us/step - loss: 0.7011
Epoch 73/400
160/160 [=====] - 0s 741us/step - loss: 0.6997
Epoch 74/400
160/160 [=====] - 0s 828us/step - loss: 0.6996
Epoch 75/400
160/160 [=====] - 0s 791us/step - loss: 0.6991
Epoch 76/400
160/160 [=====] - 0s 712us/step - loss: 0.6999
Epoch 77/400
160/160 [=====] - 0s 710us/step - loss: 0.6979
Epoch 78/400
160/160 [=====] - 0s 715us/step - loss: 0.7009
Epoch 79/400
160/160 [=====] - 0s 705us/step - loss: 0.6983
Epoch 80/400
160/160 [=====] - 0s 733us/step - loss: 0.6967
Epoch 81/400
160/160 [=====] - 0s 783us/step - loss: 0.6994
Epoch 82/400
160/160 [=====] - 0s 784us/step - loss: 0.6963
Epoch 83/400
160/160 [=====] - 0s 713us/step - loss: 0.7027
Epoch 84/400
160/160 [=====] - 0s 701us/step - loss: 0.6980
Epoch 85/400
160/160 [=====] - 0s 751us/step - loss: 0.7009
Epoch 86/400
160/160 [=====] - 0s 700us/step - loss: 0.6995

Epoch 87/400
160/160 [=====] - 0s 731us/step - loss: 0.6992
Epoch 88/400
160/160 [=====] - 0s 728us/step - loss: 0.6993
Epoch 89/400
160/160 [=====] - 0s 750us/step - loss: 0.6993
Epoch 90/400
160/160 [=====] - 0s 744us/step - loss: 0.6988
Epoch 91/400
160/160 [=====] - 0s 761us/step - loss: 0.7009
Epoch 92/400
160/160 [=====] - 0s 765us/step - loss: 0.7025
Epoch 93/400
160/160 [=====] - 0s 719us/step - loss: 0.7018
Epoch 94/400
160/160 [=====] - 0s 704us/step - loss: 0.6993
Epoch 95/400
160/160 [=====] - 0s 704us/step - loss: 0.6997
Epoch 96/400
160/160 [=====] - 0s 724us/step - loss: 0.6986
Epoch 97/400
160/160 [=====] - 0s 688us/step - loss: 0.7007
Epoch 98/400
160/160 [=====] - 0s 735us/step - loss: 0.6979
Epoch 99/400
160/160 [=====] - 0s 705us/step - loss: 0.6982
Epoch 100/400
160/160 [=====] - 0s 685us/step - loss: 0.7006
Epoch 101/400
160/160 [=====] - 0s 681us/step - loss: 0.6989
Epoch 102/400
160/160 [=====] - 0s 680us/step - loss: 0.6977
Epoch 103/400
160/160 [=====] - 0s 697us/step - loss: 0.7001
Epoch 104/400
160/160 [=====] - 0s 749us/step - loss: 0.6978
Epoch 105/400
160/160 [=====] - 0s 727us/step - loss: 0.7005
Epoch 106/400
160/160 [=====] - 0s 695us/step - loss: 0.7000
Epoch 107/400
160/160 [=====] - 0s 704us/step - loss: 0.7004
Epoch 108/400
160/160 [=====] - 0s 694us/step - loss: 0.6969
Epoch 109/400
160/160 [=====] - 0s 696us/step - loss: 0.7004
Epoch 110/400
160/160 [=====] - 0s 747us/step - loss: 0.6994

Epoch 111/400
160/160 [=====] - 0s 695us/step - loss: 0.6996
Epoch 112/400
160/160 [=====] - 0s 710us/step - loss: 0.6988
Epoch 113/400
160/160 [=====] - 0s 723us/step - loss: 0.7009
Epoch 114/400
160/160 [=====] - 0s 717us/step - loss: 0.6997
Epoch 115/400
160/160 [=====] - 0s 716us/step - loss: 0.7008
Epoch 116/400
160/160 [=====] - 0s 755us/step - loss: 0.6961
Epoch 117/400
160/160 [=====] - 0s 725us/step - loss: 0.6996
Epoch 118/400
160/160 [=====] - 0s 746us/step - loss: 0.6918
Epoch 119/400
160/160 [=====] - 0s 726us/step - loss: 0.7024
Epoch 120/400
160/160 [=====] - 0s 740us/step - loss: 0.6996
Epoch 121/400
160/160 [=====] - 0s 744us/step - loss: 0.6955
Epoch 122/400
160/160 [=====] - 0s 765us/step - loss: 0.6967
Epoch 123/400
160/160 [=====] - 0s 719us/step - loss: 0.7011
Epoch 124/400
160/160 [=====] - 0s 760us/step - loss: 0.6993
Epoch 125/400
160/160 [=====] - 0s 689us/step - loss: 0.6981
Epoch 126/400
160/160 [=====] - 0s 701us/step - loss: 0.6999
Epoch 127/400
160/160 [=====] - 0s 725us/step - loss: 0.6964
Epoch 128/400
160/160 [=====] - 0s 726us/step - loss: 0.7006
Epoch 129/400
160/160 [=====] - 0s 716us/step - loss: 0.6957
Epoch 130/400
160/160 [=====] - 0s 673us/step - loss: 0.7002
Epoch 131/400
160/160 [=====] - 0s 726us/step - loss: 0.6977
Epoch 132/400
160/160 [=====] - 0s 734us/step - loss: 0.6984
Epoch 133/400
160/160 [=====] - 0s 735us/step - loss: 0.7007
Epoch 134/400
160/160 [=====] - 0s 734us/step - loss: 0.7002

Epoch 135/400
160/160 [=====] - 0s 717us/step - loss: 0.6997
Epoch 136/400
160/160 [=====] - 0s 687us/step - loss: 0.6984
Epoch 137/400
160/160 [=====] - 0s 737us/step - loss: 0.6978
Epoch 138/400
160/160 [=====] - 0s 727us/step - loss: 0.6993
Epoch 139/400
160/160 [=====] - 0s 734us/step - loss: 0.6993
Epoch 140/400
160/160 [=====] - 0s 711us/step - loss: 0.6982
Epoch 141/400
160/160 [=====] - 0s 738us/step - loss: 0.6980
Epoch 142/400
160/160 [=====] - 0s 756us/step - loss: 0.7010
Epoch 143/400
160/160 [=====] - 0s 764us/step - loss: 0.6984
Epoch 144/400
160/160 [=====] - 0s 704us/step - loss: 0.6988
Epoch 145/400
160/160 [=====] - 0s 707us/step - loss: 0.6987
Epoch 146/400
160/160 [=====] - 0s 687us/step - loss: 0.6976
Epoch 147/400
160/160 [=====] - 0s 762us/step - loss: 0.6996
Epoch 148/400
160/160 [=====] - 0s 720us/step - loss: 0.6965
Epoch 149/400
160/160 [=====] - 0s 711us/step - loss: 0.6980
Epoch 150/400
160/160 [=====] - 0s 733us/step - loss: 0.6983
Epoch 151/400
160/160 [=====] - 0s 759us/step - loss: 0.6983
Epoch 152/400
160/160 [=====] - 0s 745us/step - loss: 0.6964
Epoch 153/400
160/160 [=====] - 0s 706us/step - loss: 0.6987
Epoch 154/400
160/160 [=====] - 0s 727us/step - loss: 0.6992
Epoch 155/400
160/160 [=====] - 0s 736us/step - loss: 0.6988
Epoch 156/400
160/160 [=====] - 0s 740us/step - loss: 0.6947
Epoch 157/400
160/160 [=====] - 0s 719us/step - loss: 0.7007
Epoch 158/400
160/160 [=====] - 0s 683us/step - loss: 0.6984

Epoch 159/400
160/160 [=====] - 0s 701us/step - loss: 0.7001
Epoch 160/400
160/160 [=====] - 0s 690us/step - loss: 0.6993
Epoch 161/400
160/160 [=====] - 0s 711us/step - loss: 0.6995
Epoch 162/400
160/160 [=====] - 0s 750us/step - loss: 0.6982
Epoch 163/400
160/160 [=====] - 0s 735us/step - loss: 0.7009
Epoch 164/400
160/160 [=====] - 0s 694us/step - loss: 0.7005
Epoch 165/400
160/160 [=====] - 0s 740us/step - loss: 0.6989
Epoch 166/400
160/160 [=====] - 0s 697us/step - loss: 0.6984
Epoch 167/400
160/160 [=====] - 0s 728us/step - loss: 0.6988
Epoch 168/400
160/160 [=====] - 0s 745us/step - loss: 0.6977
Epoch 169/400
160/160 [=====] - 0s 727us/step - loss: 0.6992
Epoch 170/400
160/160 [=====] - 0s 738us/step - loss: 0.6999
Epoch 171/400
160/160 [=====] - 0s 688us/step - loss: 0.7014
Epoch 172/400
160/160 [=====] - 0s 703us/step - loss: 0.6999
Epoch 173/400
160/160 [=====] - 0s 759us/step - loss: 0.6972
Epoch 174/400
160/160 [=====] - 0s 742us/step - loss: 0.7000
Epoch 175/400
160/160 [=====] - 0s 699us/step - loss: 0.6985
Epoch 176/400
160/160 [=====] - 0s 705us/step - loss: 0.6973
Epoch 177/400
160/160 [=====] - 0s 747us/step - loss: 0.7000
Epoch 178/400
160/160 [=====] - 0s 733us/step - loss: 0.6970
Epoch 179/400
160/160 [=====] - 0s 717us/step - loss: 0.7001
Epoch 180/400
160/160 [=====] - 0s 742us/step - loss: 0.6994
Epoch 181/400
160/160 [=====] - 0s 736us/step - loss: 0.6998
Epoch 182/400
160/160 [=====] - 0s 733us/step - loss: 0.6969

Epoch 183/400
160/160 [=====] - 0s 723us/step - loss: 0.6940
Epoch 184/400
160/160 [=====] - 0s 690us/step - loss: 0.7013
Epoch 185/400
160/160 [=====] - 0s 706us/step - loss: 0.7006
Epoch 186/400
160/160 [=====] - 0s 707us/step - loss: 0.6974
Epoch 187/400
160/160 [=====] - 0s 698us/step - loss: 0.6995
Epoch 188/400
160/160 [=====] - 0s 718us/step - loss: 0.6985
Epoch 189/400
160/160 [=====] - 0s 706us/step - loss: 0.6983
Epoch 190/400
160/160 [=====] - 0s 704us/step - loss: 0.6985
Epoch 191/400
160/160 [=====] - 0s 699us/step - loss: 0.6985
Epoch 192/400
160/160 [=====] - 0s 705us/step - loss: 0.7001
Epoch 193/400
160/160 [=====] - 0s 752us/step - loss: 0.6978
Epoch 194/400
160/160 [=====] - 0s 685us/step - loss: 0.6960
Epoch 195/400
160/160 [=====] - 0s 737us/step - loss: 0.7002
Epoch 196/400
160/160 [=====] - 0s 657us/step - loss: 0.6992
Epoch 197/400
160/160 [=====] - 0s 690us/step - loss: 0.7008
Epoch 198/400
160/160 [=====] - 0s 737us/step - loss: 0.6980
Epoch 199/400
160/160 [=====] - 0s 718us/step - loss: 0.6999
Epoch 200/400
160/160 [=====] - 0s 658us/step - loss: 0.6994
Epoch 201/400
160/160 [=====] - 0s 678us/step - loss: 0.6997
Epoch 202/400
160/160 [=====] - 0s 708us/step - loss: 0.7001
Epoch 203/400
160/160 [=====] - 0s 665us/step - loss: 0.6993
Epoch 204/400
160/160 [=====] - 0s 741us/step - loss: 0.6906
Epoch 205/400
160/160 [=====] - 0s 704us/step - loss: 0.6959
Epoch 206/400
160/160 [=====] - 0s 677us/step - loss: 0.6991

Epoch 207/400
160/160 [=====] - 0s 683us/step - loss: 0.6994
Epoch 208/400
160/160 [=====] - 0s 725us/step - loss: 0.6998
Epoch 209/400
160/160 [=====] - 0s 692us/step - loss: 0.6990
Epoch 210/400
160/160 [=====] - 0s 690us/step - loss: 0.6998
Epoch 211/400
160/160 [=====] - 0s 702us/step - loss: 0.6976
Epoch 212/400
160/160 [=====] - 0s 679us/step - loss: 0.6983
Epoch 213/400
160/160 [=====] - 0s 711us/step - loss: 0.6983
Epoch 214/400
160/160 [=====] - 0s 681us/step - loss: 0.7002
Epoch 215/400
160/160 [=====] - 0s 698us/step - loss: 0.6957
Epoch 216/400
160/160 [=====] - 0s 662us/step - loss: 0.7016
Epoch 217/400
160/160 [=====] - 0s 688us/step - loss: 0.6994
Epoch 218/400
160/160 [=====] - 0s 701us/step - loss: 0.6996
Epoch 219/400
160/160 [=====] - 0s 686us/step - loss: 0.6988
Epoch 220/400
160/160 [=====] - 0s 682us/step - loss: 0.6982
Epoch 221/400
160/160 [=====] - 0s 700us/step - loss: 0.6989
Epoch 222/400
160/160 [=====] - 0s 706us/step - loss: 0.6982
Epoch 223/400
160/160 [=====] - 0s 700us/step - loss: 0.7001
Epoch 224/400
160/160 [=====] - 0s 744us/step - loss: 0.6987
Epoch 225/400
160/160 [=====] - 0s 733us/step - loss: 0.7002
Epoch 226/400
160/160 [=====] - 0s 731us/step - loss: 0.6996
Epoch 227/400
160/160 [=====] - 0s 710us/step - loss: 0.6977
Epoch 228/400
160/160 [=====] - 0s 714us/step - loss: 0.6991
Epoch 229/400
160/160 [=====] - 0s 738us/step - loss: 0.6966
Epoch 230/400
160/160 [=====] - 0s 692us/step - loss: 0.6983

Epoch 231/400
160/160 [=====] - 0s 689us/step - loss: 0.6984
Epoch 232/400
160/160 [=====] - 0s 731us/step - loss: 0.6937
Epoch 233/400
160/160 [=====] - 0s 695us/step - loss: 0.7000
Epoch 234/400
160/160 [=====] - 0s 710us/step - loss: 0.6981
Epoch 235/400
160/160 [=====] - 0s 705us/step - loss: 0.6967
Epoch 236/400
160/160 [=====] - 0s 743us/step - loss: 0.6995
Epoch 237/400
160/160 [=====] - 0s 721us/step - loss: 0.6991
Epoch 238/400
160/160 [=====] - 0s 709us/step - loss: 0.6997
Epoch 239/400
160/160 [=====] - 0s 724us/step - loss: 0.6993
Epoch 240/400
160/160 [=====] - 0s 723us/step - loss: 0.6990
Epoch 241/400
160/160 [=====] - 0s 713us/step - loss: 0.7002
Epoch 242/400
160/160 [=====] - 0s 704us/step - loss: 0.6997
Epoch 243/400
160/160 [=====] - 0s 817us/step - loss: 0.6966
Epoch 244/400
160/160 [=====] - 0s 790us/step - loss: 0.6984
Epoch 245/400
160/160 [=====] - 0s 841us/step - loss: 0.6979
Epoch 246/400
160/160 [=====] - 0s 733us/step - loss: 0.6969
Epoch 247/400
160/160 [=====] - 0s 752us/step - loss: 0.6979
Epoch 248/400
160/160 [=====] - 0s 749us/step - loss: 0.6988
Epoch 249/400
160/160 [=====] - 0s 696us/step - loss: 0.6995
Epoch 250/400
160/160 [=====] - 0s 703us/step - loss: 0.7004
Epoch 251/400
160/160 [=====] - 0s 703us/step - loss: 0.7003
Epoch 252/400
160/160 [=====] - 0s 690us/step - loss: 0.6984
Epoch 253/400
160/160 [=====] - 0s 673us/step - loss: 0.6975
Epoch 254/400
160/160 [=====] - 0s 704us/step - loss: 0.6984

Epoch 255/400
160/160 [=====] - 0s 695us/step - loss: 0.6984
Epoch 256/400
160/160 [=====] - 0s 691us/step - loss: 0.6990
Epoch 257/400
160/160 [=====] - 0s 736us/step - loss: 0.6973
Epoch 258/400
160/160 [=====] - 0s 704us/step - loss: 0.6989
Epoch 259/400
160/160 [=====] - 0s 697us/step - loss: 0.6988
Epoch 260/400
160/160 [=====] - 0s 758us/step - loss: 0.6974
Epoch 261/400
160/160 [=====] - 0s 687us/step - loss: 0.6995
Epoch 262/400
160/160 [=====] - 0s 733us/step - loss: 0.6991
Epoch 263/400
160/160 [=====] - 0s 716us/step - loss: 0.6928
Epoch 264/400
160/160 [=====] - 0s 707us/step - loss: 0.7007
Epoch 265/400
160/160 [=====] - 0s 697us/step - loss: 0.6973
Epoch 266/400
160/160 [=====] - 0s 690us/step - loss: 0.6990
Epoch 267/400
160/160 [=====] - 0s 711us/step - loss: 0.6961
Epoch 268/400
160/160 [=====] - 0s 690us/step - loss: 0.6997
Epoch 269/400
160/160 [=====] - 0s 665us/step - loss: 0.6987
Epoch 270/400
160/160 [=====] - 0s 697us/step - loss: 0.7002
Epoch 271/400
160/160 [=====] - 0s 720us/step - loss: 0.6985
Epoch 272/400
160/160 [=====] - 0s 703us/step - loss: 0.6982
Epoch 273/400
160/160 [=====] - 0s 700us/step - loss: 0.6973
Epoch 274/400
160/160 [=====] - 0s 694us/step - loss: 0.6995
Epoch 275/400
160/160 [=====] - 0s 701us/step - loss: 0.6979
Epoch 276/400
160/160 [=====] - 0s 692us/step - loss: 0.7005
Epoch 277/400
160/160 [=====] - 0s 708us/step - loss: 0.6995
Epoch 278/400
160/160 [=====] - 0s 709us/step - loss: 0.6973

Epoch 279/400
160/160 [=====] - 0s 719us/step - loss: 0.6997
Epoch 280/400
160/160 [=====] - 0s 727us/step - loss: 0.6970
Epoch 281/400
160/160 [=====] - 0s 745us/step - loss: 0.7008
Epoch 282/400
160/160 [=====] - 0s 739us/step - loss: 0.6993
Epoch 283/400
160/160 [=====] - 0s 736us/step - loss: 0.6971
Epoch 284/400
160/160 [=====] - 0s 720us/step - loss: 0.6978
Epoch 285/400
160/160 [=====] - 0s 728us/step - loss: 0.6989
Epoch 286/400
160/160 [=====] - 0s 729us/step - loss: 0.6977
Epoch 287/400
160/160 [=====] - 0s 738us/step - loss: 0.7000
Epoch 288/400
160/160 [=====] - 0s 675us/step - loss: 0.6973
Epoch 289/400
160/160 [=====] - 0s 704us/step - loss: 0.6978
Epoch 290/400
160/160 [=====] - 0s 733us/step - loss: 0.6968
Epoch 291/400
160/160 [=====] - 0s 692us/step - loss: 0.6997
Epoch 292/400
160/160 [=====] - 0s 730us/step - loss: 0.6972
Epoch 293/400
160/160 [=====] - 0s 720us/step - loss: 0.6975
Epoch 294/400
160/160 [=====] - 0s 731us/step - loss: 0.6956
Epoch 295/400
160/160 [=====] - 0s 707us/step - loss: 0.6996
Epoch 296/400
160/160 [=====] - 0s 759us/step - loss: 0.6997
Epoch 297/400
160/160 [=====] - 0s 754us/step - loss: 0.6993
Epoch 298/400
160/160 [=====] - 0s 747us/step - loss: 0.6979
Epoch 299/400
160/160 [=====] - 0s 751us/step - loss: 0.6991
Epoch 300/400
160/160 [=====] - 0s 682us/step - loss: 0.6972
Epoch 301/400
160/160 [=====] - 0s 709us/step - loss: 0.7007
Epoch 302/400
160/160 [=====] - 0s 734us/step - loss: 0.6984

Epoch 303/400
160/160 [=====] - 0s 683us/step - loss: 0.6974
Epoch 304/400
160/160 [=====] - 0s 720us/step - loss: 0.6988
Epoch 305/400
160/160 [=====] - 0s 711us/step - loss: 0.6968
Epoch 306/400
160/160 [=====] - 0s 677us/step - loss: 0.6982
Epoch 307/400
160/160 [=====] - 0s 704us/step - loss: 0.6995
Epoch 308/400
160/160 [=====] - 0s 761us/step - loss: 0.6966
Epoch 309/400
160/160 [=====] - 0s 681us/step - loss: 0.7001
Epoch 310/400
160/160 [=====] - 0s 696us/step - loss: 0.6983
Epoch 311/400
160/160 [=====] - 0s 710us/step - loss: 0.6981
Epoch 312/400
160/160 [=====] - 0s 729us/step - loss: 0.6980
Epoch 313/400
160/160 [=====] - 0s 717us/step - loss: 0.6997
Epoch 314/400
160/160 [=====] - 0s 748us/step - loss: 0.6995
Epoch 315/400
160/160 [=====] - 0s 740us/step - loss: 0.6987
Epoch 316/400
160/160 [=====] - 0s 717us/step - loss: 0.6986
Epoch 317/400
160/160 [=====] - 0s 740us/step - loss: 0.6972
Epoch 318/400
160/160 [=====] - 0s 730us/step - loss: 0.6979
Epoch 319/400
160/160 [=====] - 0s 743us/step - loss: 0.6982
Epoch 320/400
160/160 [=====] - 0s 705us/step - loss: 0.7004
Epoch 321/400
160/160 [=====] - 0s 678us/step - loss: 0.6998
Epoch 322/400
160/160 [=====] - 0s 689us/step - loss: 0.6977
Epoch 323/400
160/160 [=====] - 0s 719us/step - loss: 0.6986
Epoch 324/400
160/160 [=====] - 0s 675us/step - loss: 0.6986
Epoch 325/400
160/160 [=====] - 0s 707us/step - loss: 0.6999
Epoch 326/400
160/160 [=====] - 0s 732us/step - loss: 0.6992

Epoch 327/400
160/160 [=====] - 0s 679us/step - loss: 0.6987
Epoch 328/400
160/160 [=====] - 0s 732us/step - loss: 0.6986
Epoch 329/400
160/160 [=====] - 0s 691us/step - loss: 0.6977
Epoch 330/400
160/160 [=====] - 0s 701us/step - loss: 0.6992
Epoch 331/400
160/160 [=====] - 0s 760us/step - loss: 0.6996
Epoch 332/400
160/160 [=====] - 0s 762us/step - loss: 0.6985
Epoch 333/400
160/160 [=====] - 0s 770us/step - loss: 0.6989
Epoch 334/400
160/160 [=====] - 0s 713us/step - loss: 0.6989
Epoch 335/400
160/160 [=====] - 0s 718us/step - loss: 0.7006
Epoch 336/400
160/160 [=====] - 0s 712us/step - loss: 0.6986
Epoch 337/400
160/160 [=====] - 0s 694us/step - loss: 0.6982
Epoch 338/400
160/160 [=====] - 0s 716us/step - loss: 0.6994
Epoch 339/400
160/160 [=====] - 0s 736us/step - loss: 0.6983
Epoch 340/400
160/160 [=====] - 0s 748us/step - loss: 0.6989
Epoch 341/400
160/160 [=====] - 0s 725us/step - loss: 0.6991
Epoch 342/400
160/160 [=====] - 0s 703us/step - loss: 0.6970
Epoch 343/400
160/160 [=====] - 0s 714us/step - loss: 0.6991
Epoch 344/400
160/160 [=====] - 0s 746us/step - loss: 0.6984
Epoch 345/400
160/160 [=====] - 0s 774us/step - loss: 0.6969
Epoch 346/400
160/160 [=====] - 0s 724us/step - loss: 0.6998
Epoch 347/400
160/160 [=====] - 0s 700us/step - loss: 0.6990
Epoch 348/400
160/160 [=====] - 0s 733us/step - loss: 0.6999
Epoch 349/400
160/160 [=====] - 0s 728us/step - loss: 0.6986
Epoch 350/400
160/160 [=====] - 0s 742us/step - loss: 0.6979

Epoch 351/400
160/160 [=====] - 0s 756us/step - loss: 0.6988
Epoch 352/400
160/160 [=====] - 0s 767us/step - loss: 0.6996
Epoch 353/400
160/160 [=====] - 0s 737us/step - loss: 0.6953
Epoch 354/400
160/160 [=====] - 0s 706us/step - loss: 0.7006
Epoch 355/400
160/160 [=====] - 0s 708us/step - loss: 0.6990
Epoch 356/400
160/160 [=====] - 0s 726us/step - loss: 0.6992
Epoch 357/400
160/160 [=====] - 0s 725us/step - loss: 0.6989
Epoch 358/400
160/160 [=====] - 0s 696us/step - loss: 0.6978
Epoch 359/400
160/160 [=====] - 0s 721us/step - loss: 0.6908
Epoch 360/400
160/160 [=====] - 0s 703us/step - loss: 0.6995
Epoch 361/400
160/160 [=====] - 0s 714us/step - loss: 0.6993
Epoch 362/400
160/160 [=====] - 0s 776us/step - loss: 0.6979
Epoch 363/400
160/160 [=====] - 0s 747us/step - loss: 0.6998
Epoch 364/400
160/160 [=====] - 0s 767us/step - loss: 0.6994
Epoch 365/400
160/160 [=====] - 0s 695us/step - loss: 0.6997
Epoch 366/400
160/160 [=====] - 0s 698us/step - loss: 0.6999
Epoch 367/400
160/160 [=====] - 0s 756us/step - loss: 0.6988
Epoch 368/400
160/160 [=====] - 0s 762us/step - loss: 0.6987
Epoch 369/400
160/160 [=====] - 0s 718us/step - loss: 0.6997
Epoch 370/400
160/160 [=====] - 0s 724us/step - loss: 0.6974
Epoch 371/400
160/160 [=====] - 0s 764us/step - loss: 0.6996
Epoch 372/400
160/160 [=====] - 0s 743us/step - loss: 0.6982
Epoch 373/400
160/160 [=====] - 0s 726us/step - loss: 0.6991
Epoch 374/400
160/160 [=====] - 0s 713us/step - loss: 0.6987

Epoch 375/400
160/160 [=====] - 0s 758us/step - loss: 0.6944
Epoch 376/400
160/160 [=====] - 0s 755us/step - loss: 0.6994
Epoch 377/400
160/160 [=====] - 0s 683us/step - loss: 0.7004
Epoch 378/400
160/160 [=====] - 0s 714us/step - loss: 0.6989
Epoch 379/400
160/160 [=====] - 0s 730us/step - loss: 0.7002
Epoch 380/400
160/160 [=====] - 0s 724us/step - loss: 0.6935
Epoch 381/400
160/160 [=====] - 0s 725us/step - loss: 0.6983
Epoch 382/400
160/160 [=====] - 0s 767us/step - loss: 0.6979
Epoch 383/400
160/160 [=====] - 0s 741us/step - loss: 0.6989
Epoch 384/400
160/160 [=====] - 0s 698us/step - loss: 0.6975
Epoch 385/400
160/160 [=====] - 0s 701us/step - loss: 0.6981
Epoch 386/400
160/160 [=====] - 0s 749us/step - loss: 0.6976
Epoch 387/400
160/160 [=====] - 0s 714us/step - loss: 0.6983
Epoch 388/400
160/160 [=====] - 0s 738us/step - loss: 0.6982
Epoch 389/400
160/160 [=====] - 0s 747us/step - loss: 0.6968
Epoch 390/400
160/160 [=====] - 0s 745us/step - loss: 0.6994
Epoch 391/400
160/160 [=====] - 0s 709us/step - loss: 0.6970
Epoch 392/400
160/160 [=====] - 0s 732us/step - loss: 0.6988
Epoch 393/400
160/160 [=====] - 0s 692us/step - loss: 0.6986
Epoch 394/400
160/160 [=====] - 0s 718us/step - loss: 0.6984
Epoch 395/400
160/160 [=====] - 0s 743us/step - loss: 0.6979
Epoch 396/400
160/160 [=====] - 0s 699us/step - loss: 0.6984
Epoch 397/400
160/160 [=====] - 0s 700us/step - loss: 0.6989
Epoch 398/400
160/160 [=====] - 0s 692us/step - loss: 0.6994

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Epoch 399/400
160/160 [=====] - 0s 676us/step - loss: 0.6980
Epoch 400/400
160/160 [=====] - 0s 691us/step - loss: 0.6961
160/160 [=====] - 0s 2ms/step
Epoch 1/400
160/160 [=====] - 1s 4ms/step - loss: 0.6993
Epoch 2/400
160/160 [=====] - 0s 785us/step - loss: 0.6975
Epoch 3/400
160/160 [=====] - 0s 816us/step - loss: 0.6962
Epoch 4/400
160/160 [=====] - 0s 789us/step - loss: 0.6956
Epoch 5/400
160/160 [=====] - 0s 800us/step - loss: 0.6950
Epoch 6/400
160/160 [=====] - 0s 793us/step - loss: 0.6944
Epoch 7/400
160/160 [=====] - 0s 866us/step - loss: 0.6941
Epoch 8/400
160/160 [=====] - 0s 875us/step - loss: 0.6942
Epoch 9/400
160/160 [=====] - 0s 826us/step - loss: 0.6940
Epoch 10/400
160/160 [=====] - 0s 830us/step - loss: 0.6939
Epoch 11/400
160/160 [=====] - 0s 841us/step - loss: 0.6939
Epoch 12/400
160/160 [=====] - 0s 811us/step - loss: 0.6939
Epoch 13/400
160/160 [=====] - 0s 863us/step - loss: 0.6939
Epoch 14/400
160/160 [=====] - 0s 862us/step - loss: 0.6937
Epoch 15/400
160/160 [=====] - 0s 843us/step - loss: 0.6939
Epoch 16/400
160/160 [=====] - 0s 875us/step - loss: 0.6938
Epoch 17/400
160/160 [=====] - 0s 877us/step - loss: 0.6938
Epoch 18/400
160/160 [=====] - 0s 785us/step - loss: 0.6939
Epoch 19/400
160/160 [=====] - 0s 828us/step - loss: 0.6939
Epoch 20/400
160/160 [=====] - 0s 816us/step - loss: 0.6938
Epoch 21/400
160/160 [=====] - 0s 795us/step - loss: 0.6939
Epoch 22/400

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160/160 [=====] - 0s 819us/step - loss: 0.6937
Epoch 23/400
160/160 [=====] - 0s 798us/step - loss: 0.6938
Epoch 24/400
160/160 [=====] - 0s 798us/step - loss: 0.6939
Epoch 25/400
160/160 [=====] - 0s 843us/step - loss: 0.6939
Epoch 26/400
160/160 [=====] - 0s 860us/step - loss: 0.6940
Epoch 27/400
160/160 [=====] - 0s 812us/step - loss: 0.6938
Epoch 28/400
160/160 [=====] - 0s 833us/step - loss: 0.6939
Epoch 29/400
160/160 [=====] - 0s 824us/step - loss: 0.6939
Epoch 30/400
160/160 [=====] - 0s 837us/step - loss: 0.6939
Epoch 31/400
160/160 [=====] - 0s 868us/step - loss: 0.6939
Epoch 32/400
160/160 [=====] - 0s 824us/step - loss: 0.6938
Epoch 33/400
160/160 [=====] - 0s 834us/step - loss: 0.6936
Epoch 34/400
160/160 [=====] - 0s 838us/step - loss: 0.6939
Epoch 35/400
160/160 [=====] - 0s 863us/step - loss: 0.6938
Epoch 36/400
160/160 [=====] - 0s 819us/step - loss: 0.6939
Epoch 37/400
160/160 [=====] - 0s 850us/step - loss: 0.6939
Epoch 38/400
160/160 [=====] - 0s 837us/step - loss: 0.6940
Epoch 39/400
160/160 [=====] - 0s 868us/step - loss: 0.6939
Epoch 40/400
160/160 [=====] - 0s 866us/step - loss: 0.6938
Epoch 41/400
160/160 [=====] - 0s 833us/step - loss: 0.6939
Epoch 42/400
160/160 [=====] - 0s 839us/step - loss: 0.6939
Epoch 43/400
160/160 [=====] - 0s 838us/step - loss: 0.6939
Epoch 44/400
160/160 [=====] - 0s 861us/step - loss: 0.6937
Epoch 45/400
160/160 [=====] - 0s 844us/step - loss: 0.6939
Epoch 46/400

160/160 [=====] - 0s 802us/step - loss: 0.6937
Epoch 47/400
160/160 [=====] - 0s 806us/step - loss: 0.6939
Epoch 48/400
160/160 [=====] - 0s 819us/step - loss: 0.6939
Epoch 49/400
160/160 [=====] - 0s 844us/step - loss: 0.6938
Epoch 50/400
160/160 [=====] - 0s 822us/step - loss: 0.6937
Epoch 51/400
160/160 [=====] - 0s 805us/step - loss: 0.6940
Epoch 52/400
160/160 [=====] - 0s 812us/step - loss: 0.6936
Epoch 53/400
160/160 [=====] - 0s 857us/step - loss: 0.6938
Epoch 54/400
160/160 [=====] - 0s 810us/step - loss: 0.6939
Epoch 55/400
160/160 [=====] - 0s 817us/step - loss: 0.6939
Epoch 56/400
160/160 [=====] - 0s 823us/step - loss: 0.6939
Epoch 57/400
160/160 [=====] - 0s 806us/step - loss: 0.6939
Epoch 58/400
160/160 [=====] - 0s 855us/step - loss: 0.6937
Epoch 59/400
160/160 [=====] - 0s 794us/step - loss: 0.6939
Epoch 60/400
160/160 [=====] - 0s 818us/step - loss: 0.6937
Epoch 61/400
160/160 [=====] - 0s 883us/step - loss: 0.6938
Epoch 62/400
160/160 [=====] - 0s 851us/step - loss: 0.6939
Epoch 63/400
160/160 [=====] - 0s 813us/step - loss: 0.6939
Epoch 64/400
160/160 [=====] - 0s 927us/step - loss: 0.6938
Epoch 65/400
160/160 [=====] - 0s 830us/step - loss: 0.6939
Epoch 66/400
160/160 [=====] - 0s 812us/step - loss: 0.6938
Epoch 67/400
160/160 [=====] - 0s 831us/step - loss: 0.6937
Epoch 68/400
160/160 [=====] - 0s 814us/step - loss: 0.6939
Epoch 69/400
160/160 [=====] - 0s 866us/step - loss: 0.6937
Epoch 70/400

160/160 [=====] - 0s 865us/step - loss: 0.6938
Epoch 71/400
160/160 [=====] - 0s 850us/step - loss: 0.6939
Epoch 72/400
160/160 [=====] - 0s 858us/step - loss: 0.6939
Epoch 73/400
160/160 [=====] - 0s 862us/step - loss: 0.6938
Epoch 74/400
160/160 [=====] - 0s 776us/step - loss: 0.6938
Epoch 75/400
160/160 [=====] - 0s 776us/step - loss: 0.6937
Epoch 76/400
160/160 [=====] - 0s 776us/step - loss: 0.6939
Epoch 77/400
160/160 [=====] - 0s 860us/step - loss: 0.6938
Epoch 78/400
160/160 [=====] - 0s 795us/step - loss: 0.6938
Epoch 79/400
160/160 [=====] - 0s 815us/step - loss: 0.6937
Epoch 80/400
160/160 [=====] - 0s 854us/step - loss: 0.6938
Epoch 81/400
160/160 [=====] - 0s 861us/step - loss: 0.6939
Epoch 82/400
160/160 [=====] - 0s 844us/step - loss: 0.6939
Epoch 83/400
160/160 [=====] - 0s 825us/step - loss: 0.6939
Epoch 84/400
160/160 [=====] - 0s 842us/step - loss: 0.6939
Epoch 85/400
160/160 [=====] - 0s 824us/step - loss: 0.6938
Epoch 86/400
160/160 [=====] - 0s 841us/step - loss: 0.6939
Epoch 87/400
160/160 [=====] - 0s 899us/step - loss: 0.6938
Epoch 88/400
160/160 [=====] - 0s 849us/step - loss: 0.6939
Epoch 89/400
160/160 [=====] - 0s 797us/step - loss: 0.6939
Epoch 90/400
160/160 [=====] - 0s 892us/step - loss: 0.6938
Epoch 91/400
160/160 [=====] - 0s 810us/step - loss: 0.6938
Epoch 92/400
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Epoch 93/400
160/160 [=====] - 0s 825us/step - loss: 0.6939
Epoch 94/400

160/160 [=====] - 0s 821us/step - loss: 0.6938
Epoch 95/400
160/160 [=====] - 0s 867us/step - loss: 0.6934
Epoch 96/400
160/160 [=====] - 0s 886us/step - loss: 0.6939
Epoch 97/400
160/160 [=====] - 0s 850us/step - loss: 0.6937
Epoch 98/400
160/160 [=====] - 0s 842us/step - loss: 0.6938
Epoch 99/400
160/160 [=====] - 0s 855us/step - loss: 0.6937
Epoch 100/400
160/160 [=====] - 0s 836us/step - loss: 0.6939
Epoch 101/400
160/160 [=====] - 0s 834us/step - loss: 0.6939
Epoch 102/400
160/160 [=====] - 0s 846us/step - loss: 0.6938
Epoch 103/400
160/160 [=====] - 0s 849us/step - loss: 0.6936
Epoch 104/400
160/160 [=====] - 0s 841us/step - loss: 0.6939
Epoch 105/400
160/160 [=====] - 0s 861us/step - loss: 0.6938
Epoch 106/400
160/160 [=====] - 0s 871us/step - loss: 0.6938
Epoch 107/400
160/160 [=====] - 0s 831us/step - loss: 0.6936
Epoch 108/400
160/160 [=====] - 0s 841us/step - loss: 0.6939
Epoch 109/400
160/160 [=====] - 0s 839us/step - loss: 0.6938
Epoch 110/400
160/160 [=====] - 0s 834us/step - loss: 0.6938
Epoch 111/400
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Epoch 112/400
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Epoch 113/400
160/160 [=====] - 0s 823us/step - loss: 0.6938
Epoch 114/400
160/160 [=====] - 0s 868us/step - loss: 0.6938
Epoch 115/400
160/160 [=====] - 0s 840us/step - loss: 0.6938
Epoch 116/400
160/160 [=====] - 0s 855us/step - loss: 0.6938
Epoch 117/400
160/160 [=====] - 0s 881us/step - loss: 0.6935
Epoch 118/400

160/160 [=====] - 0s 828us/step - loss: 0.6938
Epoch 119/400
160/160 [=====] - 0s 801us/step - loss: 0.6938
Epoch 120/400
160/160 [=====] - 0s 767us/step - loss: 0.6938
Epoch 121/400
160/160 [=====] - 0s 822us/step - loss: 0.6935
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Epoch 123/400
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Epoch 124/400
160/160 [=====] - 0s 871us/step - loss: 0.6938
Epoch 125/400
160/160 [=====] - 0s 828us/step - loss: 0.6939
Epoch 126/400
160/160 [=====] - 0s 843us/step - loss: 0.6939
Epoch 127/400
160/160 [=====] - 0s 845us/step - loss: 0.6936
Epoch 128/400
160/160 [=====] - 0s 856us/step - loss: 0.6938
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160/160 [=====] - 0s 794us/step - loss: 0.6937
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Epoch 141/400
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Epoch 142/400

160/160 [=====] - 0s 831us/step - loss: 0.6936
Epoch 143/400
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Epoch 144/400
160/160 [=====] - 0s 852us/step - loss: 0.6938
Epoch 145/400
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Epoch 146/400
160/160 [=====] - 0s 855us/step - loss: 0.6937
Epoch 147/400
160/160 [=====] - 0s 801us/step - loss: 0.6938
Epoch 148/400
160/160 [=====] - 0s 855us/step - loss: 0.6938
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160/160 [=====] - 0s 801us/step - loss: 0.6936
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160/160 [=====] - 0s 880us/step - loss: 0.6938
Epoch 155/400
160/160 [=====] - 0s 856us/step - loss: 0.6938
Epoch 156/400
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Epoch 157/400
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Epoch 158/400
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Epoch 159/400
160/160 [=====] - 0s 871us/step - loss: 0.6936
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Epoch 163/400
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Epoch 164/400
160/160 [=====] - 0s 833us/step - loss: 0.6935
Epoch 165/400
160/160 [=====] - 0s 873us/step - loss: 0.6937
Epoch 166/400

160/160 [=====] - 0s 801us/step - loss: 0.6936
Epoch 167/400
160/160 [=====] - 0s 841us/step - loss: 0.6936
Epoch 168/400
160/160 [=====] - 0s 810us/step - loss: 0.6935
Epoch 169/400
160/160 [=====] - 0s 806us/step - loss: 0.6934
Epoch 170/400
160/160 [=====] - 0s 853us/step - loss: 0.6934
Epoch 171/400
160/160 [=====] - 0s 842us/step - loss: 0.6935
Epoch 172/400
160/160 [=====] - 0s 864us/step - loss: 0.6936
Epoch 173/400
160/160 [=====] - 0s 804us/step - loss: 0.6936
Epoch 174/400
160/160 [=====] - 0s 851us/step - loss: 0.6935
Epoch 175/400
160/160 [=====] - 0s 901us/step - loss: 0.6935
Epoch 176/400
160/160 [=====] - 0s 836us/step - loss: 0.6935
Epoch 177/400
160/160 [=====] - 0s 823us/step - loss: 0.6934
Epoch 178/400
160/160 [=====] - 0s 824us/step - loss: 0.6933
Epoch 179/400
160/160 [=====] - 0s 788us/step - loss: 0.6932
Epoch 180/400
160/160 [=====] - 0s 818us/step - loss: 0.6935
Epoch 181/400
160/160 [=====] - 0s 837us/step - loss: 0.6934
Epoch 182/400
160/160 [=====] - 0s 829us/step - loss: 0.6933
Epoch 183/400
160/160 [=====] - 0s 833us/step - loss: 0.6935
Epoch 184/400
160/160 [=====] - 0s 811us/step - loss: 0.6934
Epoch 185/400
160/160 [=====] - 0s 860us/step - loss: 0.6932
Epoch 186/400
160/160 [=====] - 0s 838us/step - loss: 0.6934
Epoch 187/400
160/160 [=====] - 0s 862us/step - loss: 0.6933
Epoch 188/400
160/160 [=====] - 0s 846us/step - loss: 0.6928
Epoch 189/400
160/160 [=====] - 0s 825us/step - loss: 0.6932
Epoch 190/400

160/160 [=====] - 0s 841us/step - loss: 0.6931
Epoch 191/400
160/160 [=====] - 0s 844us/step - loss: 0.6932
Epoch 192/400
160/160 [=====] - 0s 822us/step - loss: 0.6928
Epoch 193/400
160/160 [=====] - 0s 831us/step - loss: 0.6930
Epoch 194/400
160/160 [=====] - 0s 829us/step - loss: 0.6931
Epoch 195/400
160/160 [=====] - 0s 846us/step - loss: 0.6930
Epoch 196/400
160/160 [=====] - 0s 860us/step - loss: 0.6929
Epoch 197/400
160/160 [=====] - 0s 798us/step - loss: 0.6930
Epoch 198/400
160/160 [=====] - 0s 830us/step - loss: 0.6928
Epoch 199/400
160/160 [=====] - 0s 802us/step - loss: 0.6928
Epoch 200/400
160/160 [=====] - 0s 827us/step - loss: 0.6928
Epoch 201/400
160/160 [=====] - 0s 850us/step - loss: 0.6927
Epoch 202/400
160/160 [=====] - 0s 823us/step - loss: 0.6927
Epoch 203/400
160/160 [=====] - 0s 840us/step - loss: 0.6923
Epoch 204/400
160/160 [=====] - 0s 860us/step - loss: 0.6925
Epoch 205/400
160/160 [=====] - 0s 881us/step - loss: 0.6925
Epoch 206/400
160/160 [=====] - 0s 813us/step - loss: 0.6924
Epoch 207/400
160/160 [=====] - 0s 829us/step - loss: 0.6923
Epoch 208/400
160/160 [=====] - 0s 815us/step - loss: 0.6924
Epoch 209/400
160/160 [=====] - 0s 841us/step - loss: 0.6922
Epoch 210/400
160/160 [=====] - 0s 830us/step - loss: 0.6921
Epoch 211/400
160/160 [=====] - 0s 812us/step - loss: 0.6920
Epoch 212/400
160/160 [=====] - 0s 832us/step - loss: 0.6919
Epoch 213/400
160/160 [=====] - 0s 832us/step - loss: 0.6918
Epoch 214/400

160/160 [=====] - 0s 850us/step - loss: 0.6917
Epoch 215/400
160/160 [=====] - 0s 837us/step - loss: 0.6916
Epoch 216/400
160/160 [=====] - 0s 831us/step - loss: 0.6915
Epoch 217/400
160/160 [=====] - 0s 857us/step - loss: 0.6913
Epoch 218/400
160/160 [=====] - 0s 828us/step - loss: 0.6912
Epoch 219/400
160/160 [=====] - 0s 833us/step - loss: 0.6910
Epoch 220/400
160/160 [=====] - 0s 834us/step - loss: 0.6909
Epoch 221/400
160/160 [=====] - 0s 832us/step - loss: 0.6908
Epoch 222/400
160/160 [=====] - 0s 842us/step - loss: 0.6905
Epoch 223/400
160/160 [=====] - 0s 839us/step - loss: 0.6903
Epoch 224/400
160/160 [=====] - 0s 837us/step - loss: 0.6902
Epoch 225/400
160/160 [=====] - 0s 848us/step - loss: 0.6899
Epoch 226/400
160/160 [=====] - 0s 857us/step - loss: 0.6898
Epoch 227/400
160/160 [=====] - 0s 830us/step - loss: 0.6894
Epoch 228/400
160/160 [=====] - 0s 850us/step - loss: 0.6892
Epoch 229/400
160/160 [=====] - 0s 811us/step - loss: 0.6889
Epoch 230/400
160/160 [=====] - 0s 849us/step - loss: 0.6887
Epoch 231/400
160/160 [=====] - 0s 923us/step - loss: 0.6883
Epoch 232/400
160/160 [=====] - 0s 878us/step - loss: 0.6878
Epoch 233/400
160/160 [=====] - 0s 890us/step - loss: 0.6875
Epoch 234/400
160/160 [=====] - 0s 884us/step - loss: 0.6873
Epoch 235/400
160/160 [=====] - 0s 870us/step - loss: 0.6869
Epoch 236/400
160/160 [=====] - 0s 847us/step - loss: 0.6864
Epoch 237/400
160/160 [=====] - 0s 825us/step - loss: 0.6860
Epoch 238/400

160/160 [=====] - 0s 858us/step - loss: 0.6854
Epoch 239/400
160/160 [=====] - 0s 856us/step - loss: 0.6849
Epoch 240/400
160/160 [=====] - 0s 873us/step - loss: 0.6844
Epoch 241/400
160/160 [=====] - 0s 848us/step - loss: 0.6837
Epoch 242/400
160/160 [=====] - 0s 862us/step - loss: 0.6831
Epoch 243/400
160/160 [=====] - 0s 914us/step - loss: 0.6823
Epoch 244/400
160/160 [=====] - 0s 823us/step - loss: 0.6815
Epoch 245/400
160/160 [=====] - 0s 808us/step - loss: 0.6809
Epoch 246/400
160/160 [=====] - 0s 851us/step - loss: 0.6801
Epoch 247/400
160/160 [=====] - 0s 846us/step - loss: 0.6786
Epoch 248/400
160/160 [=====] - 0s 822us/step - loss: 0.6783
Epoch 249/400
160/160 [=====] - 0s 851us/step - loss: 0.6768
Epoch 250/400
160/160 [=====] - 0s 869us/step - loss: 0.6764
Epoch 251/400
160/160 [=====] - 0s 862us/step - loss: 0.6753
Epoch 252/400
160/160 [=====] - 0s 798us/step - loss: 0.6742
Epoch 253/400
160/160 [=====] - 0s 882us/step - loss: 0.6731
Epoch 254/400
160/160 [=====] - 0s 841us/step - loss: 0.6718
Epoch 255/400
160/160 [=====] - 0s 809us/step - loss: 0.6705
Epoch 256/400
160/160 [=====] - 0s 826us/step - loss: 0.6690
Epoch 257/400
160/160 [=====] - 0s 860us/step - loss: 0.6675
Epoch 258/400
160/160 [=====] - 0s 841us/step - loss: 0.6660
Epoch 259/400
160/160 [=====] - 0s 876us/step - loss: 0.6646
Epoch 260/400
160/160 [=====] - 0s 852us/step - loss: 0.6630
Epoch 261/400
160/160 [=====] - 0s 821us/step - loss: 0.6613
Epoch 262/400

160/160 [=====] - 0s 829us/step - loss: 0.6595
Epoch 263/400
160/160 [=====] - 0s 820us/step - loss: 0.6574
Epoch 264/400
160/160 [=====] - 0s 863us/step - loss: 0.6555
Epoch 265/400
160/160 [=====] - 0s 832us/step - loss: 0.6532
Epoch 266/400
160/160 [=====] - 0s 839us/step - loss: 0.6508
Epoch 267/400
160/160 [=====] - 0s 865us/step - loss: 0.6486
Epoch 268/400
160/160 [=====] - 0s 851us/step - loss: 0.6455
Epoch 269/400
160/160 [=====] - 0s 920us/step - loss: 0.6434
Epoch 270/400
160/160 [=====] - 0s 796us/step - loss: 0.6406
Epoch 271/400
160/160 [=====] - 0s 819us/step - loss: 0.6375
Epoch 272/400
160/160 [=====] - 0s 839us/step - loss: 0.6344
Epoch 273/400
160/160 [=====] - 0s 843us/step - loss: 0.6314
Epoch 274/400
160/160 [=====] - 0s 795us/step - loss: 0.6280
Epoch 275/400
160/160 [=====] - 0s 842us/step - loss: 0.6242
Epoch 276/400
160/160 [=====] - 0s 827us/step - loss: 0.6205
Epoch 277/400
160/160 [=====] - 0s 858us/step - loss: 0.6168
Epoch 278/400
160/160 [=====] - 0s 877us/step - loss: 0.6126
Epoch 279/400
160/160 [=====] - 0s 827us/step - loss: 0.6083
Epoch 280/400
160/160 [=====] - 0s 847us/step - loss: 0.6038
Epoch 281/400
160/160 [=====] - 0s 836us/step - loss: 0.5989
Epoch 282/400
160/160 [=====] - 0s 795us/step - loss: 0.5932
Epoch 283/400
160/160 [=====] - 0s 828us/step - loss: 0.5876
Epoch 284/400
160/160 [=====] - 0s 833us/step - loss: 0.5816
Epoch 285/400
160/160 [=====] - 0s 844us/step - loss: 0.5749
Epoch 286/400

160/160 [=====] - 0s 827us/step - loss: 0.5677
 Epoch 287/400
 160/160 [=====] - 0s 824us/step - loss: 0.5597
 Epoch 288/400
 160/160 [=====] - 0s 800us/step - loss: 0.5520
 Epoch 289/400
 160/160 [=====] - 0s 865us/step - loss: 0.5440
 Epoch 290/400
 160/160 [=====] - 0s 844us/step - loss: 0.5353
 Epoch 291/400
 160/160 [=====] - 0s 887us/step - loss: 0.5262
 Epoch 292/400
 160/160 [=====] - 0s 801us/step - loss: 0.5165
 Epoch 293/400
 160/160 [=====] - 0s 841us/step - loss: 0.5071
 Epoch 294/400
 160/160 [=====] - 0s 829us/step - loss: 0.4977
 Epoch 295/400
 160/160 [=====] - 0s 803us/step - loss: 0.4874
 Epoch 296/400
 160/160 [=====] - 0s 840us/step - loss: 0.4787
 Epoch 297/400
 160/160 [=====] - 0s 972us/step - loss: 0.4702
 Epoch 298/400
 160/160 [=====] - 0s 875us/step - loss: 0.4608
 Epoch 299/400
 160/160 [=====] - 0s 858us/step - loss: 0.4522
 Epoch 300/400
 160/160 [=====] - 0s 874us/step - loss: 0.4440
 Epoch 301/400
 160/160 [=====] - 0s 862us/step - loss: 0.4360
 Epoch 302/400
 160/160 [=====] - 0s 789us/step - loss: 0.4282
 Epoch 303/400
 160/160 [=====] - 0s 838us/step - loss: 0.4217
 Epoch 304/400
 160/160 [=====] - 0s 863us/step - loss: 0.4147
 Epoch 305/400
 160/160 [=====] - 0s 816us/step - loss: 0.4084
 Epoch 306/400
 160/160 [=====] - 0s 853us/step - loss: 0.4030
 Epoch 307/400
 160/160 [=====] - 0s 741us/step - loss: 0.3965
 Epoch 308/400
 160/160 [=====] - 0s 833us/step - loss: 0.3928
 Epoch 309/400
 160/160 [=====] - 0s 843us/step - loss: 0.3879
 Epoch 310/400

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160/160 [=====] - 0s 806us/step - loss: 0.3837
Epoch 311/400
160/160 [=====] - 0s 801us/step - loss: 0.3795
Epoch 312/400
160/160 [=====] - 0s 809us/step - loss: 0.3750
Epoch 313/400
160/160 [=====] - 0s 843us/step - loss: 0.3715
Epoch 314/400
160/160 [=====] - 0s 841us/step - loss: 0.3683
Epoch 315/400
160/160 [=====] - 0s 846us/step - loss: 0.3658
Epoch 316/400
160/160 [=====] - 0s 851us/step - loss: 0.3633
Epoch 317/400
160/160 [=====] - 0s 834us/step - loss: 0.3600
Epoch 318/400
160/160 [=====] - 0s 826us/step - loss: 0.3581
Epoch 319/400
160/160 [=====] - 0s 837us/step - loss: 0.3561
Epoch 320/400
160/160 [=====] - 0s 803us/step - loss: 0.3539
Epoch 321/400
160/160 [=====] - 0s 816us/step - loss: 0.3531
Epoch 322/400
160/160 [=====] - 0s 954us/step - loss: 0.3511
Epoch 323/400
160/160 [=====] - 0s 913us/step - loss: 0.3505
Epoch 324/400
160/160 [=====] - 0s 858us/step - loss: 0.3488
Epoch 325/400
160/160 [=====] - 0s 890us/step - loss: 0.3476
Epoch 326/400
160/160 [=====] - 0s 865us/step - loss: 0.3466
Epoch 327/400
160/160 [=====] - 0s 830us/step - loss: 0.3457
Epoch 328/400
160/160 [=====] - 0s 849us/step - loss: 0.3443
Epoch 329/400
160/160 [=====] - 0s 839us/step - loss: 0.3447
Epoch 330/400
160/160 [=====] - 0s 877us/step - loss: 0.3435
Epoch 331/400
160/160 [=====] - 0s 886us/step - loss: 0.3432
Epoch 332/400
160/160 [=====] - 0s 801us/step - loss: 0.3427
Epoch 333/400
160/160 [=====] - 0s 827us/step - loss: 0.3428
Epoch 334/400

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160/160 [=====] - 0s 828us/step - loss: 0.3423
 Epoch 335/400
 160/160 [=====] - 0s 866us/step - loss: 0.3420
 Epoch 336/400
 160/160 [=====] - 0s 821us/step - loss: 0.3408
 Epoch 337/400
 160/160 [=====] - 0s 884us/step - loss: 0.3410
 Epoch 338/400
 160/160 [=====] - 0s 803us/step - loss: 0.3411
 Epoch 339/400
 160/160 [=====] - 0s 774us/step - loss: 0.3407
 Epoch 340/400
 160/160 [=====] - 0s 805us/step - loss: 0.3407
 Epoch 341/400
 160/160 [=====] - 0s 849us/step - loss: 0.3397
 Epoch 342/400
 160/160 [=====] - 0s 829us/step - loss: 0.3409
 Epoch 343/400
 160/160 [=====] - 0s 876us/step - loss: 0.3399
 Epoch 344/400
 160/160 [=====] - 0s 866us/step - loss: 0.3404
 Epoch 345/400
 160/160 [=====] - 0s 835us/step - loss: 0.3401
 Epoch 346/400
 160/160 [=====] - 0s 836us/step - loss: 0.3405
 Epoch 347/400
 160/160 [=====] - 0s 816us/step - loss: 0.3400
 Epoch 348/400
 160/160 [=====] - 0s 921us/step - loss: 0.3403
 Epoch 349/400
 160/160 [=====] - 0s 839us/step - loss: 0.3406
 Epoch 350/400
 160/160 [=====] - 0s 817us/step - loss: 0.3388
 Epoch 351/400
 160/160 [=====] - 0s 806us/step - loss: 0.3402
 Epoch 352/400
 160/160 [=====] - 0s 786us/step - loss: 0.3398
 Epoch 353/400
 160/160 [=====] - 0s 833us/step - loss: 0.3406
 Epoch 354/400
 160/160 [=====] - 0s 870us/step - loss: 0.3391
 Epoch 355/400
 160/160 [=====] - 0s 873us/step - loss: 0.3404
 Epoch 356/400
 160/160 [=====] - 0s 858us/step - loss: 0.3403
 Epoch 357/400
 160/160 [=====] - 0s 850us/step - loss: 0.3408
 Epoch 358/400

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160/160 [=====] - 0s 862us/step - loss: 0.3401
Epoch 359/400
160/160 [=====] - 0s 921us/step - loss: 0.3398
Epoch 360/400
160/160 [=====] - 0s 821us/step - loss: 0.3413
Epoch 361/400
160/160 [=====] - 0s 861us/step - loss: 0.3410
Epoch 362/400
160/160 [=====] - 0s 879us/step - loss: 0.3406
Epoch 363/400
160/160 [=====] - 0s 865us/step - loss: 0.3406
Epoch 364/400
160/160 [=====] - 0s 839us/step - loss: 0.3408
Epoch 365/400
160/160 [=====] - 0s 831us/step - loss: 0.3404
Epoch 366/400
160/160 [=====] - 0s 818us/step - loss: 0.3415
Epoch 367/400
160/160 [=====] - 0s 836us/step - loss: 0.3409
Epoch 368/400
160/160 [=====] - 0s 831us/step - loss: 0.3418
Epoch 369/400
160/160 [=====] - 0s 845us/step - loss: 0.3412
Epoch 370/400
160/160 [=====] - 0s 886us/step - loss: 0.3406
Epoch 371/400
160/160 [=====] - 0s 891us/step - loss: 0.3416
Epoch 372/400
160/160 [=====] - 0s 814us/step - loss: 0.3405
Epoch 373/400
160/160 [=====] - 0s 886us/step - loss: 0.3415
Epoch 374/400
160/160 [=====] - 0s 883us/step - loss: 0.3419
Epoch 375/400
160/160 [=====] - 0s 872us/step - loss: 0.3419
Epoch 376/400
160/160 [=====] - 0s 867us/step - loss: 0.3429
Epoch 377/400
160/160 [=====] - 0s 838us/step - loss: 0.3420
Epoch 378/400
160/160 [=====] - 0s 874us/step - loss: 0.3422
Epoch 379/400
160/160 [=====] - 0s 833us/step - loss: 0.3424
Epoch 380/400
160/160 [=====] - 0s 833us/step - loss: 0.3428
Epoch 381/400
160/160 [=====] - 0s 809us/step - loss: 0.3421
Epoch 382/400

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160/160 [=====] - 0s 823us/step - loss: 0.3426
Epoch 383/400
160/160 [=====] - 0s 824us/step - loss: 0.3419
Epoch 384/400
160/160 [=====] - 0s 834us/step - loss: 0.3419
Epoch 385/400
160/160 [=====] - 0s 840us/step - loss: 0.3420
Epoch 386/400
160/160 [=====] - 0s 862us/step - loss: 0.3425
Epoch 387/400
160/160 [=====] - 0s 833us/step - loss: 0.3427
Epoch 388/400
160/160 [=====] - 0s 852us/step - loss: 0.3421
Epoch 389/400
160/160 [=====] - 0s 859us/step - loss: 0.3430
Epoch 390/400
160/160 [=====] - 0s 835us/step - loss: 0.3418
Epoch 391/400
160/160 [=====] - 0s 857us/step - loss: 0.3425
Epoch 392/400
160/160 [=====] - 0s 877us/step - loss: 0.3429
Epoch 393/400
160/160 [=====] - 0s 789us/step - loss: 0.3424
Epoch 394/400
160/160 [=====] - 0s 866us/step - loss: 0.3429
Epoch 395/400
160/160 [=====] - 0s 833us/step - loss: 0.3417
Epoch 396/400
160/160 [=====] - 0s 833us/step - loss: 0.3426
Epoch 397/400
160/160 [=====] - 0s 814us/step - loss: 0.3422
Epoch 398/400
160/160 [=====] - 0s 855us/step - loss: 0.3417
Epoch 399/400
160/160 [=====] - 0s 809us/step - loss: 0.3428
Epoch 400/400
160/160 [=====] - 0s 841us/step - loss: 0.3426
160/160 [=====] - 0s 2ms/step
Epoch 1/400
160/160 [=====] - 1s 5ms/step - loss: 0.7318
Epoch 2/400
160/160 [=====] - 0s 1ms/step - loss: 0.7121
Epoch 3/400
160/160 [=====] - 0s 1ms/step - loss: 0.7030
Epoch 4/400
160/160 [=====] - 0s 975us/step - loss: 0.6979
Epoch 5/400
160/160 [=====] - 0s 993us/step - loss: 0.6960

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Epoch 6/400
160/160 [=====] - 0s 954us/step - loss: 0.6950
Epoch 7/400
160/160 [=====] - 0s 950us/step - loss: 0.6946
Epoch 8/400
160/160 [=====] - 0s 944us/step - loss: 0.6943
Epoch 9/400
160/160 [=====] - 0s 989us/step - loss: 0.6942
Epoch 10/400
160/160 [=====] - 0s 985us/step - loss: 0.6944
Epoch 11/400
160/160 [=====] - 0s 958us/step - loss: 0.6941
Epoch 12/400
160/160 [=====] - 0s 933us/step - loss: 0.6942
Epoch 13/400
160/160 [=====] - 0s 974us/step - loss: 0.6943
Epoch 14/400
160/160 [=====] - 0s 951us/step - loss: 0.6940
Epoch 15/400
160/160 [=====] - 0s 950us/step - loss: 0.6942
Epoch 16/400
160/160 [=====] - 0s 986us/step - loss: 0.6946
Epoch 17/400
160/160 [=====] - 0s 929us/step - loss: 0.6944
Epoch 18/400
160/160 [=====] - 0s 950us/step - loss: 0.6942
Epoch 19/400
160/160 [=====] - 0s 989us/step - loss: 0.6943
Epoch 20/400
160/160 [=====] - 0s 1ms/step - loss: 0.6943
Epoch 21/400
160/160 [=====] - 0s 1ms/step - loss: 0.6943
Epoch 22/400
160/160 [=====] - 0s 962us/step - loss: 0.6944
Epoch 23/400
160/160 [=====] - 0s 937us/step - loss: 0.6941
Epoch 24/400
160/160 [=====] - 0s 966us/step - loss: 0.6942
Epoch 25/400
160/160 [=====] - 0s 997us/step - loss: 0.6941
Epoch 26/400
160/160 [=====] - 0s 1ms/step - loss: 0.6943
Epoch 27/400
160/160 [=====] - 0s 990us/step - loss: 0.6939
Epoch 28/400
160/160 [=====] - 0s 939us/step - loss: 0.6942
Epoch 29/400
160/160 [=====] - 0s 971us/step - loss: 0.6942

Epoch 30/400
160/160 [=====] - 0s 961us/step - loss: 0.6945
Epoch 31/400
160/160 [=====] - 0s 995us/step - loss: 0.6941
Epoch 32/400
160/160 [=====] - 0s 1ms/step - loss: 0.6943
Epoch 33/400
160/160 [=====] - 0s 918us/step - loss: 0.6943
Epoch 34/400
160/160 [=====] - 0s 931us/step - loss: 0.6939
Epoch 35/400
160/160 [=====] - 0s 917us/step - loss: 0.6942
Epoch 36/400
160/160 [=====] - 0s 951us/step - loss: 0.6943
Epoch 37/400
160/160 [=====] - 0s 931us/step - loss: 0.6941
Epoch 38/400
160/160 [=====] - 0s 965us/step - loss: 0.6940
Epoch 39/400
160/160 [=====] - 0s 940us/step - loss: 0.6943
Epoch 40/400
160/160 [=====] - 0s 921us/step - loss: 0.6942
Epoch 41/400
160/160 [=====] - 0s 936us/step - loss: 0.6944
Epoch 42/400
160/160 [=====] - 0s 937us/step - loss: 0.6944
Epoch 43/400
160/160 [=====] - 0s 923us/step - loss: 0.6941
Epoch 44/400
160/160 [=====] - 0s 959us/step - loss: 0.6945
Epoch 45/400
160/160 [=====] - 0s 934us/step - loss: 0.6938
Epoch 46/400
160/160 [=====] - 0s 919us/step - loss: 0.6942
Epoch 47/400
160/160 [=====] - 0s 930us/step - loss: 0.6941
Epoch 48/400
160/160 [=====] - 0s 952us/step - loss: 0.6942
Epoch 49/400
160/160 [=====] - 0s 924us/step - loss: 0.6941
Epoch 50/400
160/160 [=====] - 0s 935us/step - loss: 0.6940
Epoch 51/400
160/160 [=====] - 0s 931us/step - loss: 0.6943
Epoch 52/400
160/160 [=====] - 0s 933us/step - loss: 0.6942
Epoch 53/400
160/160 [=====] - 0s 947us/step - loss: 0.6940

Epoch 54/400
160/160 [=====] - 0s 942us/step - loss: 0.6939
Epoch 55/400
160/160 [=====] - 0s 930us/step - loss: 0.6943
Epoch 56/400
160/160 [=====] - 0s 973us/step - loss: 0.6941
Epoch 57/400
160/160 [=====] - 0s 986us/step - loss: 0.6943
Epoch 58/400
160/160 [=====] - 0s 966us/step - loss: 0.6941
Epoch 59/400
160/160 [=====] - 0s 944us/step - loss: 0.6942
Epoch 60/400
160/160 [=====] - 0s 957us/step - loss: 0.6941
Epoch 61/400
160/160 [=====] - 0s 1ms/step - loss: 0.6941
Epoch 62/400
160/160 [=====] - 0s 997us/step - loss: 0.6942
Epoch 63/400
160/160 [=====] - 0s 972us/step - loss: 0.6941
Epoch 64/400
160/160 [=====] - 0s 1ms/step - loss: 0.6942
Epoch 65/400
160/160 [=====] - 0s 942us/step - loss: 0.6943
Epoch 66/400
160/160 [=====] - 0s 932us/step - loss: 0.6941
Epoch 67/400
160/160 [=====] - 0s 921us/step - loss: 0.6943
Epoch 68/400
160/160 [=====] - 0s 930us/step - loss: 0.6944
Epoch 69/400
160/160 [=====] - 0s 917us/step - loss: 0.6943
Epoch 70/400
160/160 [=====] - 0s 914us/step - loss: 0.6940
Epoch 71/400
160/160 [=====] - 0s 1ms/step - loss: 0.6942
Epoch 72/400
160/160 [=====] - 0s 990us/step - loss: 0.6941
Epoch 73/400
160/160 [=====] - 0s 945us/step - loss: 0.6943
Epoch 74/400
160/160 [=====] - 0s 956us/step - loss: 0.6941
Epoch 75/400
160/160 [=====] - 0s 937us/step - loss: 0.6941
Epoch 76/400
160/160 [=====] - 0s 987us/step - loss: 0.6945
Epoch 77/400
160/160 [=====] - 0s 966us/step - loss: 0.6940

Epoch 78/400
160/160 [=====] - 0s 989us/step - loss: 0.6943
Epoch 79/400
160/160 [=====] - 0s 1ms/step - loss: 0.6943
Epoch 80/400
160/160 [=====] - 0s 983us/step - loss: 0.6944
Epoch 81/400
160/160 [=====] - 0s 938us/step - loss: 0.6941
Epoch 82/400
160/160 [=====] - 0s 962us/step - loss: 0.6942
Epoch 83/400
160/160 [=====] - 0s 967us/step - loss: 0.6944
Epoch 84/400
160/160 [=====] - 0s 1ms/step - loss: 0.6942
Epoch 85/400
160/160 [=====] - 0s 912us/step - loss: 0.6943
Epoch 86/400
160/160 [=====] - 0s 931us/step - loss: 0.6938
Epoch 87/400
160/160 [=====] - 0s 928us/step - loss: 0.6942
Epoch 88/400
160/160 [=====] - 0s 922us/step - loss: 0.6940
Epoch 89/400
160/160 [=====] - 0s 965us/step - loss: 0.6943
Epoch 90/400
160/160 [=====] - 0s 938us/step - loss: 0.6942
Epoch 91/400
160/160 [=====] - 0s 976us/step - loss: 0.6937
Epoch 92/400
160/160 [=====] - 0s 932us/step - loss: 0.6942
Epoch 93/400
160/160 [=====] - 0s 954us/step - loss: 0.6941
Epoch 94/400
160/160 [=====] - 0s 918us/step - loss: 0.6943
Epoch 95/400
160/160 [=====] - 0s 954us/step - loss: 0.6944
Epoch 96/400
160/160 [=====] - 0s 1ms/step - loss: 0.6940
Epoch 97/400
160/160 [=====] - 0s 978us/step - loss: 0.6943
Epoch 98/400
160/160 [=====] - 0s 1ms/step - loss: 0.6941
Epoch 99/400
160/160 [=====] - 0s 937us/step - loss: 0.6945
Epoch 100/400
160/160 [=====] - 0s 955us/step - loss: 0.6943
Epoch 101/400
160/160 [=====] - 0s 946us/step - loss: 0.6945

Epoch 102/400
160/160 [=====] - 0s 998us/step - loss: 0.6941
Epoch 103/400
160/160 [=====] - 0s 887us/step - loss: 0.6942
Epoch 104/400
160/160 [=====] - 0s 903us/step - loss: 0.6942
Epoch 105/400
160/160 [=====] - 0s 926us/step - loss: 0.6941
Epoch 106/400
160/160 [=====] - 0s 949us/step - loss: 0.6943
Epoch 107/400
160/160 [=====] - 0s 998us/step - loss: 0.6941
Epoch 108/400
160/160 [=====] - 0s 948us/step - loss: 0.6941
Epoch 109/400
160/160 [=====] - 0s 961us/step - loss: 0.6941
Epoch 110/400
160/160 [=====] - 0s 916us/step - loss: 0.6941
Epoch 111/400
160/160 [=====] - 0s 922us/step - loss: 0.6941
Epoch 112/400
160/160 [=====] - 0s 1ms/step - loss: 0.6941
Epoch 113/400
160/160 [=====] - 0s 919us/step - loss: 0.6943
Epoch 114/400
160/160 [=====] - 0s 947us/step - loss: 0.6941
Epoch 115/400
160/160 [=====] - 0s 982us/step - loss: 0.6943
Epoch 116/400
160/160 [=====] - 0s 971us/step - loss: 0.6943
Epoch 117/400
160/160 [=====] - 0s 926us/step - loss: 0.6941
Epoch 118/400
160/160 [=====] - 0s 969us/step - loss: 0.6940
Epoch 119/400
160/160 [=====] - 0s 1ms/step - loss: 0.6942
Epoch 120/400
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Epoch 121/400
160/160 [=====] - 0s 917us/step - loss: 0.6943
Epoch 122/400
160/160 [=====] - 0s 953us/step - loss: 0.6942
Epoch 123/400
160/160 [=====] - 0s 933us/step - loss: 0.6942
Epoch 124/400
160/160 [=====] - 0s 958us/step - loss: 0.6943
Epoch 125/400
160/160 [=====] - 0s 922us/step - loss: 0.6940

Epoch 126/400
160/160 [=====] - 0s 953us/step - loss: 0.6943
Epoch 127/400
160/160 [=====] - 0s 912us/step - loss: 0.6942
Epoch 128/400
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Epoch 129/400
160/160 [=====] - 0s 924us/step - loss: 0.6943
Epoch 130/400
160/160 [=====] - 0s 946us/step - loss: 0.6943
Epoch 131/400
160/160 [=====] - 0s 936us/step - loss: 0.6942
Epoch 132/400
160/160 [=====] - 0s 949us/step - loss: 0.6940
Epoch 133/400
160/160 [=====] - 0s 936us/step - loss: 0.6939
Epoch 134/400
160/160 [=====] - 0s 991us/step - loss: 0.6940
Epoch 135/400
160/160 [=====] - 0s 1ms/step - loss: 0.6941
Epoch 136/400
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Epoch 137/400
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Epoch 138/400
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Epoch 139/400
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Epoch 140/400
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Epoch 141/400
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Epoch 142/400
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Epoch 143/400
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Epoch 144/400
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Epoch 145/400
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Epoch 146/400
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Epoch 147/400
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Epoch 148/400
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Epoch 149/400
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Epoch 150/400
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Epoch 151/400
160/160 [=====] - 0s 954us/step - loss: 0.6941
Epoch 152/400
160/160 [=====] - 0s 984us/step - loss: 0.6940
Epoch 153/400
160/160 [=====] - 0s 983us/step - loss: 0.6943
Epoch 154/400
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Epoch 155/400
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Epoch 161/400
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Epoch 162/400
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Epoch 163/400
160/160 [=====] - 0s 955us/step - loss: 0.6943
Epoch 164/400
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Epoch 165/400
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Epoch 166/400
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Epoch 167/400
160/160 [=====] - 0s 923us/step - loss: 0.6942
Epoch 168/400
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Epoch 169/400
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Epoch 170/400
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Epoch 171/400
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Epoch 172/400
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Epoch 173/400
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Epoch 174/400
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Epoch 175/400
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Epoch 176/400
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Epoch 177/400
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Epoch 178/400
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Epoch 179/400
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Epoch 187/400
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Epoch 191/400
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Epoch 193/400
160/160 [=====] - 0s 940us/step - loss: 0.6941
Epoch 194/400
160/160 [=====] - 0s 970us/step - loss: 0.6942
Epoch 195/400
160/160 [=====] - 0s 963us/step - loss: 0.6943
Epoch 196/400
160/160 [=====] - 0s 992us/step - loss: 0.6944
Epoch 197/400
160/160 [=====] - 0s 935us/step - loss: 0.6942

Epoch 198/400
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Epoch 199/400
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Epoch 205/400
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Epoch 206/400
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Epoch 207/400
160/160 [=====] - 0s 923us/step - loss: 0.6943
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Epoch 209/400
160/160 [=====] - 0s 928us/step - loss: 0.6940
Epoch 210/400
160/160 [=====] - 0s 934us/step - loss: 0.6941
Epoch 211/400
160/160 [=====] - 0s 976us/step - loss: 0.6941
Epoch 212/400
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Epoch 213/400
160/160 [=====] - 0s 960us/step - loss: 0.6943
Epoch 214/400
160/160 [=====] - 0s 1ms/step - loss: 0.6942
Epoch 215/400
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Epoch 216/400
160/160 [=====] - 0s 924us/step - loss: 0.6941
Epoch 217/400
160/160 [=====] - 0s 933us/step - loss: 0.6940
Epoch 218/400
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Epoch 219/400
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Epoch 220/400
160/160 [=====] - 0s 931us/step - loss: 0.6943
Epoch 221/400
160/160 [=====] - 0s 911us/step - loss: 0.6941

Epoch 222/400
160/160 [=====] - 0s 938us/step - loss: 0.6942
Epoch 223/400
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Epoch 224/400
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Epoch 225/400
160/160 [=====] - 0s 974us/step - loss: 0.6938
Epoch 226/400
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Epoch 227/400
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Epoch 228/400
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Epoch 229/400
160/160 [=====] - 0s 991us/step - loss: 0.6939
Epoch 230/400
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Epoch 231/400
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Epoch 232/400
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Epoch 233/400
160/160 [=====] - 0s 916us/step - loss: 0.6942
Epoch 234/400
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Epoch 235/400
160/160 [=====] - 0s 930us/step - loss: 0.6943
Epoch 236/400
160/160 [=====] - 0s 985us/step - loss: 0.6943
Epoch 237/400
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Epoch 238/400
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Epoch 239/400
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Epoch 240/400
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Epoch 241/400
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Epoch 242/400
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Epoch 243/400
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Epoch 244/400
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Epoch 245/400
160/160 [=====] - 0s 931us/step - loss: 0.6944

Epoch 246/400
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Epoch 247/400
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Epoch 248/400
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Epoch 249/400
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Epoch 252/400
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Epoch 253/400
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Epoch 254/400
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Epoch 255/400
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Epoch 256/400
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Epoch 257/400
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Epoch 258/400
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Epoch 259/400
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Epoch 342/400
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Epoch 366/400
160/160 [=====] - 0s 961us/step - loss: 0.6941
Epoch 367/400
160/160 [=====] - 0s 919us/step - loss: 0.6942
Epoch 368/400
160/160 [=====] - 0s 929us/step - loss: 0.6940
Epoch 369/400
160/160 [=====] - 0s 932us/step - loss: 0.6941
Epoch 370/400
160/160 [=====] - 0s 931us/step - loss: 0.6939
Epoch 371/400
160/160 [=====] - 0s 939us/step - loss: 0.6940
Epoch 372/400
160/160 [=====] - 0s 918us/step - loss: 0.6941
Epoch 373/400
160/160 [=====] - 0s 936us/step - loss: 0.6941
Epoch 374/400
160/160 [=====] - 0s 941us/step - loss: 0.6940
Epoch 375/400
160/160 [=====] - 0s 915us/step - loss: 0.6941
Epoch 376/400
160/160 [=====] - 0s 951us/step - loss: 0.6942
Epoch 377/400
160/160 [=====] - 0s 950us/step - loss: 0.6942
Epoch 378/400
160/160 [=====] - 0s 927us/step - loss: 0.6940
Epoch 379/400
160/160 [=====] - 0s 928us/step - loss: 0.6941
Epoch 380/400
160/160 [=====] - 0s 944us/step - loss: 0.6939
Epoch 381/400
160/160 [=====] - 0s 918us/step - loss: 0.6941
Epoch 382/400
160/160 [=====] - 0s 948us/step - loss: 0.6940
Epoch 383/400
160/160 [=====] - 0s 921us/step - loss: 0.6939
Epoch 384/400
160/160 [=====] - 0s 932us/step - loss: 0.6941
Epoch 385/400
160/160 [=====] - 0s 909us/step - loss: 0.6941
Epoch 386/400
160/160 [=====] - 0s 951us/step - loss: 0.6939
Epoch 387/400
160/160 [=====] - 0s 946us/step - loss: 0.6942
Epoch 388/400
160/160 [=====] - 0s 972us/step - loss: 0.6941
Epoch 389/400
160/160 [=====] - 0s 993us/step - loss: 0.6940

Epoch 390/400
 160/160 [=====] - 0s 957us/step - loss: 0.6941
 Epoch 391/400
 160/160 [=====] - 0s 981us/step - loss: 0.6940
 Epoch 392/400
 160/160 [=====] - 0s 995us/step - loss: 0.6941
 Epoch 393/400
 160/160 [=====] - 0s 1ms/step - loss: 0.6940
 Epoch 394/400
 160/160 [=====] - 0s 983us/step - loss: 0.6940
 Epoch 395/400
 160/160 [=====] - 0s 939us/step - loss: 0.6939
 Epoch 396/400
 160/160 [=====] - 0s 943us/step - loss: 0.6941
 Epoch 397/400
 160/160 [=====] - 0s 967us/step - loss: 0.6941
 Epoch 398/400
 160/160 [=====] - 0s 937us/step - loss: 0.6941
 Epoch 399/400
 160/160 [=====] - 0s 963us/step - loss: 0.6942
 Epoch 400/400
 160/160 [=====] - 0s 968us/step - loss: 0.6940
 160/160 [=====] - 0s 2ms/step
 Epoch 1/400
 160/160 [=====] - 1s 5ms/step - loss: 0.7026
 Epoch 2/400
 160/160 [=====] - 0s 971us/step - loss: 0.6974
 Epoch 3/400
 160/160 [=====] - 0s 944us/step - loss: 0.6951
 Epoch 4/400
 160/160 [=====] - 0s 858us/step - loss: 0.6944
 Epoch 5/400
 160/160 [=====] - 0s 867us/step - loss: 0.6939
 Epoch 6/400
 160/160 [=====] - 0s 900us/step - loss: 0.6941
 Epoch 7/400
 160/160 [=====] - 0s 965us/step - loss: 0.6942
 Epoch 8/400
 160/160 [=====] - 0s 945us/step - loss: 0.6939
 Epoch 9/400
 160/160 [=====] - 0s 920us/step - loss: 0.6940
 Epoch 10/400
 160/160 [=====] - 0s 914us/step - loss: 0.6940
 Epoch 11/400
 160/160 [=====] - 0s 879us/step - loss: 0.6940
 Epoch 12/400
 160/160 [=====] - 0s 877us/step - loss: 0.6941
 Epoch 13/400


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160/160 [=====] - 0s 869us/step - loss: 0.6947
Epoch 14/400
160/160 [=====] - 0s 904us/step - loss: 0.6936
Epoch 15/400
160/160 [=====] - 0s 906us/step - loss: 0.6948
Epoch 16/400
160/160 [=====] - 0s 873us/step - loss: 0.6941
Epoch 17/400
160/160 [=====] - 0s 864us/step - loss: 0.6940
Epoch 18/400
160/160 [=====] - 0s 1ms/step - loss: 0.6942
Epoch 19/400
160/160 [=====] - 0s 998us/step - loss: 0.6951
Epoch 20/400
160/160 [=====] - 0s 955us/step - loss: 0.6948
Epoch 21/400
160/160 [=====] - 0s 917us/step - loss: 0.6943
Epoch 22/400
160/160 [=====] - 0s 913us/step - loss: 0.6937
Epoch 23/400
160/160 [=====] - 0s 889us/step - loss: 0.6937 0s - loss: 0.69
Epoch 24/400
160/160 [=====] - 0s 890us/step - loss: 0.6939
Epoch 25/400
160/160 [=====] - 0s 991us/step - loss: 0.6941
Epoch 26/400
160/160 [=====] - 0s 984us/step - loss: 0.6947
Epoch 27/400
160/160 [=====] - 0s 918us/step - loss: 0.6936
Epoch 28/400
160/160 [=====] - 0s 1ms/step - loss: 0.6937
Epoch 29/400
160/160 [=====] - 0s 934us/step - loss: 0.6936
Epoch 30/400
160/160 [=====] - 0s 891us/step - loss: 0.6942
Epoch 31/400
160/160 [=====] - 0s 905us/step - loss: 0.6942
Epoch 32/400
160/160 [=====] - 0s 961us/step - loss: 0.6937
Epoch 33/400
160/160 [=====] - 0s 966us/step - loss: 0.6944
Epoch 34/400
160/160 [=====] - 0s 894us/step - loss: 0.6938
Epoch 35/400
160/160 [=====] - 0s 906us/step - loss: 0.6937
Epoch 36/400
160/160 [=====] - 0s 967us/step - loss: 0.6949
Epoch 37/400

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160/160 [=====] - 0s 946us/step - loss: 0.6940
Epoch 38/400
160/160 [=====] - 0s 961us/step - loss: 0.6938
Epoch 39/400
160/160 [=====] - 0s 988us/step - loss: 0.6948
Epoch 40/400
160/160 [=====] - 0s 883us/step - loss: 0.6937
Epoch 41/400
160/160 [=====] - 0s 891us/step - loss: 0.6942
Epoch 42/400
160/160 [=====] - 0s 913us/step - loss: 0.6944
Epoch 43/400
160/160 [=====] - 0s 885us/step - loss: 0.6939
Epoch 44/400
160/160 [=====] - 0s 956us/step - loss: 0.6936
Epoch 45/400
160/160 [=====] - 0s 899us/step - loss: 0.6943
Epoch 46/400
160/160 [=====] - 0s 919us/step - loss: 0.6938
Epoch 47/400
160/160 [=====] - 0s 942us/step - loss: 0.6941
Epoch 48/400
160/160 [=====] - 0s 853us/step - loss: 0.6944
Epoch 49/400
160/160 [=====] - 0s 870us/step - loss: 0.6949
Epoch 50/400
160/160 [=====] - 0s 889us/step - loss: 0.6938
Epoch 51/400
160/160 [=====] - 0s 921us/step - loss: 0.6950
Epoch 52/400
160/160 [=====] - 0s 860us/step - loss: 0.6943
Epoch 53/400
160/160 [=====] - 0s 873us/step - loss: 0.6941
Epoch 54/400
160/160 [=====] - 0s 934us/step - loss: 0.6942
Epoch 55/400
160/160 [=====] - 0s 950us/step - loss: 0.6937
Epoch 56/400
160/160 [=====] - 0s 937us/step - loss: 0.6943
Epoch 57/400
160/160 [=====] - 0s 909us/step - loss: 0.6939
Epoch 58/400
160/160 [=====] - 0s 906us/step - loss: 0.6937
Epoch 59/400
160/160 [=====] - 0s 904us/step - loss: 0.6940
Epoch 60/400
160/160 [=====] - 0s 891us/step - loss: 0.6945
Epoch 61/400

160/160 [=====] - 0s 940us/step - loss: 0.6938
Epoch 62/400
160/160 [=====] - 0s 895us/step - loss: 0.6943
Epoch 63/400
160/160 [=====] - 0s 879us/step - loss: 0.6936
Epoch 64/400
160/160 [=====] - 0s 910us/step - loss: 0.6937
Epoch 65/400
160/160 [=====] - 0s 867us/step - loss: 0.6939
Epoch 66/400
160/160 [=====] - 0s 978us/step - loss: 0.6946
Epoch 67/400
160/160 [=====] - 0s 825us/step - loss: 0.6942
Epoch 68/400
160/160 [=====] - 0s 843us/step - loss: 0.6938
Epoch 69/400
160/160 [=====] - 0s 926us/step - loss: 0.6937
Epoch 70/400
160/160 [=====] - 0s 866us/step - loss: 0.6941
Epoch 71/400
160/160 [=====] - 0s 847us/step - loss: 0.6935
Epoch 72/400
160/160 [=====] - 0s 889us/step - loss: 0.6938
Epoch 73/400
160/160 [=====] - 0s 880us/step - loss: 0.6940
Epoch 74/400
160/160 [=====] - 0s 856us/step - loss: 0.6932
Epoch 75/400
160/160 [=====] - 0s 899us/step - loss: 0.6941
Epoch 76/400
160/160 [=====] - 0s 873us/step - loss: 0.6938
Epoch 77/400
160/160 [=====] - 0s 855us/step - loss: 0.6934
Epoch 78/400
160/160 [=====] - 0s 865us/step - loss: 0.6940
Epoch 79/400
160/160 [=====] - 0s 865us/step - loss: 0.6941
Epoch 80/400
160/160 [=====] - 0s 875us/step - loss: 0.6929
Epoch 81/400
160/160 [=====] - 0s 856us/step - loss: 0.6932
Epoch 82/400
160/160 [=====] - 0s 873us/step - loss: 0.6934
Epoch 83/400
160/160 [=====] - 0s 951us/step - loss: 0.6934
Epoch 84/400
160/160 [=====] - 0s 967us/step - loss: 0.6936
Epoch 85/400

160/160 [=====] - 0s 925us/step - loss: 0.6932
Epoch 86/400
160/160 [=====] - 0s 888us/step - loss: 0.6933
Epoch 87/400
160/160 [=====] - 0s 931us/step - loss: 0.6936
Epoch 88/400
160/160 [=====] - 0s 866us/step - loss: 0.6937
Epoch 89/400
160/160 [=====] - 0s 922us/step - loss: 0.6940
Epoch 90/400
160/160 [=====] - 0s 987us/step - loss: 0.6943
Epoch 91/400
160/160 [=====] - 0s 877us/step - loss: 0.6928
Epoch 92/400
160/160 [=====] - 0s 866us/step - loss: 0.6933
Epoch 93/400
160/160 [=====] - 0s 886us/step - loss: 0.6939
Epoch 94/400
160/160 [=====] - 0s 913us/step - loss: 0.6930
Epoch 95/400
160/160 [=====] - 0s 997us/step - loss: 0.6931
Epoch 96/400
160/160 [=====] - 0s 962us/step - loss: 0.6928
Epoch 97/400
160/160 [=====] - 0s 956us/step - loss: 0.6923
Epoch 98/400
160/160 [=====] - 0s 887us/step - loss: 0.6925
Epoch 99/400
160/160 [=====] - 0s 869us/step - loss: 0.6930
Epoch 100/400
160/160 [=====] - 0s 887us/step - loss: 0.6923
Epoch 101/400
160/160 [=====] - 0s 935us/step - loss: 0.6925
Epoch 102/400
160/160 [=====] - 0s 921us/step - loss: 0.6926
Epoch 103/400
160/160 [=====] - 0s 914us/step - loss: 0.6918
Epoch 104/400
160/160 [=====] - 0s 871us/step - loss: 0.6920
Epoch 105/400
160/160 [=====] - 0s 868us/step - loss: 0.6923
Epoch 106/400
160/160 [=====] - 0s 860us/step - loss: 0.6917
Epoch 107/400
160/160 [=====] - 0s 893us/step - loss: 0.6922
Epoch 108/400
160/160 [=====] - 0s 892us/step - loss: 0.6912
Epoch 109/400

160/160 [=====] - 0s 866us/step - loss: 0.6917
 Epoch 110/400
 160/160 [=====] - 0s 874us/step - loss: 0.6912
 Epoch 111/400
 160/160 [=====] - 0s 882us/step - loss: 0.6909
 Epoch 112/400
 160/160 [=====] - 0s 898us/step - loss: 0.6903
 Epoch 113/400
 160/160 [=====] - 0s 866us/step - loss: 0.6902
 Epoch 114/400
 160/160 [=====] - 0s 900us/step - loss: 0.6899
 Epoch 115/400
 160/160 [=====] - 0s 871us/step - loss: 0.6908
 Epoch 116/400
 160/160 [=====] - 0s 878us/step - loss: 0.6893
 Epoch 117/400
 160/160 [=====] - 0s 859us/step - loss: 0.6892
 Epoch 118/400
 160/160 [=====] - 0s 894us/step - loss: 0.6889
 Epoch 119/400
 160/160 [=====] - 0s 927us/step - loss: 0.6879
 Epoch 120/400
 160/160 [=====] - 0s 902us/step - loss: 0.6884
 Epoch 121/400
 160/160 [=====] - 0s 890us/step - loss: 0.6879
 Epoch 122/400
 160/160 [=====] - 0s 892us/step - loss: 0.6875
 Epoch 123/400
 160/160 [=====] - 0s 986us/step - loss: 0.6875
 Epoch 124/400
 160/160 [=====] - 0s 997us/step - loss: 0.6883
 Epoch 125/400
 160/160 [=====] - 0s 892us/step - loss: 0.6863
 Epoch 126/400
 160/160 [=====] - 0s 863us/step - loss: 0.6864
 Epoch 127/400
 160/160 [=====] - 0s 934us/step - loss: 0.6846
 Epoch 128/400
 160/160 [=====] - 0s 921us/step - loss: 0.6837
 Epoch 129/400
 160/160 [=====] - 0s 944us/step - loss: 0.6830
 Epoch 130/400
 160/160 [=====] - 0s 944us/step - loss: 0.6829
 Epoch 131/400
 160/160 [=====] - 0s 918us/step - loss: 0.6818
 Epoch 132/400
 160/160 [=====] - 0s 901us/step - loss: 0.6805
 Epoch 133/400

160/160 [=====] - 0s 880us/step - loss: 0.6807
 Epoch 134/400
 160/160 [=====] - 0s 903us/step - loss: 0.6792
 Epoch 135/400
 160/160 [=====] - 0s 927us/step - loss: 0.6790
 Epoch 136/400
 160/160 [=====] - 0s 917us/step - loss: 0.6780
 Epoch 137/400
 160/160 [=====] - 0s 845us/step - loss: 0.6766
 Epoch 138/400
 160/160 [=====] - 0s 887us/step - loss: 0.6765
 Epoch 139/400
 160/160 [=====] - 0s 895us/step - loss: 0.6742
 Epoch 140/400
 160/160 [=====] - 0s 885us/step - loss: 0.6746
 Epoch 141/400
 160/160 [=====] - 0s 924us/step - loss: 0.6721
 Epoch 142/400
 160/160 [=====] - 0s 890us/step - loss: 0.6703
 Epoch 143/400
 160/160 [=====] - 0s 922us/step - loss: 0.6695
 Epoch 144/400
 160/160 [=====] - 0s 908us/step - loss: 0.6678
 Epoch 145/400
 160/160 [=====] - 0s 901us/step - loss: 0.6669
 Epoch 146/400
 160/160 [=====] - 0s 959us/step - loss: 0.6647
 Epoch 147/400
 160/160 [=====] - 0s 925us/step - loss: 0.6634
 Epoch 148/400
 160/160 [=====] - 0s 915us/step - loss: 0.6618
 Epoch 149/400
 160/160 [=====] - 0s 894us/step - loss: 0.6605
 Epoch 150/400
 160/160 [=====] - 0s 861us/step - loss: 0.6584
 Epoch 151/400
 160/160 [=====] - 0s 896us/step - loss: 0.6573
 Epoch 152/400
 160/160 [=====] - 0s 847us/step - loss: 0.6550
 Epoch 153/400
 160/160 [=====] - 0s 904us/step - loss: 0.6543
 Epoch 154/400
 160/160 [=====] - 0s 894us/step - loss: 0.6511
 Epoch 155/400
 160/160 [=====] - 0s 893us/step - loss: 0.6487
 Epoch 156/400
 160/160 [=====] - 0s 874us/step - loss: 0.6469
 Epoch 157/400

160/160 [=====] - 0s 890us/step - loss: 0.6452
Epoch 158/400
160/160 [=====] - 0s 900us/step - loss: 0.6432
Epoch 159/400
160/160 [=====] - 0s 858us/step - loss: 0.6411
Epoch 160/400
160/160 [=====] - 0s 859us/step - loss: 0.6399
Epoch 161/400
160/160 [=====] - 0s 890us/step - loss: 0.6370
Epoch 162/400
160/160 [=====] - 0s 879us/step - loss: 0.6355
Epoch 163/400
160/160 [=====] - 0s 900us/step - loss: 0.6349
Epoch 164/400
160/160 [=====] - 0s 858us/step - loss: 0.6318
Epoch 165/400
160/160 [=====] - 0s 880us/step - loss: 0.6311
Epoch 166/400
160/160 [=====] - 0s 880us/step - loss: 0.6284
Epoch 167/400
160/160 [=====] - 0s 878us/step - loss: 0.6262
Epoch 168/400
160/160 [=====] - 0s 955us/step - loss: 0.6247
Epoch 169/400
160/160 [=====] - 0s 920us/step - loss: 0.6227
Epoch 170/400
160/160 [=====] - 0s 858us/step - loss: 0.6214
Epoch 171/400
160/160 [=====] - 0s 921us/step - loss: 0.6194
Epoch 172/400
160/160 [=====] - 0s 857us/step - loss: 0.6181
Epoch 173/400
160/160 [=====] - 0s 893us/step - loss: 0.6166
Epoch 174/400
160/160 [=====] - 0s 906us/step - loss: 0.6148
Epoch 175/400
160/160 [=====] - 0s 954us/step - loss: 0.6138
Epoch 176/400
160/160 [=====] - 0s 1ms/step - loss: 0.6125
Epoch 177/400
160/160 [=====] - 0s 933us/step - loss: 0.6106
Epoch 178/400
160/160 [=====] - 0s 910us/step - loss: 0.6091
Epoch 179/400
160/160 [=====] - 0s 898us/step - loss: 0.6076
Epoch 180/400
160/160 [=====] - 0s 903us/step - loss: 0.6072
Epoch 181/400

160/160 [=====] - 0s 927us/step - loss: 0.6050
 Epoch 182/400
 160/160 [=====] - 0s 923us/step - loss: 0.6039
 Epoch 183/400
 160/160 [=====] - 0s 896us/step - loss: 0.6025
 Epoch 184/400
 160/160 [=====] - 0s 904us/step - loss: 0.6029
 Epoch 185/400
 160/160 [=====] - 0s 899us/step - loss: 0.6003
 Epoch 186/400
 160/160 [=====] - 0s 866us/step - loss: 0.5993
 Epoch 187/400
 160/160 [=====] - 0s 891us/step - loss: 0.5986
 Epoch 188/400
 160/160 [=====] - 0s 870us/step - loss: 0.5978
 Epoch 189/400
 160/160 [=====] - 0s 903us/step - loss: 0.5967
 Epoch 190/400
 160/160 [=====] - 0s 867us/step - loss: 0.5966
 Epoch 191/400
 160/160 [=====] - 0s 898us/step - loss: 0.5953
 Epoch 192/400
 160/160 [=====] - 0s 897us/step - loss: 0.5941
 Epoch 193/400
 160/160 [=====] - 0s 876us/step - loss: 0.5936
 Epoch 194/400
 160/160 [=====] - 0s 853us/step - loss: 0.5927
 Epoch 195/400
 160/160 [=====] - 0s 913us/step - loss: 0.5918
 Epoch 196/400
 160/160 [=====] - 0s 896us/step - loss: 0.5913
 Epoch 197/400
 160/160 [=====] - 0s 913us/step - loss: 0.5906
 Epoch 198/400
 160/160 [=====] - 0s 902us/step - loss: 0.5904
 Epoch 199/400
 160/160 [=====] - 0s 877us/step - loss: 0.5892
 Epoch 200/400
 160/160 [=====] - 0s 912us/step - loss: 0.5883
 Epoch 201/400
 160/160 [=====] - 0s 884us/step - loss: 0.5877
 Epoch 202/400
 160/160 [=====] - 0s 893us/step - loss: 0.5879
 Epoch 203/400
 160/160 [=====] - 0s 917us/step - loss: 0.5865
 Epoch 204/400
 160/160 [=====] - 0s 907us/step - loss: 0.5862
 Epoch 205/400

160/160 [=====] - 0s 886us/step - loss: 0.5852
 Epoch 206/400
 160/160 [=====] - 0s 914us/step - loss: 0.5846
 Epoch 207/400
 160/160 [=====] - 0s 923us/step - loss: 0.5856
 Epoch 208/400
 160/160 [=====] - 0s 868us/step - loss: 0.5837
 Epoch 209/400
 160/160 [=====] - 0s 880us/step - loss: 0.5833
 Epoch 210/400
 160/160 [=====] - 0s 900us/step - loss: 0.5824
 Epoch 211/400
 160/160 [=====] - 0s 888us/step - loss: 0.5830
 Epoch 212/400
 160/160 [=====] - 0s 896us/step - loss: 0.5814
 Epoch 213/400
 160/160 [=====] - 0s 870us/step - loss: 0.5810
 Epoch 214/400
 160/160 [=====] - 0s 865us/step - loss: 0.5807
 Epoch 215/400
 160/160 [=====] - 0s 873us/step - loss: 0.5806
 Epoch 216/400
 160/160 [=====] - 0s 873us/step - loss: 0.5791
 Epoch 217/400
 160/160 [=====] - 0s 847us/step - loss: 0.5797
 Epoch 218/400
 160/160 [=====] - 0s 894us/step - loss: 0.5786
 Epoch 219/400
 160/160 [=====] - 0s 898us/step - loss: 0.5782
 Epoch 220/400
 160/160 [=====] - 0s 882us/step - loss: 0.5776
 Epoch 221/400
 160/160 [=====] - 0s 855us/step - loss: 0.5768
 Epoch 222/400
 160/160 [=====] - 0s 895us/step - loss: 0.5765
 Epoch 223/400
 160/160 [=====] - 0s 854us/step - loss: 0.5760
 Epoch 224/400
 160/160 [=====] - 0s 873us/step - loss: 0.5752
 Epoch 225/400
 160/160 [=====] - 0s 884us/step - loss: 0.5751
 Epoch 226/400
 160/160 [=====] - 0s 878us/step - loss: 0.5744
 Epoch 227/400
 160/160 [=====] - 0s 856us/step - loss: 0.5731
 Epoch 228/400
 160/160 [=====] - 0s 879us/step - loss: 0.5722
 Epoch 229/400

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160/160 [=====] - 0s 888us/step - loss: 0.5715
Epoch 230/400
160/160 [=====] - 0s 899us/step - loss: 0.5714
Epoch 231/400
160/160 [=====] - 0s 842us/step - loss: 0.5699
Epoch 232/400
160/160 [=====] - 0s 851us/step - loss: 0.5694
Epoch 233/400
160/160 [=====] - 0s 855us/step - loss: 0.5679
Epoch 234/400
160/160 [=====] - 0s 861us/step - loss: 0.5683
Epoch 235/400
160/160 [=====] - 0s 860us/step - loss: 0.5663
Epoch 236/400
160/160 [=====] - 0s 862us/step - loss: 0.5665
Epoch 237/400
160/160 [=====] - 0s 904us/step - loss: 0.5649
Epoch 238/400
160/160 [=====] - 0s 877us/step - loss: 0.5633
Epoch 239/400
160/160 [=====] - 0s 850us/step - loss: 0.5629
Epoch 240/400
160/160 [=====] - 0s 859us/step - loss: 0.5601
Epoch 241/400
160/160 [=====] - 0s 904us/step - loss: 0.5592
Epoch 242/400
160/160 [=====] - 0s 872us/step - loss: 0.5569
Epoch 243/400
160/160 [=====] - 0s 853us/step - loss: 0.5556
Epoch 244/400
160/160 [=====] - 0s 885us/step - loss: 0.5553
Epoch 245/400
160/160 [=====] - 0s 881us/step - loss: 0.5518
Epoch 246/400
160/160 [=====] - 0s 861us/step - loss: 0.5495
Epoch 247/400
160/160 [=====] - 0s 864us/step - loss: 0.5479
Epoch 248/400
160/160 [=====] - 0s 888us/step - loss: 0.5453
Epoch 249/400
160/160 [=====] - 0s 861us/step - loss: 0.5420
Epoch 250/400
160/160 [=====] - 0s 876us/step - loss: 0.5394
Epoch 251/400
160/160 [=====] - 0s 863us/step - loss: 0.5395
Epoch 252/400
160/160 [=====] - 0s 863us/step - loss: 0.5337
Epoch 253/400

```

160/160 [=====] - 0s 864us/step - loss: 0.5338
 Epoch 254/400
 160/160 [=====] - 0s 881us/step - loss: 0.5286
 Epoch 255/400
 160/160 [=====] - 0s 918us/step - loss: 0.5242
 Epoch 256/400
 160/160 [=====] - 0s 895us/step - loss: 0.5206
 Epoch 257/400
 160/160 [=====] - 0s 849us/step - loss: 0.5173
 Epoch 258/400
 160/160 [=====] - 0s 868us/step - loss: 0.5126
 Epoch 259/400
 160/160 [=====] - 0s 857us/step - loss: 0.5096
 Epoch 260/400
 160/160 [=====] - 0s 900us/step - loss: 0.5047
 Epoch 261/400
 160/160 [=====] - 0s 859us/step - loss: 0.4997
 Epoch 262/400
 160/160 [=====] - 0s 884us/step - loss: 0.4945
 Epoch 263/400
 160/160 [=====] - 0s 885us/step - loss: 0.4902
 Epoch 264/400
 160/160 [=====] - 0s 870us/step - loss: 0.4868
 Epoch 265/400
 160/160 [=====] - 0s 860us/step - loss: 0.4806
 Epoch 266/400
 160/160 [=====] - 0s 876us/step - loss: 0.4765
 Epoch 267/400
 160/160 [=====] - 0s 842us/step - loss: 0.4700
 Epoch 268/400
 160/160 [=====] - 0s 914us/step - loss: 0.4657
 Epoch 269/400
 160/160 [=====] - 0s 903us/step - loss: 0.4622
 Epoch 270/400
 160/160 [=====] - 0s 878us/step - loss: 0.4554
 Epoch 271/400
 160/160 [=====] - 0s 886us/step - loss: 0.4495
 Epoch 272/400
 160/160 [=====] - 0s 851us/step - loss: 0.4453
 Epoch 273/400
 160/160 [=====] - 0s 913us/step - loss: 0.4402
 Epoch 274/400
 160/160 [=====] - 0s 934us/step - loss: 0.4357
 Epoch 275/400
 160/160 [=====] - 0s 893us/step - loss: 0.4320
 Epoch 276/400
 160/160 [=====] - 0s 920us/step - loss: 0.4278
 Epoch 277/400

160/160 [=====] - 0s 899us/step - loss: 0.4244
 Epoch 278/400
 160/160 [=====] - 0s 839us/step - loss: 0.4194
 Epoch 279/400
 160/160 [=====] - 0s 860us/step - loss: 0.4154
 Epoch 280/400
 160/160 [=====] - 0s 886us/step - loss: 0.4099
 Epoch 281/400
 160/160 [=====] - 0s 858us/step - loss: 0.4076
 Epoch 282/400
 160/160 [=====] - 0s 907us/step - loss: 0.4036
 Epoch 283/400
 160/160 [=====] - 0s 876us/step - loss: 0.3997
 Epoch 284/400
 160/160 [=====] - 0s 872us/step - loss: 0.3969
 Epoch 285/400
 160/160 [=====] - 0s 876us/step - loss: 0.3932
 Epoch 286/400
 160/160 [=====] - 0s 887us/step - loss: 0.3907
 Epoch 287/400
 160/160 [=====] - 0s 870us/step - loss: 0.3879
 Epoch 288/400
 160/160 [=====] - 0s 848us/step - loss: 0.3853
 Epoch 289/400
 160/160 [=====] - 0s 863us/step - loss: 0.3817
 Epoch 290/400
 160/160 [=====] - 0s 917us/step - loss: 0.3793
 Epoch 291/400
 160/160 [=====] - 0s 882us/step - loss: 0.3777
 Epoch 292/400
 160/160 [=====] - 0s 853us/step - loss: 0.3750
 Epoch 293/400
 160/160 [=====] - 0s 891us/step - loss: 0.3722
 Epoch 294/400
 160/160 [=====] - 0s 873us/step - loss: 0.3708
 Epoch 295/400
 160/160 [=====] - 0s 877us/step - loss: 0.3682
 Epoch 296/400
 160/160 [=====] - 0s 861us/step - loss: 0.3662
 Epoch 297/400
 160/160 [=====] - 0s 904us/step - loss: 0.3644
 Epoch 298/400
 160/160 [=====] - 0s 860us/step - loss: 0.3621
 Epoch 299/400
 160/160 [=====] - 0s 882us/step - loss: 0.3597
 Epoch 300/400
 160/160 [=====] - 0s 851us/step - loss: 0.3575
 Epoch 301/400

160/160 [=====] - 0s 899us/step - loss: 0.3570
Epoch 302/400
160/160 [=====] - 0s 875us/step - loss: 0.3557
Epoch 303/400
160/160 [=====] - 0s 889us/step - loss: 0.3546
Epoch 304/400
160/160 [=====] - 0s 891us/step - loss: 0.3529
Epoch 305/400
160/160 [=====] - 0s 895us/step - loss: 0.3520
Epoch 306/400
160/160 [=====] - 0s 873us/step - loss: 0.3507
Epoch 307/400
160/160 [=====] - 0s 893us/step - loss: 0.3493
Epoch 308/400
160/160 [=====] - 0s 874us/step - loss: 0.3488
Epoch 309/400
160/160 [=====] - 0s 858us/step - loss: 0.3477
Epoch 310/400
160/160 [=====] - 0s 877us/step - loss: 0.3447
Epoch 311/400
160/160 [=====] - 0s 864us/step - loss: 0.3443
Epoch 312/400
160/160 [=====] - 0s 914us/step - loss: 0.3429
Epoch 313/400
160/160 [=====] - 0s 853us/step - loss: 0.3426
Epoch 314/400
160/160 [=====] - 0s 878us/step - loss: 0.3430
Epoch 315/400
160/160 [=====] - 0s 861us/step - loss: 0.3421
Epoch 316/400
160/160 [=====] - 0s 866us/step - loss: 0.3402
Epoch 317/400
160/160 [=====] - 0s 928us/step - loss: 0.3393
Epoch 318/400
160/160 [=====] - 0s 866us/step - loss: 0.3383
Epoch 319/400
160/160 [=====] - 0s 888us/step - loss: 0.3382
Epoch 320/400
160/160 [=====] - 0s 900us/step - loss: 0.3373
Epoch 321/400
160/160 [=====] - 0s 863us/step - loss: 0.3355
Epoch 322/400
160/160 [=====] - 0s 896us/step - loss: 0.3351
Epoch 323/400
160/160 [=====] - 0s 856us/step - loss: 0.3339
Epoch 324/400
160/160 [=====] - 0s 876us/step - loss: 0.3346
Epoch 325/400

```

160/160 [=====] - 0s 867us/step - loss: 0.3322
Epoch 326/400
160/160 [=====] - 0s 900us/step - loss: 0.3324
Epoch 327/400
160/160 [=====] - 0s 888us/step - loss: 0.3322
Epoch 328/400
160/160 [=====] - 0s 861us/step - loss: 0.3310
Epoch 329/400
160/160 [=====] - 0s 850us/step - loss: 0.3305
Epoch 330/400
160/160 [=====] - 0s 855us/step - loss: 0.3298
Epoch 331/400
160/160 [=====] - 0s 874us/step - loss: 0.3294
Epoch 332/400
160/160 [=====] - 0s 862us/step - loss: 0.3286
Epoch 333/400
160/160 [=====] - 0s 856us/step - loss: 0.3275
Epoch 334/400
160/160 [=====] - 0s 857us/step - loss: 0.3278
Epoch 335/400
160/160 [=====] - 0s 891us/step - loss: 0.3282
Epoch 336/400
160/160 [=====] - 0s 862us/step - loss: 0.3272
Epoch 337/400
160/160 [=====] - 0s 866us/step - loss: 0.3264
Epoch 338/400
160/160 [=====] - 0s 835us/step - loss: 0.3252
Epoch 339/400
160/160 [=====] - 0s 883us/step - loss: 0.3251
Epoch 340/400
160/160 [=====] - 0s 894us/step - loss: 0.3244
Epoch 341/400
160/160 [=====] - 0s 836us/step - loss: 0.3248
Epoch 342/400
160/160 [=====] - 0s 867us/step - loss: 0.3253
Epoch 343/400
160/160 [=====] - 0s 859us/step - loss: 0.3234
Epoch 344/400
160/160 [=====] - 0s 884us/step - loss: 0.3240
Epoch 345/400
160/160 [=====] - 0s 863us/step - loss: 0.3227
Epoch 346/400
160/160 [=====] - 0s 889us/step - loss: 0.3232
Epoch 347/400
160/160 [=====] - 0s 877us/step - loss: 0.3226
Epoch 348/400
160/160 [=====] - 0s 879us/step - loss: 0.3220
Epoch 349/400

```

```

160/160 [=====] - 0s 854us/step - loss: 0.3212
Epoch 350/400
160/160 [=====] - 0s 894us/step - loss: 0.3220
Epoch 351/400
160/160 [=====] - 0s 867us/step - loss: 0.3208
Epoch 352/400
160/160 [=====] - 0s 847us/step - loss: 0.3204
Epoch 353/400
160/160 [=====] - 0s 881us/step - loss: 0.3203
Epoch 354/400
160/160 [=====] - 0s 887us/step - loss: 0.3195
Epoch 355/400
160/160 [=====] - 0s 853us/step - loss: 0.3206
Epoch 356/400
160/160 [=====] - 0s 854us/step - loss: 0.3196
Epoch 357/400
160/160 [=====] - 0s 861us/step - loss: 0.3195
Epoch 358/400
160/160 [=====] - 0s 898us/step - loss: 0.3192
Epoch 359/400
160/160 [=====] - 0s 857us/step - loss: 0.3190
Epoch 360/400
160/160 [=====] - 0s 855us/step - loss: 0.3182
Epoch 361/400
160/160 [=====] - 0s 887us/step - loss: 0.3179
Epoch 362/400
160/160 [=====] - 0s 863us/step - loss: 0.3198
Epoch 363/400
160/160 [=====] - 0s 891us/step - loss: 0.3168
Epoch 364/400
160/160 [=====] - 0s 856us/step - loss: 0.3178
Epoch 365/400
160/160 [=====] - 0s 917us/step - loss: 0.3169
Epoch 366/400
160/160 [=====] - 0s 858us/step - loss: 0.3177
Epoch 367/400
160/160 [=====] - 0s 879us/step - loss: 0.3164
Epoch 368/400
160/160 [=====] - 0s 884us/step - loss: 0.3167
Epoch 369/400
160/160 [=====] - 0s 885us/step - loss: 0.3172
Epoch 370/400
160/160 [=====] - 0s 853us/step - loss: 0.3171
Epoch 371/400
160/160 [=====] - 0s 866us/step - loss: 0.3168
Epoch 372/400
160/160 [=====] - 0s 886us/step - loss: 0.3155
Epoch 373/400

```

160/160 [=====] - 0s 869us/step - loss: 0.3165
Epoch 374/400
160/160 [=====] - 0s 878us/step - loss: 0.3152
Epoch 375/400
160/160 [=====] - 0s 869us/step - loss: 0.3149
Epoch 376/400
160/160 [=====] - 0s 904us/step - loss: 0.3142
Epoch 377/400
160/160 [=====] - 0s 872us/step - loss: 0.3151
Epoch 378/400
160/160 [=====] - 0s 879us/step - loss: 0.3156
Epoch 379/400
160/160 [=====] - 0s 855us/step - loss: 0.3147
Epoch 380/400
160/160 [=====] - 0s 895us/step - loss: 0.3146
Epoch 381/400
160/160 [=====] - 0s 880us/step - loss: 0.3137
Epoch 382/400
160/160 [=====] - 0s 926us/step - loss: 0.3132
Epoch 383/400
160/160 [=====] - 0s 890us/step - loss: 0.3133
Epoch 384/400
160/160 [=====] - 0s 894us/step - loss: 0.3144
Epoch 385/400
160/160 [=====] - 0s 851us/step - loss: 0.3125
Epoch 386/400
160/160 [=====] - 0s 877us/step - loss: 0.3138
Epoch 387/400
160/160 [=====] - 0s 880us/step - loss: 0.3129
Epoch 388/400
160/160 [=====] - 0s 893us/step - loss: 0.3131
Epoch 389/400
160/160 [=====] - 0s 868us/step - loss: 0.3131
Epoch 390/400
160/160 [=====] - 0s 912us/step - loss: 0.3126
Epoch 391/400
160/160 [=====] - 0s 867us/step - loss: 0.3116
Epoch 392/400
160/160 [=====] - 0s 878us/step - loss: 0.3126
Epoch 393/400
160/160 [=====] - 0s 877us/step - loss: 0.3115
Epoch 394/400
160/160 [=====] - 0s 879us/step - loss: 0.3114
Epoch 395/400
160/160 [=====] - 0s 910us/step - loss: 0.3109
Epoch 396/400
160/160 [=====] - 0s 866us/step - loss: 0.3111
Epoch 397/400


```

160/160 [=====] - 0s 900us/step - loss: 0.3106
Epoch 398/400
160/160 [=====] - 0s 891us/step - loss: 0.3108
Epoch 399/400
160/160 [=====] - 0s 900us/step - loss: 0.3104
Epoch 400/400
160/160 [=====] - 0s 865us/step - loss: 0.3129
160/160 [=====] - 0s 3ms/step

```

```
In [28]: color = []
```

```

for score in scores:
    if score == min(scores):
        color.append('limegreen')
    else:
        color.append('dodgerblue')

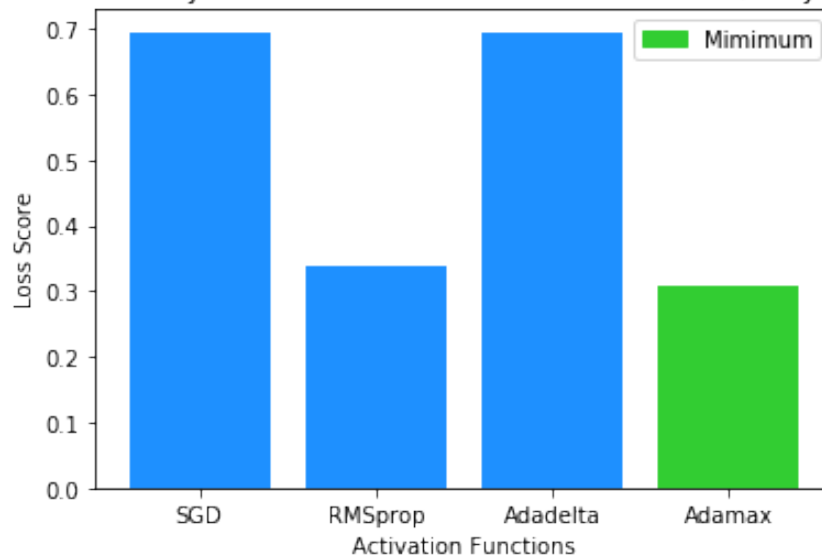
patch1 = mpatches.Patch(color='limegreen', label='Mimimum')
plt.legend(handles=[patch1], loc = 'best')

actives = ['SGD', 'RMSprop', 'Adadelata', 'Adamax']

plt.bar(actives, scores, width = .8, color = color)
plt.xlabel('Activation Functions')
plt.ylabel('Loss Score')
plt.title('Loss Scores For 4 Layer Neural Networks with 5 Neurons Each, Varying Optimizers')
plt.show()

```

Loss Scores For 4 Layer Neural Networks with 5 Neurons Each, Varying Optimizers



Looking at the above graph, Adamax Prop appears to perform the best

1.2 Part 2 - BYOD (Bring your own Dataset)

Using your own dataset, experiment and find the best Neural Network configuration. You may use any resource to improve results, just reference it.

While you may use any dataset, I'd prefer you didn't use the diabetes dataset used in the lesson.

<https://stackoverflow.com/questions/34673164/how-to-train-and-tune-an-artificial-multilayer-perceptron-neural-network-using-k>

<https://keras.io/>

2 For this analysis, I will be using the game_team_stats.csv from the NHL game data found on Kaggle [here](#). I will be predicting the whether a team won a game, with 1 is a win and 0 is a loss.

```
In [31]: import pandas as pd
```

```
#load in data
df = pd.read_csv('../data/game_teams_stats.csv')

X = df[['HoA', 'settled_in', 'head_coach', 'goals', 'shots', 'hits', 'pim',
        'powerPlayGoals', 'faceOffWinPercentage', 'giveaways', 'takeaways']]

y = df['won_num']

#encode string columns
from sklearn.preprocessing import LabelEncoder

str_col = X.select_dtypes('object').columns

for col in str_col:
    X[col] = LabelEncoder().fit_transform(X[col].values)
```

/Users/Broth/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:17: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame.

Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: <http://pandas.pydata.org/pandas-docs/stable/indexing.html>

2.0.1 Step 1. Determine optimal number of layers, starting with 11 nodes each to match number of input layers

```
In [32]: scores = []
```

```
### One Layer ###
```

```

model = Sequential()

model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
# model.add(Dense(2, activation='tanh'))
model.add(Dense(1, activation='sigmoid'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Two Layers ###
model = Sequential()

model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Three Layers ###
model = Sequential()

model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

```

```

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Four Layers
model = Sequential()

model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Five Layers
model = Sequential()

model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

```

Six Layers

```
model = Sequential()
```

```
model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))
```

```
sgd = SGD(lr=0.1)
```

```
model.compile(loss='binary_crossentropy', optimizer='sgd')
```

```
model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))
```

```
# evaluate the model
```

```
scores.append(model.evaluate(X, y))
```

Seven Layers

```
model = Sequential()
```

```
model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))
```

```
sgd = SGD(lr=0.1)
```

```
model.compile(loss='binary_crossentropy', optimizer='sgd')
```

```
model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))
```

```

# evaluate the model
scores.append(model.evaluate(X, y))

### Eight Layers
model = Sequential()

model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Nine Layers
model = Sequential()

model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)

```

```

model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Ten Layers
model = Sequential()

model.add(Dense(11, input_dim=11, activation='tanh')) #sigmoid, relu
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(11, input_dim = 11, activation='tanh'))
model.add(Dense(1, activation='tanh'))
# model.add(Dense(1, input_dim=2, activation='sigmoid'))

sgd = SGD(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

```

```

Epoch 1/200
22868/22868 [=====] - 1s 35us/step - loss: 0.7136
Epoch 2/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6977
Epoch 3/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6958
Epoch 4/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6948
Epoch 5/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6944
Epoch 6/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6935

```

```

Epoch 7/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6933
Epoch 8/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6930
Epoch 9/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6928
Epoch 10/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6927
Epoch 11/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6925
Epoch 12/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6924
Epoch 13/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6924
Epoch 14/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6921
Epoch 15/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6921
Epoch 16/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6919
Epoch 17/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6919
Epoch 18/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6917
Epoch 19/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6917
Epoch 20/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6916
Epoch 21/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6915
Epoch 22/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6915
Epoch 23/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6914
Epoch 24/200
22868/22868 [=====] - 0s 11us/step - loss: 0.6914
Epoch 25/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6913
Epoch 26/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6912
Epoch 27/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6911
Epoch 28/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6911
Epoch 29/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6909
Epoch 30/200
22868/22868 [=====] - 0s 11us/step - loss: 0.6908

```


Epoch 31/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6907
Epoch 32/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6906
Epoch 33/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6906
Epoch 34/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6904
Epoch 35/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6901
Epoch 36/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6899
Epoch 37/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6897
Epoch 38/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6894
Epoch 39/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6893
Epoch 40/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6890
Epoch 41/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6887
Epoch 42/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6883
Epoch 43/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6882
Epoch 44/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6876
Epoch 45/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6868
Epoch 46/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6855
Epoch 47/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6830
Epoch 48/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6782
Epoch 49/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6701
Epoch 50/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6469
Epoch 51/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6239
Epoch 52/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6108
Epoch 53/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6028
Epoch 54/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5969

Epoch 55/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5886
Epoch 56/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5765
Epoch 57/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5693
Epoch 58/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5653
Epoch 59/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5497
Epoch 60/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5588
Epoch 61/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5537
Epoch 62/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5515
Epoch 63/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5479
Epoch 64/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5402
Epoch 65/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5401
Epoch 66/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5366
Epoch 67/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5399
Epoch 68/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5405
Epoch 69/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5385
Epoch 70/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5363
Epoch 71/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5338
Epoch 72/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5362
Epoch 73/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5327
Epoch 74/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5327
Epoch 75/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5307
Epoch 76/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5297
Epoch 77/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5338
Epoch 78/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5304

Epoch 79/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5271
Epoch 80/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5317
Epoch 81/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5284
Epoch 82/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5320
Epoch 83/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5279
Epoch 84/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5250
Epoch 85/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5303
Epoch 86/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5292
Epoch 87/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5253
Epoch 88/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5247
Epoch 89/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5302
Epoch 90/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5298
Epoch 91/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5239
Epoch 92/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5276
Epoch 93/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5294
Epoch 94/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5260
Epoch 95/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5293
Epoch 96/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5289
Epoch 97/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5229
Epoch 98/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5275
Epoch 99/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5242
Epoch 100/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5272
Epoch 101/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5248
Epoch 102/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5233

Epoch 103/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5220
Epoch 104/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5228
Epoch 105/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5261
Epoch 106/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5247
Epoch 107/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5236
Epoch 108/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5234
Epoch 109/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5267
Epoch 110/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5271
Epoch 111/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5212
Epoch 112/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5251
Epoch 113/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5309
Epoch 114/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5214
Epoch 115/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5227
Epoch 116/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5232
Epoch 117/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5219
Epoch 118/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5193
Epoch 119/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5203
Epoch 120/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5197
Epoch 121/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5187
Epoch 122/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5151
Epoch 123/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5117
Epoch 124/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5137
Epoch 125/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5126
Epoch 126/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5113

Epoch 127/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5120
Epoch 128/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5131
Epoch 129/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5162
Epoch 130/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5092
Epoch 131/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5104
Epoch 132/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5104
Epoch 133/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5097
Epoch 134/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5094
Epoch 135/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5097
Epoch 136/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5113
Epoch 137/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5104
Epoch 138/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5091
Epoch 139/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5137
Epoch 140/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5060
Epoch 141/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5081
Epoch 142/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5049
Epoch 143/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5082
Epoch 144/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5090
Epoch 145/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5063
Epoch 146/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5065
Epoch 147/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5038
Epoch 148/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5037
Epoch 149/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4993
Epoch 150/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5011

Epoch 151/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5002
Epoch 152/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4982
Epoch 153/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5007
Epoch 154/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4999
Epoch 155/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5026
Epoch 156/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4965
Epoch 157/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5021
Epoch 158/200
22868/22868 [=====] - 0s 11us/step - loss: 0.5006
Epoch 159/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4975
Epoch 160/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4987
Epoch 161/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4940
Epoch 162/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4972
Epoch 163/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4962
Epoch 164/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4962
Epoch 165/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4973
Epoch 166/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4940
Epoch 167/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4919
Epoch 168/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5009
Epoch 169/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4944
Epoch 170/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4932
Epoch 171/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4937
Epoch 172/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4938
Epoch 173/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4926
Epoch 174/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4920

Epoch 175/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4921
Epoch 176/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4939
Epoch 177/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4940
Epoch 178/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4909
Epoch 179/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4913
Epoch 180/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4898
Epoch 181/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4939
Epoch 182/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4927
Epoch 183/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4882
Epoch 184/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4935
Epoch 185/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4955
Epoch 186/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4943
Epoch 187/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4939
Epoch 188/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4914
Epoch 189/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4965
Epoch 190/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4905
Epoch 191/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4938
Epoch 192/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4929
Epoch 193/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4916
Epoch 194/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4925
Epoch 195/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4930
Epoch 196/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4894
Epoch 197/200
22868/22868 [=====] - 0s 12us/step - loss: 0.4905
Epoch 198/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4914

Epoch 199/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4902
Epoch 200/200
22868/22868 [=====] - 0s 11us/step - loss: 0.4910
22868/22868 [=====] - 1s 35us/step
Epoch 1/200
22868/22868 [=====] - 1s 35us/step - loss: 0.7079
Epoch 2/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6928
Epoch 3/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6920
Epoch 4/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6896
Epoch 5/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6824
Epoch 6/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6798
Epoch 7/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6369
Epoch 8/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6265
Epoch 9/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6917
Epoch 10/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6930
Epoch 11/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6928
Epoch 12/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6922
Epoch 13/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6914
Epoch 14/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6902
Epoch 15/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6871
Epoch 16/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6801
Epoch 17/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6613
Epoch 18/200
22868/22868 [=====] - 0s 12us/step - loss: 0.6502
Epoch 19/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6375
Epoch 20/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6300
Epoch 21/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6204
Epoch 22/200

22868/22868 [=====] - 0s 12us/step - loss: 0.6056
Epoch 23/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5866
Epoch 24/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5825
Epoch 25/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5795
Epoch 26/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5698
Epoch 27/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5613
Epoch 28/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5534
Epoch 29/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5553
Epoch 30/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5489
Epoch 31/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5449
Epoch 32/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5480
Epoch 33/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5409
Epoch 34/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5395
Epoch 35/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5312
Epoch 36/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5333
Epoch 37/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5275
Epoch 38/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5289
Epoch 39/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5279
Epoch 40/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5263
Epoch 41/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5260
Epoch 42/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5240
Epoch 43/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5275
Epoch 44/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5322
Epoch 45/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5281
Epoch 46/200

22868/22868 [=====] - 0s 12us/step - loss: 0.5252
Epoch 47/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5182
Epoch 48/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5392
Epoch 49/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5355
Epoch 50/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5338
Epoch 51/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5372
Epoch 52/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5314
Epoch 53/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5340
Epoch 54/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5276
Epoch 55/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5316
Epoch 56/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5352
Epoch 57/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5304
Epoch 58/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5294
Epoch 59/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5318
Epoch 60/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5272
Epoch 61/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5306
Epoch 62/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5336
Epoch 63/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5263
Epoch 64/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5276
Epoch 65/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5253
Epoch 66/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5255
Epoch 67/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5294
Epoch 68/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5280
Epoch 69/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5309
Epoch 70/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5315
Epoch 71/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5318
Epoch 72/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5264
Epoch 73/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5259
Epoch 74/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5280
Epoch 75/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5258
Epoch 76/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5251
Epoch 77/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5283
Epoch 78/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5266
Epoch 79/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 80/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5277
Epoch 81/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5224
Epoch 82/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5272
Epoch 83/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5231
Epoch 84/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5246
Epoch 85/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5276
Epoch 86/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5288
Epoch 87/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5254
Epoch 88/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5252
Epoch 89/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5273
Epoch 90/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5243
Epoch 91/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5258
Epoch 92/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5257
Epoch 93/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5267
Epoch 94/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5265
Epoch 95/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5222
Epoch 96/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5259
Epoch 97/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5268
Epoch 98/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5276
Epoch 99/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5261
Epoch 100/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5266
Epoch 101/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5252
Epoch 102/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5218
Epoch 103/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5246
Epoch 104/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5234
Epoch 105/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5257
Epoch 106/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5256
Epoch 107/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5262
Epoch 108/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5248
Epoch 109/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5224
Epoch 110/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5224
Epoch 111/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5239
Epoch 112/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5245
Epoch 113/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5260
Epoch 114/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5212
Epoch 115/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5223
Epoch 116/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5229
Epoch 117/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5203
Epoch 118/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5235
Epoch 119/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5251
Epoch 120/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5215
Epoch 121/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5204
Epoch 122/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5222
Epoch 123/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5177
Epoch 124/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5225
Epoch 125/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5225
Epoch 126/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5219
Epoch 127/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5267
Epoch 128/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5217
Epoch 129/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5248
Epoch 130/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5195
Epoch 131/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5209
Epoch 132/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5200
Epoch 133/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5208
Epoch 134/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5227
Epoch 135/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5259
Epoch 136/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5218
Epoch 137/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5198
Epoch 138/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5253
Epoch 139/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 140/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5161
Epoch 141/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5218
Epoch 142/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5201
Epoch 143/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5206
Epoch 144/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5207
Epoch 145/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5202
Epoch 146/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5193
Epoch 147/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5217
Epoch 148/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5232
Epoch 149/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5221
Epoch 150/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5219
Epoch 151/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5227
Epoch 152/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5240
Epoch 153/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5190
Epoch 154/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222
Epoch 155/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5208
Epoch 156/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5237
Epoch 157/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5212
Epoch 158/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5197
Epoch 159/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5245
Epoch 160/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5204
Epoch 161/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5186
Epoch 162/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5190
Epoch 163/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5191
Epoch 164/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5177
Epoch 165/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5189
Epoch 166/200

22868/22868 [=====] - 0s 12us/step - loss: 0.5201
Epoch 167/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5198
Epoch 168/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5203
Epoch 169/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5199
Epoch 170/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5212
Epoch 171/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5220
Epoch 172/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5199
Epoch 173/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5239
Epoch 174/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5202
Epoch 175/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5199
Epoch 176/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5208
Epoch 177/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5185
Epoch 178/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5181
Epoch 179/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5186
Epoch 180/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5203
Epoch 181/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5196
Epoch 182/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5207
Epoch 183/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5178
Epoch 184/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5188
Epoch 185/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5211
Epoch 186/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5212
Epoch 187/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5201
Epoch 188/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5211
Epoch 189/200
22868/22868 [=====] - 0s 12us/step - loss: 0.5194
Epoch 190/200

22868/22868 [=====] - 0s 12us/step - loss: 0.5156
 Epoch 191/200
 22868/22868 [=====] - 0s 12us/step - loss: 0.5214
 Epoch 192/200
 22868/22868 [=====] - 0s 12us/step - loss: 0.5172
 Epoch 193/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5213
 Epoch 194/200
 22868/22868 [=====] - 0s 12us/step - loss: 0.5186
 Epoch 195/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5193
 Epoch 196/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5199
 Epoch 197/200
 22868/22868 [=====] - 0s 12us/step - loss: 0.5188
 Epoch 198/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5171
 Epoch 199/200
 22868/22868 [=====] - 0s 12us/step - loss: 0.5195
 Epoch 200/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5202
 22868/22868 [=====] - 1s 38us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 36us/step - loss: 0.7093
 Epoch 2/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6933
 Epoch 3/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6931
 Epoch 4/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6929
 Epoch 5/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6923
 Epoch 6/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6923
 Epoch 7/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6912
 Epoch 8/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6896
 Epoch 9/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6898
 Epoch 10/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6884
 Epoch 11/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6865
 Epoch 12/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6831
 Epoch 13/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6691

Epoch 14/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6633
Epoch 15/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6494
Epoch 16/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6575
Epoch 17/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6583
Epoch 18/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6936
Epoch 19/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6255
Epoch 20/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6073
Epoch 21/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6023
Epoch 22/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5974
Epoch 23/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5819
Epoch 24/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5756
Epoch 25/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5718
Epoch 26/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5628
Epoch 27/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5602
Epoch 28/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5540
Epoch 29/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5510
Epoch 30/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5526
Epoch 31/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5490
Epoch 32/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5381
Epoch 33/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5399
Epoch 34/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5362
Epoch 35/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5433
Epoch 36/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5386
Epoch 37/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5376

Epoch 38/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5354
Epoch 39/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5327
Epoch 40/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5345
Epoch 41/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5344
Epoch 42/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5294
Epoch 43/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5342
Epoch 44/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5299
Epoch 45/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5301
Epoch 46/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5298
Epoch 47/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5324
Epoch 48/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5364
Epoch 49/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5364
Epoch 50/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5335
Epoch 51/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5315
Epoch 52/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5290
Epoch 53/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5276
Epoch 54/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5288
Epoch 55/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5305
Epoch 56/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5288
Epoch 57/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 58/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5296
Epoch 59/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5273
Epoch 60/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5267
Epoch 61/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5246

Epoch 62/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5264
Epoch 63/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5248
Epoch 64/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5264
Epoch 65/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 66/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5238
Epoch 67/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5246
Epoch 68/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5267
Epoch 69/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5260
Epoch 70/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5244
Epoch 71/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5200
Epoch 72/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5265
Epoch 73/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5248
Epoch 74/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 75/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5253
Epoch 76/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5271
Epoch 77/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5221
Epoch 78/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 79/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5244
Epoch 80/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5218
Epoch 81/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 82/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5232
Epoch 83/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5245
Epoch 84/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5211
Epoch 85/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5248

Epoch 86/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5229
Epoch 87/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 88/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5223
Epoch 89/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5212
Epoch 90/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5208
Epoch 91/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5215
Epoch 92/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5203
Epoch 93/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5239
Epoch 94/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5201
Epoch 95/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5227
Epoch 96/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5186
Epoch 97/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5213
Epoch 98/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5214
Epoch 99/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5218
Epoch 100/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5220
Epoch 101/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5203
Epoch 102/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5177
Epoch 103/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5187
Epoch 104/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5178
Epoch 105/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5244
Epoch 106/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5171
Epoch 107/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5182
Epoch 108/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5218
Epoch 109/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5195

Epoch 110/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5196
Epoch 111/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5164
Epoch 112/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5182
Epoch 113/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5170
Epoch 114/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5180
Epoch 115/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5172
Epoch 116/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5199
Epoch 117/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5163
Epoch 118/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5195
Epoch 119/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5157
Epoch 120/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5187
Epoch 121/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5192
Epoch 122/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5160
Epoch 123/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5167
Epoch 124/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5163
Epoch 125/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5155
Epoch 126/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5154
Epoch 127/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5178
Epoch 128/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5155
Epoch 129/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5149
Epoch 130/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5188
Epoch 131/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5151
Epoch 132/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5177
Epoch 133/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5186

Epoch 134/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5171
Epoch 135/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5157
Epoch 136/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5146
Epoch 137/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5152
Epoch 138/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5131
Epoch 139/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5120
Epoch 140/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5127
Epoch 141/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5126
Epoch 142/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5126
Epoch 143/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5113
Epoch 144/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5111
Epoch 145/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5095
Epoch 146/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5099
Epoch 147/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5097
Epoch 148/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5071
Epoch 149/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5055
Epoch 150/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5081
Epoch 151/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5069
Epoch 152/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5052
Epoch 153/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5105
Epoch 154/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5049
Epoch 155/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5065
Epoch 156/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5065
Epoch 157/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5049

Epoch 158/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5035
Epoch 159/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5021
Epoch 160/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5018
Epoch 161/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5002
Epoch 162/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5018
Epoch 163/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5047
Epoch 164/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5014
Epoch 165/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4986
Epoch 166/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5014
Epoch 167/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4991
Epoch 168/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5003
Epoch 169/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4972
Epoch 170/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5061
Epoch 171/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5005
Epoch 172/200
22868/22868 [=====] - 0s 13us/step - loss: 0.4984
Epoch 173/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4934
Epoch 174/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4965
Epoch 175/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4962
Epoch 176/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5051
Epoch 177/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4986
Epoch 178/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4996
Epoch 179/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4935
Epoch 180/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4974
Epoch 181/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4985

Epoch 182/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.4992
 Epoch 183/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4953
 Epoch 184/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5000
 Epoch 185/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4942
 Epoch 186/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4954
 Epoch 187/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5011
 Epoch 188/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4938
 Epoch 189/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4891
 Epoch 190/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4935
 Epoch 191/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4884
 Epoch 192/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6756
 Epoch 193/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6975
 Epoch 194/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6977
 Epoch 195/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6971
 Epoch 196/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6964
 Epoch 197/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6957
 Epoch 198/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6959
 Epoch 199/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6957
 Epoch 200/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6958
 22868/22868 [=====] - 1s 37us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 40us/step - loss: 0.7134
 Epoch 2/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6843
 Epoch 3/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6783
 Epoch 4/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6685
 Epoch 5/200

22868/22868 [=====] - 0s 15us/step - loss: 0.6481
 Epoch 6/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6239
 Epoch 7/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6264
 Epoch 8/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6200
 Epoch 9/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6044
 Epoch 10/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6132
 Epoch 11/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5991
 Epoch 12/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5891
 Epoch 13/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5853
 Epoch 14/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5837
 Epoch 15/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5646
 Epoch 16/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5594
 Epoch 17/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5509
 Epoch 18/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5502
 Epoch 19/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5429
 Epoch 20/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5414
 Epoch 21/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5360
 Epoch 22/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5334
 Epoch 23/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5350
 Epoch 24/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5307
 Epoch 25/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5334
 Epoch 26/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5241
 Epoch 27/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5249
 Epoch 28/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5348
 Epoch 29/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5270
Epoch 30/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5199
Epoch 31/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5185
Epoch 32/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5205
Epoch 33/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5199
Epoch 34/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5162
Epoch 35/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5238
Epoch 36/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5155
Epoch 37/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5167
Epoch 38/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5115
Epoch 39/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5137
Epoch 40/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5074
Epoch 41/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5109
Epoch 42/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5087
Epoch 43/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5155
Epoch 44/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5045
Epoch 45/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5054
Epoch 46/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5062
Epoch 47/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5075
Epoch 48/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5060
Epoch 49/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5049
Epoch 50/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5038
Epoch 51/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5043
Epoch 52/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5011
Epoch 53/200

22868/22868 [=====] - 0s 15us/step - loss: 0.4982
Epoch 54/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5072
Epoch 55/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5105
Epoch 56/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5000
Epoch 57/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5041
Epoch 58/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5086
Epoch 59/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5003
Epoch 60/200
22868/22868 [=====] - 0s 15us/step - loss: 0.4976
Epoch 61/200
22868/22868 [=====] - 0s 15us/step - loss: 0.4998
Epoch 62/200
22868/22868 [=====] - 0s 15us/step - loss: 0.4995
Epoch 63/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5015
Epoch 64/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5361
Epoch 65/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5316
Epoch 66/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5349
Epoch 67/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5299
Epoch 68/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5305
Epoch 69/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5300
Epoch 70/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5306
Epoch 71/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5293
Epoch 72/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5300
Epoch 73/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5295
Epoch 74/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5286
Epoch 75/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5271
Epoch 76/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5264
Epoch 77/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5291
Epoch 78/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5276
Epoch 79/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5241
Epoch 80/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5300
Epoch 81/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5284
Epoch 82/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5248
Epoch 83/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5283
Epoch 84/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5192
Epoch 85/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5242
Epoch 86/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5249
Epoch 87/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5234
Epoch 88/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5234
Epoch 89/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5235
Epoch 90/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5214
Epoch 91/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5215
Epoch 92/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5209
Epoch 93/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5182
Epoch 94/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5220
Epoch 95/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5206
Epoch 96/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5223
Epoch 97/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5227
Epoch 98/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5203
Epoch 99/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5200
Epoch 100/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5204
Epoch 101/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5235
 Epoch 102/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5177
 Epoch 103/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5165
 Epoch 104/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5190
 Epoch 105/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5179
 Epoch 106/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5184
 Epoch 107/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5203
 Epoch 108/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5179
 Epoch 109/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5173
 Epoch 110/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5179
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5188
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5169
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5184
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5171
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5173
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5238
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5161
 Epoch 121/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5150
 Epoch 122/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5168
 Epoch 123/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5158
 Epoch 124/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5202
 Epoch 125/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5159
Epoch 126/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5167
Epoch 127/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5172
Epoch 128/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5171
Epoch 129/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5111
Epoch 130/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5181
Epoch 131/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5138
Epoch 132/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5157
Epoch 133/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5153
Epoch 134/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5151
Epoch 135/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5213
Epoch 136/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5130
Epoch 137/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5188
Epoch 138/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5136
Epoch 139/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5199
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22868/22868 [=====] - 0s 15us/step - loss: 0.5172
Epoch 142/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5162
Epoch 143/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5243
Epoch 144/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5144
Epoch 145/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5142
Epoch 146/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5169
Epoch 147/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5113
Epoch 148/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5167
Epoch 149/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5204
 Epoch 150/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5191
 Epoch 151/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5191
 Epoch 152/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5215
 Epoch 153/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5145
 Epoch 154/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5127
 Epoch 155/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.5150
 Epoch 156/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5150
 Epoch 157/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5179
 Epoch 158/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5220
 Epoch 159/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5174
 Epoch 160/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5174
 Epoch 161/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5154
 Epoch 162/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5187
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5167
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5185
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5144
 Epoch 166/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5141
 Epoch 167/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5154
 Epoch 168/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5175
 Epoch 169/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5182
 Epoch 170/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5164
 Epoch 171/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5143
 Epoch 172/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5123
 Epoch 173/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5150
Epoch 174/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5162
Epoch 175/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5152
Epoch 176/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5188
Epoch 177/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5135
Epoch 178/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5134
Epoch 179/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5167
Epoch 180/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5131
Epoch 181/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5174
Epoch 182/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5151
Epoch 183/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5138
Epoch 184/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5155
Epoch 185/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5149
Epoch 186/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5166
Epoch 187/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5136
Epoch 188/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5160
Epoch 189/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5154
Epoch 190/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5151
Epoch 191/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5143
Epoch 192/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5136
Epoch 193/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5183
Epoch 194/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5179
Epoch 195/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5152
Epoch 196/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5167
Epoch 197/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5142
 Epoch 198/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5145
 Epoch 199/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5141
 Epoch 200/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5169
 22868/22868 [=====] - 1s 39us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 43us/step - loss: 0.7028
 Epoch 2/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6938
 Epoch 3/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6928
 Epoch 4/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6923
 Epoch 5/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6919
 Epoch 6/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6915
 Epoch 7/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6906
 Epoch 8/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6899
 Epoch 9/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6890
 Epoch 10/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6885
 Epoch 11/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6874
 Epoch 12/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6871
 Epoch 13/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6866
 Epoch 14/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6856
 Epoch 15/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6849
 Epoch 16/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6842
 Epoch 17/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6827
 Epoch 18/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6814
 Epoch 19/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6798
 Epoch 20/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6781

Epoch 21/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6749
Epoch 22/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6710
Epoch 23/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6638
Epoch 24/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6471
Epoch 25/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6333
Epoch 26/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6199
Epoch 27/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6097
Epoch 28/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6001
Epoch 29/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5875
Epoch 30/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5868
Epoch 31/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5744
Epoch 32/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5640
Epoch 33/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5652
Epoch 34/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5559
Epoch 35/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5524
Epoch 36/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5528
Epoch 37/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5450
Epoch 38/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5444
Epoch 39/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5402
Epoch 40/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5418
Epoch 41/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5366
Epoch 42/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5367
Epoch 43/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5333
Epoch 44/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5363

Epoch 45/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5307
Epoch 46/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5294
Epoch 47/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5337
Epoch 48/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5259
Epoch 49/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5256
Epoch 50/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5233
Epoch 51/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5379
Epoch 52/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5207
Epoch 53/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5231
Epoch 54/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5186
Epoch 55/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5198
Epoch 56/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5219
Epoch 57/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5166
Epoch 58/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5154
Epoch 59/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5158
Epoch 60/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5148
Epoch 61/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5127
Epoch 62/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5105
Epoch 63/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5063
Epoch 64/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5034
Epoch 65/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5086
Epoch 66/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5605
Epoch 67/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5252
Epoch 68/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5217

Epoch 69/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5161
Epoch 70/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5166
Epoch 71/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5166
Epoch 72/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5134
Epoch 73/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5135
Epoch 74/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5122
Epoch 75/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5166
Epoch 76/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5106
Epoch 77/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5133
Epoch 78/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5091
Epoch 79/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5081
Epoch 80/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5066
Epoch 81/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5107
Epoch 82/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5044
Epoch 83/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5041
Epoch 84/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5068
Epoch 85/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5039
Epoch 86/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5070
Epoch 87/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5024
Epoch 88/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4999
Epoch 89/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5011
Epoch 90/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5000
Epoch 91/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4994
Epoch 92/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4943

Epoch 93/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4994
Epoch 94/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4973
Epoch 95/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4961
Epoch 96/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4940
Epoch 97/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4942
Epoch 98/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4928
Epoch 99/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4903
Epoch 100/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4896
Epoch 101/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4944
Epoch 102/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5001
Epoch 103/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5011
Epoch 104/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4941
Epoch 105/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4889
Epoch 106/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4913
Epoch 107/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4895
Epoch 108/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5034
Epoch 109/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5036
Epoch 110/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5069
Epoch 111/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5051
Epoch 112/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5071
Epoch 113/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4989
Epoch 114/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4982
Epoch 115/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5046
Epoch 116/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5030

Epoch 117/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5066
Epoch 118/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5000
Epoch 119/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4993
Epoch 120/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5016
Epoch 121/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6602
Epoch 122/200
22868/22868 [=====] - 0s 17us/step - loss: 0.7006
Epoch 123/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6996
Epoch 124/200
22868/22868 [=====] - 0s 16us/step - loss: 0.7002
Epoch 125/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6988
Epoch 126/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6978
Epoch 127/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6978
Epoch 128/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6976
Epoch 129/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6976
Epoch 130/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6971
Epoch 131/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6977
Epoch 132/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6968
Epoch 133/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6971
Epoch 134/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6969
Epoch 135/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6970
Epoch 136/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6963
Epoch 137/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6970
Epoch 138/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6965
Epoch 139/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6972
Epoch 140/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6967

Epoch 141/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6966
Epoch 142/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6963
Epoch 143/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6960
Epoch 144/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6966
Epoch 145/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6956
Epoch 146/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6966
Epoch 147/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6960
Epoch 148/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6955
Epoch 149/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6959
Epoch 150/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6964
Epoch 151/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6960
Epoch 152/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6958
Epoch 153/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6958
Epoch 154/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6956
Epoch 155/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6958
Epoch 156/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6964
Epoch 157/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6956
Epoch 158/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6958
Epoch 159/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6958
Epoch 160/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6954
Epoch 161/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6960
Epoch 162/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6958
Epoch 163/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6958
Epoch 164/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6956

Epoch 165/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6954
Epoch 166/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6957
Epoch 167/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6953
Epoch 168/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6952
Epoch 169/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6960
Epoch 170/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6958
Epoch 171/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6956
Epoch 172/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6954
Epoch 173/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6954
Epoch 174/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6954
Epoch 175/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6953
Epoch 176/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6952
Epoch 177/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6952
Epoch 178/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6952
Epoch 179/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6955
Epoch 180/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6953
Epoch 181/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6954
Epoch 182/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6951
Epoch 183/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6956
Epoch 184/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6951
Epoch 185/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6955
Epoch 186/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6955
Epoch 187/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6951
Epoch 188/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6950

Epoch 189/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6952
 Epoch 190/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6950
 Epoch 191/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6951
 Epoch 192/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6950
 Epoch 193/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6951
 Epoch 194/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6950
 Epoch 195/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6955
 Epoch 196/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6950
 Epoch 197/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6947
 Epoch 198/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6953
 Epoch 199/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6948
 Epoch 200/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6948
 22868/22868 [=====] - 1s 43us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 46us/step - loss: 0.7008
 Epoch 2/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6937
 Epoch 3/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6936
 Epoch 4/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6936
 Epoch 5/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6932
 Epoch 6/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6932
 Epoch 7/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6933
 Epoch 8/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6931
 Epoch 9/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6929
 Epoch 10/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6928
 Epoch 11/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6926
 Epoch 12/200

22868/22868 [=====] - 0s 18us/step - loss: 0.6923
 Epoch 13/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6917
 Epoch 14/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6911
 Epoch 15/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6904
 Epoch 16/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.6901
 Epoch 17/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6897
 Epoch 18/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6894
 Epoch 19/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6890
 Epoch 20/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6883
 Epoch 21/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6864
 Epoch 22/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6851
 Epoch 23/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6842
 Epoch 24/200
 22868/22868 [=====] - 0s 20us/step - loss: 0.6833
 Epoch 25/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.6825
 Epoch 26/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6810
 Epoch 27/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.6798
 Epoch 28/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6782
 Epoch 29/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6749
 Epoch 30/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6710
 Epoch 31/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6642
 Epoch 32/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6515
 Epoch 33/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6229
 Epoch 34/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6050
 Epoch 35/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.6031
 Epoch 36/200

22868/22868 [=====] - 0s 18us/step - loss: 0.5958
 Epoch 37/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5914
 Epoch 38/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5718
 Epoch 39/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5760
 Epoch 40/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5679
 Epoch 41/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5595
 Epoch 42/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5587
 Epoch 43/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5518
 Epoch 44/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5431
 Epoch 45/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5356
 Epoch 46/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5317
 Epoch 47/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5366
 Epoch 48/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5320
 Epoch 49/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5287
 Epoch 50/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5328
 Epoch 51/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5233
 Epoch 52/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5238
 Epoch 53/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5225
 Epoch 54/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5251
 Epoch 55/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5236
 Epoch 56/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5164
 Epoch 57/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5189
 Epoch 58/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5152
 Epoch 59/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5237
 Epoch 60/200

22868/22868 [=====] - 0s 18us/step - loss: 0.5154
 Epoch 61/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5135
 Epoch 62/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5137
 Epoch 63/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5152
 Epoch 64/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5129
 Epoch 65/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5140
 Epoch 66/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5131
 Epoch 67/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5063
 Epoch 68/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5066
 Epoch 69/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5089
 Epoch 70/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5050
 Epoch 71/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5095
 Epoch 72/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5069
 Epoch 73/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5142
 Epoch 74/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5095
 Epoch 75/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5074
 Epoch 76/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5064
 Epoch 77/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5107
 Epoch 78/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5045
 Epoch 79/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5027
 Epoch 80/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5004
 Epoch 81/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5038
 Epoch 82/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5021
 Epoch 83/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4960
 Epoch 84/200

22868/22868 [=====] - 0s 18us/step - loss: 0.5036
 Epoch 85/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4990
 Epoch 86/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4980
 Epoch 87/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4973
 Epoch 88/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4974
 Epoch 89/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5013
 Epoch 90/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4997
 Epoch 91/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5025
 Epoch 92/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4970
 Epoch 93/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4983
 Epoch 94/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4989
 Epoch 95/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4967
 Epoch 96/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4935
 Epoch 97/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4968
 Epoch 98/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4918
 Epoch 99/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4957
 Epoch 100/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4933
 Epoch 101/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4974
 Epoch 102/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4971
 Epoch 103/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4949
 Epoch 104/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4939
 Epoch 105/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4945
 Epoch 106/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4963
 Epoch 107/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4931
 Epoch 108/200

22868/22868 [=====] - 0s 17us/step - loss: 0.4977
Epoch 109/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4939
Epoch 110/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4929
Epoch 111/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4941
Epoch 112/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4932
Epoch 113/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4958
Epoch 114/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4929
Epoch 115/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4959
Epoch 116/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4931
Epoch 117/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6020
Epoch 118/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6968
Epoch 119/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6968
Epoch 120/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6963
Epoch 121/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6956
Epoch 122/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6957
Epoch 123/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6956
Epoch 124/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6955
Epoch 125/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6950
Epoch 126/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6946
Epoch 127/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6950
Epoch 128/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6954
Epoch 129/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6951
Epoch 130/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6946
Epoch 131/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6951
Epoch 132/200

22868/22868 [=====] - 0s 17us/step - loss: 0.6948
 Epoch 133/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6943
 Epoch 134/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6946
 Epoch 135/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6945
 Epoch 136/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6945
 Epoch 137/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6943
 Epoch 138/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6942
 Epoch 139/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6944
 Epoch 140/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6946
 Epoch 141/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6945
 Epoch 142/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6942
 Epoch 143/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6941
 Epoch 144/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6938
 Epoch 145/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6938
 Epoch 146/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6939
 Epoch 147/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6944
 Epoch 148/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6935
 Epoch 149/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6939
 Epoch 150/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6933
 Epoch 151/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6937
 Epoch 152/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6939
 Epoch 153/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6937
 Epoch 154/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6940
 Epoch 155/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6938
 Epoch 156/200

22868/22868 [=====] - 0s 18us/step - loss: 0.6935
Epoch 157/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6928
Epoch 158/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6921
Epoch 159/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6920
Epoch 160/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6917
Epoch 161/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6911
Epoch 162/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6908
Epoch 163/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6905
Epoch 164/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6896
Epoch 165/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6894
Epoch 166/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6883
Epoch 167/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6876
Epoch 168/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6870
Epoch 169/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6854
Epoch 170/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6844
Epoch 171/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6819
Epoch 172/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6793
Epoch 173/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6751
Epoch 174/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6690
Epoch 175/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6574
Epoch 176/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6406
Epoch 177/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6310
Epoch 178/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6242
Epoch 179/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6268
Epoch 180/200

22868/22868 [=====] - 0s 17us/step - loss: 0.6331
 Epoch 181/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5993
 Epoch 182/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5929
 Epoch 183/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5809
 Epoch 184/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5899
 Epoch 185/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5850
 Epoch 186/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5706
 Epoch 187/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5632
 Epoch 188/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5562
 Epoch 189/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5625
 Epoch 190/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5503
 Epoch 191/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5554
 Epoch 192/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5542
 Epoch 193/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5457
 Epoch 194/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5473
 Epoch 195/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5494
 Epoch 196/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5414
 Epoch 197/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5428
 Epoch 198/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5426
 Epoch 199/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5363
 Epoch 200/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5419
 22868/22868 [=====] - 1s 43us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 48us/step - loss: 0.7018
 Epoch 2/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6913
 Epoch 3/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.6900

Epoch 4/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6883
Epoch 5/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6872
Epoch 6/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6857
Epoch 7/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6848
Epoch 8/200
22868/22868 [=====] - 0s 19us/step - loss: 0.6827
Epoch 9/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6783
Epoch 10/200
22868/22868 [=====] - 0s 19us/step - loss: 0.6712
Epoch 11/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6608
Epoch 12/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6393
Epoch 13/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6286
Epoch 14/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6718
Epoch 15/200
22868/22868 [=====] - 0s 19us/step - loss: 0.6679
Epoch 16/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6448
Epoch 17/200
22868/22868 [=====] - 0s 18us/step - loss: 0.6021
Epoch 18/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5902
Epoch 19/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5767
Epoch 20/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5681
Epoch 21/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5645
Epoch 22/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5548
Epoch 23/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5513
Epoch 24/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5406
Epoch 25/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5386
Epoch 26/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5338
Epoch 27/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5431

Epoch 28/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5289
 Epoch 29/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5267
 Epoch 30/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5246
 Epoch 31/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5261
 Epoch 32/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5242
 Epoch 33/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5353
 Epoch 34/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5170
 Epoch 35/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5216
 Epoch 36/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5177
 Epoch 37/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5123
 Epoch 38/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5200
 Epoch 39/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5080
 Epoch 40/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5101
 Epoch 41/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5100
 Epoch 42/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5093
 Epoch 43/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5010
 Epoch 44/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5031
 Epoch 45/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5003
 Epoch 46/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5034
 Epoch 47/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5061
 Epoch 48/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5036
 Epoch 49/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5040
 Epoch 50/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5101
 Epoch 51/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5033

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Epoch 52/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5422
Epoch 53/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5444
Epoch 54/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5415
Epoch 55/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5328
Epoch 56/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5333
Epoch 57/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5348
Epoch 58/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5319
Epoch 59/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5293
Epoch 60/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5277
Epoch 61/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5269
Epoch 62/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5278
Epoch 63/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5273
Epoch 64/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5232
Epoch 65/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5227
Epoch 66/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5167
Epoch 67/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5188
Epoch 68/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5161
Epoch 69/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5110
Epoch 70/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5149
Epoch 71/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5184
Epoch 72/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5172
Epoch 73/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5145
Epoch 74/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5122
Epoch 75/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5120

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Epoch 76/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5136
Epoch 77/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5128
Epoch 78/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5091
Epoch 79/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5137
Epoch 80/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5094
Epoch 81/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5108
Epoch 82/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5068
Epoch 83/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5123
Epoch 84/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5134
Epoch 85/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5084
Epoch 86/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5092
Epoch 87/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5236
Epoch 88/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5035
Epoch 89/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5075
Epoch 90/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5102
Epoch 91/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5114
Epoch 92/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5162
Epoch 93/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5049
Epoch 94/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5013
Epoch 95/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5041
Epoch 96/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5055
Epoch 97/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5194
Epoch 98/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5180
Epoch 99/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5191

Epoch 100/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5257
Epoch 101/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5179
Epoch 102/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5183
Epoch 103/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5183
Epoch 104/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5279
Epoch 105/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5206
Epoch 106/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5256
Epoch 107/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5207
Epoch 108/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5195
Epoch 109/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5183
Epoch 110/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5202
Epoch 111/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5184
Epoch 112/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5168
Epoch 113/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5251
Epoch 114/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5201
Epoch 115/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5195
Epoch 116/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5198
Epoch 117/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5159
Epoch 118/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5185
Epoch 119/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5184
Epoch 120/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5180
Epoch 121/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5175
Epoch 122/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5185
Epoch 123/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5249

Epoch 124/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5186
Epoch 125/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5242
Epoch 126/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5203
Epoch 127/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5177
Epoch 128/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5189
Epoch 129/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5207
Epoch 130/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5210
Epoch 131/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5175
Epoch 132/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5163
Epoch 133/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5227
Epoch 134/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5227
Epoch 135/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5177
Epoch 136/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5170
Epoch 137/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5174
Epoch 138/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5145
Epoch 139/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5180
Epoch 140/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5163
Epoch 141/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5118
Epoch 142/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5173
Epoch 143/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5163
Epoch 144/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5111
Epoch 145/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5170
Epoch 146/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5193
Epoch 147/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5180

Epoch 148/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5154
Epoch 149/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5179
Epoch 150/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5162
Epoch 151/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5155
Epoch 152/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5131
Epoch 153/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5165
Epoch 154/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5133
Epoch 155/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5151
Epoch 156/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5160
Epoch 157/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5173
Epoch 158/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5164
Epoch 159/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5147
Epoch 160/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5182
Epoch 161/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5145
Epoch 162/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5156
Epoch 163/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5171
Epoch 164/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5142
Epoch 165/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5143
Epoch 166/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5145
Epoch 167/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5189
Epoch 168/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5174
Epoch 169/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5166
Epoch 170/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5167
Epoch 171/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5157

Epoch 172/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5144
Epoch 173/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5184
Epoch 174/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5138
Epoch 175/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5186
Epoch 176/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5165
Epoch 177/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5133
Epoch 178/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5119
Epoch 179/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5140
Epoch 180/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5138
Epoch 181/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5176
Epoch 182/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5098
Epoch 183/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5135
Epoch 184/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5155
Epoch 185/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5137
Epoch 186/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5148
Epoch 187/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5102
Epoch 188/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5132
Epoch 189/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5128
Epoch 190/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5128
Epoch 191/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5198
Epoch 192/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5131
Epoch 193/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5123
Epoch 194/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5152
Epoch 195/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5155

Epoch 196/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5130
Epoch 197/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5161
Epoch 198/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5134
Epoch 199/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5108
Epoch 200/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5131
22868/22868 [=====] - 1s 46us/step
Epoch 1/200
22868/22868 [=====] - 1s 51us/step - loss: 1.2155
Epoch 2/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6897
Epoch 3/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6871
Epoch 4/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6851
Epoch 5/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6808
Epoch 6/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6719
Epoch 7/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6562
Epoch 8/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6397
Epoch 9/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6390
Epoch 10/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6303
Epoch 11/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6084
Epoch 12/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5904
Epoch 13/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5773
Epoch 14/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5734
Epoch 15/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5650
Epoch 16/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5513
Epoch 17/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5497
Epoch 18/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5488
Epoch 19/200

22868/22868 [=====] - 0s 20us/step - loss: 0.5377
Epoch 20/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5403
Epoch 21/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5397
Epoch 22/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5494
Epoch 23/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5335
Epoch 24/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5295
Epoch 25/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5217
Epoch 26/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5235
Epoch 27/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5199
Epoch 28/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5408
Epoch 29/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5483
Epoch 30/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5460
Epoch 31/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5394
Epoch 32/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5368
Epoch 33/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5382
Epoch 34/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5313
Epoch 35/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5342
Epoch 36/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5243
Epoch 37/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5285
Epoch 38/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5181
Epoch 39/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5254
Epoch 40/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5225
Epoch 41/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5231
Epoch 42/200
22868/22868 [=====] - 0s 20us/step - loss: 0.5162
Epoch 43/200

22868/22868 [=====] - 0s 20us/step - loss: 0.7784
Epoch 44/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6940
Epoch 45/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6935
Epoch 46/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6935
Epoch 47/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6937
Epoch 48/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6935
Epoch 49/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6934
Epoch 50/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6935
Epoch 51/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6936
Epoch 52/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6936
Epoch 53/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6936
Epoch 54/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6934
Epoch 55/200
22868/22868 [=====] - 0s 19us/step - loss: 0.6935
Epoch 56/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6933
Epoch 57/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6935
Epoch 58/200
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Epoch 66/200
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Epoch 67/200

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Epoch 68/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6934
Epoch 69/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6932
Epoch 70/200
22868/22868 [=====] - 0s 19us/step - loss: 0.6934
Epoch 71/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6935
Epoch 72/200
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Epoch 73/200
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Epoch 74/200
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Epoch 75/200
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Epoch 76/200
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Epoch 81/200
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Epoch 82/200
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Epoch 86/200
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Epoch 152/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6934
Epoch 153/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6934
Epoch 154/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6934
Epoch 155/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6933
Epoch 156/200
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Epoch 157/200
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Epoch 158/200
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Epoch 162/200
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Epoch 163/200

22868/22868 [=====] - 0s 20us/step - loss: 0.6933
Epoch 164/200
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Epoch 166/200
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Epoch 167/200
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Epoch 168/200
22868/22868 [=====] - 0s 19us/step - loss: 0.6934
Epoch 169/200
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Epoch 170/200
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Epoch 171/200
22868/22868 [=====] - 0s 19us/step - loss: 0.6934
Epoch 172/200
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Epoch 173/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6934
Epoch 174/200
22868/22868 [=====] - 0s 19us/step - loss: 0.6934
Epoch 175/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6932
Epoch 176/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6933
Epoch 177/200
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Epoch 178/200
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Epoch 179/200
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Epoch 180/200
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Epoch 181/200
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Epoch 182/200
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Epoch 183/200
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Epoch 184/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6933
Epoch 185/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6932
Epoch 186/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6931
Epoch 187/200

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22868/22868 [=====] - 0s 20us/step - loss: 0.6931
Epoch 188/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6932
Epoch 189/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6931
Epoch 190/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6931
Epoch 191/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6928
Epoch 192/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6930
Epoch 193/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6930
Epoch 194/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6930
Epoch 195/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6929
Epoch 196/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6929
Epoch 197/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6927
Epoch 198/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6928
Epoch 199/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6928
Epoch 200/200
22868/22868 [=====] - 0s 20us/step - loss: 0.6927
22868/22868 [=====] - 1s 48us/step
Epoch 1/200
22868/22868 [=====] - 1s 53us/step - loss: 8.0590
Epoch 2/200
22868/22868 [=====] - 0s 21us/step - loss: 8.0590
Epoch 3/200
22868/22868 [=====] - 0s 21us/step - loss: 8.0590
Epoch 4/200
22868/22868 [=====] - 0s 21us/step - loss: 8.0590
Epoch 5/200
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Epoch 9/200
22868/22868 [=====] - 0s 21us/step - loss: 8.0590
Epoch 10/200
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Epoch 11/200
22868/22868 [=====] - 0s 21us/step - loss: 8.0590
Epoch 12/200
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Epoch 13/200
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Epoch 35/200
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Epoch 112/200
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Epoch 115/200
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Epoch 118/200
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Epoch 119/200
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Epoch 120/200
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Epoch 121/200
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Epoch 131/200
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Epoch 148/200
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Epoch 151/200
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Epoch 155/200
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Epoch 178/200
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Epoch 179/200
22868/22868 [=====] - 0s 21us/step - loss: 8.0590
Epoch 180/200
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Epoch 181/200
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Epoch 199/200
22868/22868 [=====] - 0s 21us/step - loss: 8.0590
Epoch 200/200
22868/22868 [=====] - 0s 21us/step - loss: 8.0590
22868/22868 [=====] - 1s 50us/step
Epoch 1/200
22868/22868 [=====] - 1s 57us/step - loss: 0.8380
Epoch 2/200

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22868/22868 [=====] - 1s 22us/step - loss: 0.6912
 Epoch 3/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6892
 Epoch 4/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6877
 Epoch 5/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6835
 Epoch 6/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6796
 Epoch 7/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6709
 Epoch 8/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6500
 Epoch 9/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6265
 Epoch 10/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6242
 Epoch 11/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6173
 Epoch 12/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.6049
 Epoch 13/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5901
 Epoch 14/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5865
 Epoch 15/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5815
 Epoch 16/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5733
 Epoch 17/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5710
 Epoch 18/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5605
 Epoch 19/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5603
 Epoch 20/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5557
 Epoch 21/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5556
 Epoch 22/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5492
 Epoch 23/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5517
 Epoch 24/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5461
 Epoch 25/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5416
 Epoch 26/200

22868/22868 [=====] - 1s 23us/step - loss: 0.5395
 Epoch 27/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5450
 Epoch 28/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5384
 Epoch 29/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5427
 Epoch 30/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5375
 Epoch 31/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5360
 Epoch 32/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5387
 Epoch 33/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5374
 Epoch 34/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5348
 Epoch 35/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5379
 Epoch 36/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5311
 Epoch 37/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5342
 Epoch 38/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5335
 Epoch 39/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5346
 Epoch 40/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5293
 Epoch 41/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5326
 Epoch 42/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5245: 0s - loss: 0.524
 Epoch 43/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5281
 Epoch 44/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5297
 Epoch 45/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5256
 Epoch 46/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5290
 Epoch 47/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5249
 Epoch 48/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5261
 Epoch 49/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5243
 Epoch 50/200

22868/22868 [=====] - 1s 22us/step - loss: 0.5191
Epoch 51/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5181
Epoch 52/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5137
Epoch 53/200
22868/22868 [=====] - 0s 22us/step - loss: 0.5165
Epoch 54/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5174
Epoch 55/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5188
Epoch 56/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5141
Epoch 57/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5157
Epoch 58/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5136
Epoch 59/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5178
Epoch 60/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5145
Epoch 61/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5147
Epoch 62/200
22868/22868 [=====] - 0s 22us/step - loss: 0.5137
Epoch 63/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5112
Epoch 64/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5085
Epoch 65/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5149
Epoch 66/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5175
Epoch 67/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5081
Epoch 68/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5104
Epoch 69/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5098
Epoch 70/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5098
Epoch 71/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5463
Epoch 72/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5163
Epoch 73/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5140
Epoch 74/200

22868/22868 [=====] - 1s 22us/step - loss: 0.5150
Epoch 75/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5116
Epoch 76/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5060
Epoch 77/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5044
Epoch 78/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5201
Epoch 79/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5301
Epoch 80/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5312
Epoch 81/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5286
Epoch 82/200
22868/22868 [=====] - 1s 24us/step - loss: 0.5322
Epoch 83/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5314
Epoch 84/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5258
Epoch 85/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5119
Epoch 86/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5080
Epoch 87/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5097
Epoch 88/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5062
Epoch 89/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5673
Epoch 90/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5289
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22868/22868 [=====] - 1s 23us/step - loss: 0.5265
Epoch 92/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5275
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22868/22868 [=====] - 1s 23us/step - loss: 0.5256
Epoch 94/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5267
Epoch 95/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5286
Epoch 96/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5263
Epoch 97/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5248
Epoch 98/200

22868/22868 [=====] - 1s 24us/step - loss: 0.5226
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 22868/22868 [=====] - 1s 23us/step - loss: 0.5262
 Epoch 100/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5245
 Epoch 101/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5218
 Epoch 102/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5235
 Epoch 103/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5208
 Epoch 104/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5199
 Epoch 105/200
 22868/22868 [=====] - 1s 24us/step - loss: 0.5200
 Epoch 106/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5237
 Epoch 107/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5203
 Epoch 108/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5212
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5222
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5203
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5203
 Epoch 112/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5173
 Epoch 113/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5181
 Epoch 114/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5193
 Epoch 115/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5157
 Epoch 116/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5157
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5165
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5191
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5155
 Epoch 122/200

22868/22868 [=====] - 1s 22us/step - loss: 0.5204
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5225
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5176
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5126
 Epoch 127/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5180
 Epoch 128/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5150
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5142
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 22868/22868 [=====] - 1s 22us/step - loss: 0.5197
 Epoch 131/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5178
 Epoch 132/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5182
 Epoch 133/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5224
 Epoch 134/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5173
 Epoch 135/200
 22868/22868 [=====] - 0s 22us/step - loss: 0.5166
 Epoch 136/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5171
 Epoch 137/200
 22868/22868 [=====] - 0s 22us/step - loss: 0.5162
 Epoch 138/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5175
 Epoch 139/200
 22868/22868 [=====] - 0s 22us/step - loss: 0.5155
 Epoch 140/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5167
 Epoch 141/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5163
 Epoch 142/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5150
 Epoch 143/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5149
 Epoch 144/200
 22868/22868 [=====] - 0s 22us/step - loss: 0.5129
 Epoch 145/200
 22868/22868 [=====] - 0s 22us/step - loss: 0.5142
 Epoch 146/200

22868/22868 [=====] - 1s 22us/step - loss: 0.5147
 Epoch 147/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5366
 Epoch 148/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5179
 Epoch 149/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5128
 Epoch 150/200
 22868/22868 [=====] - 1s 23us/step - loss: 0.5133
 Epoch 151/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5132
 Epoch 152/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5122
 Epoch 153/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5146
 Epoch 154/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5141
 Epoch 155/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5100
 Epoch 156/200
 22868/22868 [=====] - 0s 22us/step - loss: 0.5129
 Epoch 157/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5142
 Epoch 158/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5114
 Epoch 159/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5166
 Epoch 160/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5135
 Epoch 161/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5150
 Epoch 162/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5150
 Epoch 163/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5119
 Epoch 164/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5150
 Epoch 165/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5112
 Epoch 166/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5131
 Epoch 167/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5119
 Epoch 168/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5143
 Epoch 169/200
 22868/22868 [=====] - 1s 22us/step - loss: 0.5134
 Epoch 170/200

22868/22868 [=====] - 1s 22us/step - loss: 0.5155
Epoch 171/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5097
Epoch 172/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5134
Epoch 173/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5109
Epoch 174/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5087
Epoch 175/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5127
Epoch 176/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5162
Epoch 177/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5145
Epoch 178/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5141
Epoch 179/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5137
Epoch 180/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5135
Epoch 181/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5119
Epoch 182/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5114
Epoch 183/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5110
Epoch 184/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5157
Epoch 185/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5146
Epoch 186/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5131
Epoch 187/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5121
Epoch 188/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5133
Epoch 189/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5105
Epoch 190/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5116
Epoch 191/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5119
Epoch 192/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5122
Epoch 193/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5095
Epoch 194/200

```

22868/22868 [=====] - 1s 22us/step - loss: 0.5111
Epoch 195/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5114
Epoch 196/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5099
Epoch 197/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5117
Epoch 198/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5116
Epoch 199/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5158
Epoch 200/200
22868/22868 [=====] - 1s 22us/step - loss: 0.5128
22868/22868 [=====] - 1s 53us/step

```

```

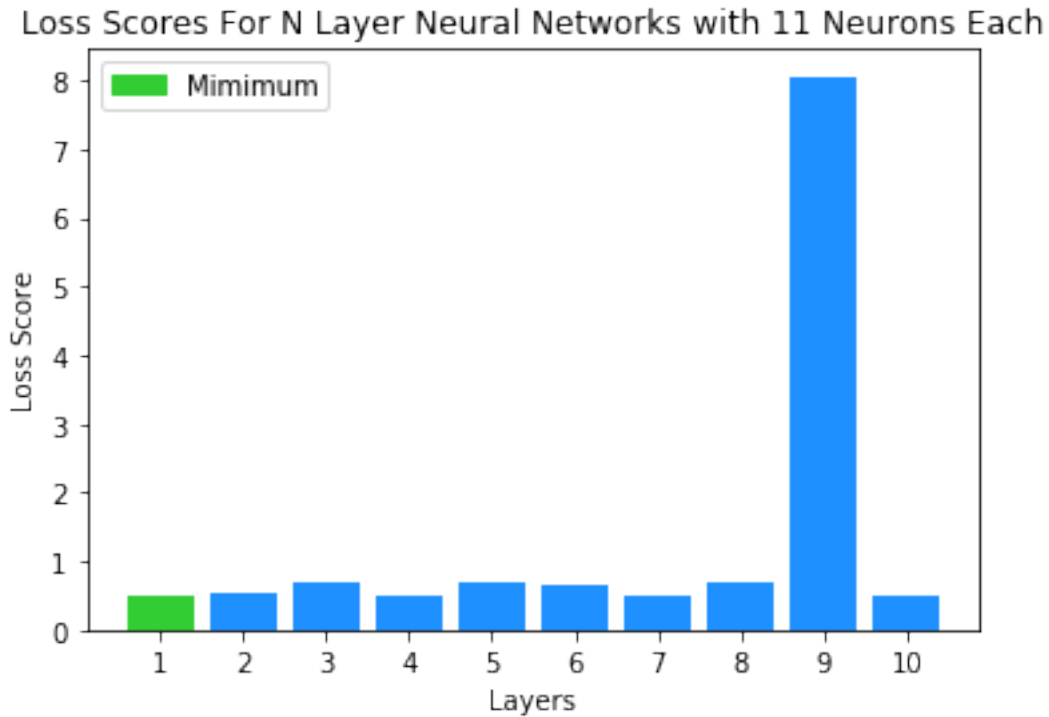
In [34]: layers = np.arange(1,11,1)
        color = []

        for score in scores:
            if score == min(scores):
                color.append('limegreen')
            else:
                color.append('dodgerblue')

        patch1 = mpatches.Patch(color='limegreen', label='Mimimum')
        plt.legend(handles=[patch1], loc = 'best')

        plt.bar(layers, scores, width = .8, color = color)
        plt.xlabel('Layers')
        plt.xticks(layers)
        plt.ylabel('Loss Score')
        plt.title('Loss Scores For N Layer Neural Networks with 11 Neurons Each')
        plt.show()

```



Judging by the graph above, only 1 layer appears necessary for this dataset.

2.0.2 Step 2. Determine Optimal Number of Neurons Per Layer

```
In [35]: scores = []
         neurons = np.arange(1,21,2)

         for n in neurons:
             model = Sequential()

             model.add(Dense(n, input_dim=11, activation='tanh')) #sigmoid, relu
             model.add(Dense(1, activation='tanh'))

             sgd = SGD(lr=0.1)
             model.compile(loss='binary_crossentropy', optimizer='sgd')

             model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
             #print(model.predict_proba(X).reshape(4*n))

             # evaluate the model
             scores.append(model.evaluate(X, y))
```

Epoch 1/200

22868/22868 [=====] - 1s 46us/step - loss: 1.2151

```

Epoch 2/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6933
Epoch 3/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 4/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6933
Epoch 5/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6933
Epoch 6/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6933
Epoch 7/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 8/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6933
Epoch 9/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 10/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 11/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 12/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6932
Epoch 13/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 14/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6932
Epoch 15/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 16/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 17/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
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22868/22868 [=====] - 0s 13us/step - loss: 0.6932
Epoch 21/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6934
Epoch 22/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6931
Epoch 23/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6932
Epoch 24/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6932
Epoch 25/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933

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Epoch 26/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 27/200
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22868/22868 [=====] - 0s 13us/step - loss: 0.6933
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22868/22868 [=====] - 0s 13us/step - loss: 0.6933
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22868/22868 [=====] - 0s 13us/step - loss: 0.6932
Epoch 48/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 49/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6934

Epoch 50/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 51/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6933
Epoch 52/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6932
Epoch 53/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6933
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22868/22868 [=====] - 0s 13us/step - loss: 0.6933
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22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 56/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 57/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6932
Epoch 58/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6932
Epoch 59/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 60/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6931
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 Epoch 199/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6933
 Epoch 200/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6933
 22868/22868 [=====] - 1s 47us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 43us/step - loss: 6.9269
 Epoch 2/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6938
 Epoch 3/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6932
 Epoch 4/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6931
 Epoch 5/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6930
 Epoch 6/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6930
 Epoch 7/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6929
 Epoch 8/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6930
 Epoch 9/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6929
 Epoch 10/200
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 Epoch 15/200
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 Epoch 16/200
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 Epoch 17/200

22868/22868 [=====] - 0s 13us/step - loss: 0.6929
Epoch 18/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6928
Epoch 19/200
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Epoch 20/200
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Epoch 21/200
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Epoch 22/200
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Epoch 24/200
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Epoch 25/200
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Epoch 26/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6927
Epoch 27/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6926
Epoch 28/200
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Epoch 29/200
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Epoch 30/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6927
Epoch 31/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6925
Epoch 32/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6926
Epoch 33/200
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Epoch 34/200
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Epoch 35/200
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Epoch 36/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6923
Epoch 37/200
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Epoch 38/200
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Epoch 39/200
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Epoch 40/200
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Epoch 41/200

22868/22868 [=====] - 0s 14us/step - loss: 0.6923
Epoch 42/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6921
Epoch 43/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6921
Epoch 44/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6920
Epoch 45/200
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Epoch 46/200
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Epoch 49/200
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Epoch 50/200
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Epoch 51/200
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Epoch 56/200
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Epoch 57/200
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Epoch 58/200
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Epoch 60/200
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Epoch 61/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6911
Epoch 62/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6910
Epoch 63/200
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Epoch 64/200
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Epoch 65/200

22868/22868 [=====] - 0s 13us/step - loss: 0.6907
Epoch 66/200
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Epoch 67/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6904
Epoch 68/200
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Epoch 69/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6902
Epoch 70/200
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Epoch 71/200
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22868/22868 [=====] - 0s 13us/step - loss: 0.6894
Epoch 78/200
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Epoch 79/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6892
Epoch 80/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6890
Epoch 81/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6891
Epoch 82/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6888
Epoch 83/200
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Epoch 84/200
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Epoch 85/200
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Epoch 86/200
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Epoch 87/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6879
Epoch 88/200
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Epoch 89/200

22868/22868 [=====] - 0s 13us/step - loss: 0.6875
 Epoch 90/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6870
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 22868/22868 [=====] - 0s 13us/step - loss: 0.6870
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 22868/22868 [=====] - 0s 13us/step - loss: 0.6864
 Epoch 93/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6859
 Epoch 94/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6849
 Epoch 95/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6842
 Epoch 96/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6835
 Epoch 97/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6827
 Epoch 98/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6818
 Epoch 99/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6806
 Epoch 100/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6792
 Epoch 101/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6776
 Epoch 102/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6748
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 22868/22868 [=====] - 0s 13us/step - loss: 0.6711
 Epoch 104/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6630
 Epoch 105/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6425
 Epoch 106/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6129
 Epoch 107/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6027
 Epoch 108/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5954
 Epoch 109/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5936
 Epoch 110/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5766
 Epoch 111/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5673
 Epoch 112/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5689
 Epoch 113/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5577
Epoch 114/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5633
Epoch 115/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5580
Epoch 116/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5539
Epoch 117/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5516
Epoch 118/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5462
Epoch 119/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5403
Epoch 120/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5342
Epoch 121/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5418
Epoch 122/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5363
Epoch 123/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5420
Epoch 124/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5377
Epoch 125/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5343
Epoch 126/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5343
Epoch 127/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5385
Epoch 128/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5342
Epoch 129/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5394
Epoch 130/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5322
Epoch 131/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5367
Epoch 132/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5318
Epoch 133/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5288
Epoch 134/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5330
Epoch 135/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5266
Epoch 136/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5309
Epoch 137/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5309
Epoch 138/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5301
Epoch 139/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5266
Epoch 140/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5275
Epoch 141/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5305
Epoch 142/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5324
Epoch 143/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5249
Epoch 144/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5301
Epoch 145/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5289
Epoch 146/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5264
Epoch 147/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5257
Epoch 148/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5339
Epoch 149/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5286
Epoch 150/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5275
Epoch 151/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5252
Epoch 152/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5295
Epoch 153/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5270
Epoch 154/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5268
Epoch 155/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5267
Epoch 156/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5255
Epoch 157/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5254
Epoch 158/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5289
Epoch 159/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5267
Epoch 160/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5244
Epoch 161/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5268
Epoch 162/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5228
Epoch 163/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5249
Epoch 164/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5270
Epoch 165/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5280
Epoch 166/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5274
Epoch 167/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5251
Epoch 168/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5252
Epoch 169/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5239
Epoch 170/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5280
Epoch 171/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5274
Epoch 172/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5286
Epoch 173/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5241
Epoch 174/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5241
Epoch 175/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5252
Epoch 176/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5261
Epoch 177/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5269
Epoch 178/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5249
Epoch 179/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5235
Epoch 180/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5269
Epoch 181/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5226
Epoch 182/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5239
Epoch 183/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5251
Epoch 184/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5198
Epoch 185/200

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22868/22868 [=====] - 0s 13us/step - loss: 0.5252
Epoch 186/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5244
Epoch 187/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5269
Epoch 188/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5262
Epoch 189/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5262
Epoch 190/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5235
Epoch 191/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5218
Epoch 192/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5247
Epoch 193/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5256
Epoch 194/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5250
Epoch 195/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5261
Epoch 196/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5235
Epoch 197/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5222
Epoch 198/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5222
Epoch 199/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5264
Epoch 200/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5219
22868/22868 [=====] - 1s 49us/step
Epoch 1/200
22868/22868 [=====] - 1s 43us/step - loss: 0.7179
Epoch 2/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6954
Epoch 3/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6946
Epoch 4/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6945
Epoch 5/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6943
Epoch 6/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6940
Epoch 7/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6939
Epoch 8/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6939

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Epoch 9/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6939
Epoch 10/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6937
Epoch 11/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6938
Epoch 12/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6935
Epoch 13/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6935
Epoch 14/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6935
Epoch 15/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6935
Epoch 16/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6936
Epoch 17/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6936
Epoch 18/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6934
Epoch 19/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6935
Epoch 20/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 21/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6934
Epoch 22/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 23/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6935
Epoch 24/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6935
Epoch 25/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 26/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6934
Epoch 27/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6936
Epoch 28/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6931
Epoch 29/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6929
Epoch 30/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6925
Epoch 31/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6918
Epoch 32/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6888

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Epoch 33/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6788
Epoch 34/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6646
Epoch 35/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6399
Epoch 36/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6190
Epoch 37/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6109
Epoch 38/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6097
Epoch 39/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5942
Epoch 40/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5824
Epoch 41/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5824
Epoch 42/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5727
Epoch 43/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5696
Epoch 44/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5591
Epoch 45/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5636
Epoch 46/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5478
Epoch 47/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5533
Epoch 48/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5481
Epoch 49/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5464
Epoch 50/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5421
Epoch 51/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5464
Epoch 52/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5410
Epoch 53/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5420
Epoch 54/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5421
Epoch 55/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5360
Epoch 56/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5383

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Epoch 57/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5365
Epoch 58/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5356
Epoch 59/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5350
Epoch 60/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5361
Epoch 61/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5319
Epoch 62/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5360
Epoch 63/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5322
Epoch 64/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5345
Epoch 65/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5306
Epoch 66/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5260
Epoch 67/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5295
Epoch 68/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5336
Epoch 69/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5312
Epoch 70/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5349
Epoch 71/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5285
Epoch 72/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5320
Epoch 73/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5310
Epoch 74/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5295
Epoch 75/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5296
Epoch 76/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5269
Epoch 77/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5302
Epoch 78/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5273
Epoch 79/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5269
Epoch 80/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5287

Epoch 81/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5306
Epoch 82/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5251
Epoch 83/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5276
Epoch 84/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5279
Epoch 85/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5265
Epoch 86/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5250
Epoch 87/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5274
Epoch 88/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5282
Epoch 89/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5257
Epoch 90/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5265
Epoch 91/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5257
Epoch 92/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5265
Epoch 93/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5261
Epoch 94/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5242
Epoch 95/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5271
Epoch 96/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5268
Epoch 97/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 98/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5247
Epoch 99/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5269
Epoch 100/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5245
Epoch 101/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5226
Epoch 102/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5242
Epoch 103/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5280
Epoch 104/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5266

Epoch 105/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5276
Epoch 106/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5269
Epoch 107/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5259
Epoch 108/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5251
Epoch 109/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5263
Epoch 110/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5203
Epoch 111/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5263
Epoch 112/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5253
Epoch 113/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5244
Epoch 114/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5283
Epoch 115/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5257
Epoch 116/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5241
Epoch 117/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5243
Epoch 118/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5219
Epoch 119/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5259
Epoch 120/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5241
Epoch 121/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5236
Epoch 122/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5221
Epoch 123/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5256
Epoch 124/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5253
Epoch 125/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5258
Epoch 126/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5226
Epoch 127/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5230
Epoch 128/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5241

Epoch 129/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5274
Epoch 130/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5215
Epoch 131/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5252
Epoch 132/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5225
Epoch 133/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5233
Epoch 134/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5236
Epoch 135/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5253
Epoch 136/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5243
Epoch 137/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5233
Epoch 138/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5260
Epoch 139/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5225
Epoch 140/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5207
Epoch 141/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5214
Epoch 142/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5223
Epoch 143/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5234
Epoch 144/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5214
Epoch 145/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5211
Epoch 146/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5274
Epoch 147/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5237
Epoch 148/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5211
Epoch 149/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5228
Epoch 150/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5275
Epoch 151/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5230
Epoch 152/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5267

Epoch 153/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5210
Epoch 154/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5256
Epoch 155/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5215
Epoch 156/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5213
Epoch 157/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5238
Epoch 158/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5232
Epoch 159/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5224
Epoch 160/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5239
Epoch 161/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5247
Epoch 162/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5243
Epoch 163/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5224
Epoch 164/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 165/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5223
Epoch 166/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 167/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5210
Epoch 168/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5228
Epoch 169/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5219
Epoch 170/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5246
Epoch 171/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5221
Epoch 172/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5209
Epoch 173/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5243
Epoch 174/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5215
Epoch 175/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5236
Epoch 176/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5250

Epoch 177/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5225
Epoch 178/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5238
Epoch 179/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5238
Epoch 180/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5225
Epoch 181/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 182/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5225
Epoch 183/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5249
Epoch 184/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5266
Epoch 185/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5238
Epoch 186/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5209
Epoch 187/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5235
Epoch 188/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5213
Epoch 189/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5234
Epoch 190/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5211
Epoch 191/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5242
Epoch 192/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5227
Epoch 193/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5229
Epoch 194/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5222
Epoch 195/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5240
Epoch 196/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5221
Epoch 197/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5222
Epoch 198/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5216
Epoch 199/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5240
Epoch 200/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5236

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22868/22868 [=====] - 1s 49us/step
Epoch 1/200
22868/22868 [=====] - 1s 44us/step - loss: 0.7733
Epoch 2/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6956
Epoch 3/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6953
Epoch 4/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6961
Epoch 5/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6959
Epoch 6/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6949
Epoch 7/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6925
Epoch 8/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6903
Epoch 9/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6873
Epoch 10/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6859
Epoch 11/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6842
Epoch 12/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6828
Epoch 13/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6800
Epoch 14/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6814
Epoch 15/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6830
Epoch 16/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6525
Epoch 17/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6564
Epoch 18/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6354
Epoch 19/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6147
Epoch 20/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5981
Epoch 21/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5924
Epoch 22/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5796
Epoch 23/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5784
Epoch 24/200

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22868/22868 [=====] - 0s 13us/step - loss: 0.5649
Epoch 25/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5635
Epoch 26/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5506
Epoch 27/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5543
Epoch 28/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5489
Epoch 29/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5538
Epoch 30/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5480
Epoch 31/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5392
Epoch 32/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5393
Epoch 33/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5404
Epoch 34/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5396
Epoch 35/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5358
Epoch 36/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5366
Epoch 37/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5333
Epoch 38/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5366
Epoch 39/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5353
Epoch 40/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5356
Epoch 41/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5363
Epoch 42/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5305
Epoch 43/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5317
Epoch 44/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5344
Epoch 45/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5335
Epoch 46/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5329
Epoch 47/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5289
Epoch 48/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5291
Epoch 49/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5318
Epoch 50/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5283
Epoch 51/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5301
Epoch 52/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5278
Epoch 53/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5358
Epoch 54/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5313
Epoch 55/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5295
Epoch 56/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5314
Epoch 57/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5282
Epoch 58/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5247
Epoch 59/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5276
Epoch 60/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5261
Epoch 61/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5287
Epoch 62/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5254
Epoch 63/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5254
Epoch 64/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5226
Epoch 65/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5242
Epoch 66/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5285
Epoch 67/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5234
Epoch 68/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5265
Epoch 69/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5271
Epoch 70/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5260
Epoch 71/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5278
Epoch 72/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5263
 Epoch 73/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5266
 Epoch 74/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5248
 Epoch 75/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5286
 Epoch 76/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5290
 Epoch 77/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5272
 Epoch 78/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5223
 Epoch 79/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5253
 Epoch 80/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5272
 Epoch 81/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5272
 Epoch 82/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5245
 Epoch 83/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5258
 Epoch 84/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5264
 Epoch 85/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5273
 Epoch 86/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5229
 Epoch 87/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5260
 Epoch 88/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5257
 Epoch 89/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5259
 Epoch 90/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5223
 Epoch 91/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5241
 Epoch 92/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5267
 Epoch 93/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5260
 Epoch 94/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5263
 Epoch 95/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5223
 Epoch 96/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5238
 Epoch 97/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5238
 Epoch 98/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5252
 Epoch 99/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5248
 Epoch 100/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5235
 Epoch 101/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5263
 Epoch 102/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5267
 Epoch 103/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5237
 Epoch 104/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5238
 Epoch 105/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5268
 Epoch 106/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5288
 Epoch 107/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5259
 Epoch 108/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5238
 Epoch 109/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5221
 Epoch 110/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5267
 Epoch 111/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5255
 Epoch 112/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5255
 Epoch 113/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5218
 Epoch 114/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5222
 Epoch 115/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5230
 Epoch 116/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5251
 Epoch 117/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5260
 Epoch 118/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5234
 Epoch 119/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5235
 Epoch 120/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 121/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5222
Epoch 122/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 123/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 124/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 125/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5248
Epoch 126/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5226
Epoch 127/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5214
Epoch 128/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5244
Epoch 129/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5237
Epoch 130/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5239
Epoch 131/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5254
Epoch 132/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5263
Epoch 133/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5264
Epoch 134/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5239
Epoch 135/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5264
Epoch 136/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5218
Epoch 137/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222
Epoch 138/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5230
Epoch 139/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5246
Epoch 140/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5257
Epoch 141/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5220
Epoch 142/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5268
Epoch 143/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5244
Epoch 144/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5226
 Epoch 145/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5261
 Epoch 146/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5235
 Epoch 147/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5241
 Epoch 148/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5271
 Epoch 149/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5196
 Epoch 150/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5238
 Epoch 151/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5217
 Epoch 152/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5248
 Epoch 153/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5260
 Epoch 154/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5209
 Epoch 155/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5239
 Epoch 156/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5262
 Epoch 157/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5198
 Epoch 158/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5219
 Epoch 159/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5226
 Epoch 160/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5222
 Epoch 161/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5262
 Epoch 162/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5226
 Epoch 163/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5243
 Epoch 164/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5220
 Epoch 165/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5236
 Epoch 166/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5251
 Epoch 167/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5230
 Epoch 168/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5226
Epoch 169/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 170/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5210
Epoch 171/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5227
Epoch 172/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5222
Epoch 173/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5190
Epoch 174/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5240
Epoch 175/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5221
Epoch 176/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5233
Epoch 177/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5213
Epoch 178/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5241
Epoch 179/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5216
Epoch 180/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5231
Epoch 181/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5251
Epoch 182/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5229
Epoch 183/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5199
Epoch 184/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5243
Epoch 185/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5266
Epoch 186/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5228
Epoch 187/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5239
Epoch 188/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5203
Epoch 189/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 190/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5225
Epoch 191/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5241
Epoch 192/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5234
 Epoch 193/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5238
 Epoch 194/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5259
 Epoch 195/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5246
 Epoch 196/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5232
 Epoch 197/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5232
 Epoch 198/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5238
 Epoch 199/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5227
 Epoch 200/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5224
 22868/22868 [=====] - 1s 49us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 45us/step - loss: 0.7760
 Epoch 2/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6901
 Epoch 3/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6888
 Epoch 4/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6851
 Epoch 5/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6819
 Epoch 6/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6786
 Epoch 7/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6723
 Epoch 8/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6597
 Epoch 9/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.6290
 Epoch 10/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6150
 Epoch 11/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6096
 Epoch 12/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5926
 Epoch 13/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5931
 Epoch 14/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5872
 Epoch 15/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5803

Epoch 16/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5639
Epoch 17/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5593
Epoch 18/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5667
Epoch 19/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5510
Epoch 20/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5495
Epoch 21/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5527
Epoch 22/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5476
Epoch 23/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5456
Epoch 24/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5405
Epoch 25/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5419
Epoch 26/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5400
Epoch 27/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5378
Epoch 28/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5397
Epoch 29/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5327
Epoch 30/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5381
Epoch 31/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5348
Epoch 32/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5353
Epoch 33/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5352
Epoch 34/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5267
Epoch 35/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5308
Epoch 36/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5321
Epoch 37/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5339
Epoch 38/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5342
Epoch 39/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5326

Epoch 40/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5318
Epoch 41/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5292
Epoch 42/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5295
Epoch 43/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5276
Epoch 44/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5292
Epoch 45/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5272
Epoch 46/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5292
Epoch 47/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5271
Epoch 48/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5273
Epoch 49/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5291
Epoch 50/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5240
Epoch 51/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5305
Epoch 52/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5271
Epoch 53/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5302
Epoch 54/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5232
Epoch 55/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5270
Epoch 56/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 57/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5243
Epoch 58/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5235
Epoch 59/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5290
Epoch 60/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5282
Epoch 61/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5286
Epoch 62/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5255
Epoch 63/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5225

Epoch 64/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5229
Epoch 65/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5286
Epoch 66/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 67/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5265
Epoch 68/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5288
Epoch 69/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5265
Epoch 70/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5261
Epoch 71/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5274
Epoch 72/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5237
Epoch 73/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5229
Epoch 74/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5262
Epoch 75/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5262
Epoch 76/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5249
Epoch 77/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5258
Epoch 78/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5262
Epoch 79/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5235
Epoch 80/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5227
Epoch 81/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5215
Epoch 82/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5246
Epoch 83/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5233
Epoch 84/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5225
Epoch 85/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5249
Epoch 86/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 87/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5195

Epoch 88/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5206
Epoch 89/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5220
Epoch 90/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5237
Epoch 91/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5232
Epoch 92/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5227
Epoch 93/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5185
Epoch 94/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5186
Epoch 95/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5208
Epoch 96/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5186
Epoch 97/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5186
Epoch 98/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5210
Epoch 99/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5199
Epoch 100/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5168
Epoch 101/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5222
Epoch 102/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5194
Epoch 103/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5167
Epoch 104/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5199
Epoch 105/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5189
Epoch 106/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5189
Epoch 107/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5156
Epoch 108/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5170
Epoch 109/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5157
Epoch 110/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5112
Epoch 111/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5132

Epoch 112/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5118
Epoch 113/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5127
Epoch 114/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5081
Epoch 115/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5103
Epoch 116/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5071
Epoch 117/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5125
Epoch 118/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5237
Epoch 119/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5229
Epoch 120/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5156
Epoch 121/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5242
Epoch 122/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5214
Epoch 123/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5255
Epoch 124/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5241
Epoch 125/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5246
Epoch 126/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5230
Epoch 127/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 128/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5243
Epoch 129/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5247
Epoch 130/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5261
Epoch 131/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5247
Epoch 132/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5272
Epoch 133/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5232
Epoch 134/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5256
Epoch 135/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5291

Epoch 136/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5238
 Epoch 137/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5228
 Epoch 138/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5223
 Epoch 139/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5246
 Epoch 140/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5250
 Epoch 141/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5257
 Epoch 142/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5241
 Epoch 143/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5200
 Epoch 144/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5251
 Epoch 145/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5253
 Epoch 146/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5277
 Epoch 147/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5256
 Epoch 148/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5228
 Epoch 149/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5247
 Epoch 150/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5219
 Epoch 151/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5248
 Epoch 152/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5264
 Epoch 153/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5244
 Epoch 154/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5252
 Epoch 155/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5245
 Epoch 156/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5275
 Epoch 157/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5236
 Epoch 158/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5225
 Epoch 159/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5234

Epoch 160/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 161/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5266
Epoch 162/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5215
Epoch 163/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5227
Epoch 164/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5205
Epoch 165/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5232
Epoch 166/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5148
Epoch 167/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5063
Epoch 168/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5087
Epoch 169/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5108
Epoch 170/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5104
Epoch 171/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5190
Epoch 172/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5255
Epoch 173/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5224
Epoch 174/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5239
Epoch 175/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 176/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5201
Epoch 177/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 178/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5227
Epoch 179/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5261
Epoch 180/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5223
Epoch 181/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5247
Epoch 182/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5224
Epoch 183/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5218

Epoch 184/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5208
Epoch 185/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5223
Epoch 186/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5234
Epoch 187/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5231
Epoch 188/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222
Epoch 189/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5238
Epoch 190/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5216
Epoch 191/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5105
Epoch 192/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5084
Epoch 193/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5058
Epoch 194/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5071
Epoch 195/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6297
Epoch 196/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5222
Epoch 197/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5239
Epoch 198/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5218
Epoch 199/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 200/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5227
22868/22868 [=====] - 1s 49us/step
Epoch 1/200
22868/22868 [=====] - 1s 46us/step - loss: 0.8184
Epoch 2/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6937
Epoch 3/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6908
Epoch 4/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6883
Epoch 5/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6862
Epoch 6/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6849
Epoch 7/200

22868/22868 [=====] - 0s 14us/step - loss: 0.6821
Epoch 8/200
22868/22868 [=====] - 0s 13us/step - loss: 1.0419
Epoch 9/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6962
Epoch 10/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6951
Epoch 11/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 12/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6951
Epoch 13/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6949
Epoch 14/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6944
Epoch 15/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6933
Epoch 16/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6937
Epoch 17/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6932
Epoch 18/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6932
Epoch 19/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6918
Epoch 20/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6912
Epoch 21/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6881
Epoch 22/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6820
Epoch 23/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6716
Epoch 24/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6409
Epoch 25/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6344
Epoch 26/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6182
Epoch 27/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6032
Epoch 28/200
22868/22868 [=====] - 0s 13us/step - loss: 0.6016
Epoch 29/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5926
Epoch 30/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5822
Epoch 31/200

22868/22868 [=====] - 0s 13us/step - loss: 0.5724
Epoch 32/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5758
Epoch 33/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5608
Epoch 34/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5552
Epoch 35/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5595
Epoch 36/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5465
Epoch 37/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5536
Epoch 38/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5410
Epoch 39/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5472
Epoch 40/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5415
Epoch 41/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5440
Epoch 42/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5372
Epoch 43/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5416
Epoch 44/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5398
Epoch 45/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5400
Epoch 46/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5374
Epoch 47/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5362
Epoch 48/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5288
Epoch 49/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5442
Epoch 50/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5364
Epoch 51/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5337
Epoch 52/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5408
Epoch 53/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5334
Epoch 54/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5322
Epoch 55/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5305
 Epoch 56/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5351
 Epoch 57/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5335
 Epoch 58/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5332
 Epoch 59/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5321
 Epoch 60/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5333
 Epoch 61/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5280
 Epoch 62/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5252
 Epoch 63/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5328
 Epoch 64/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5309
 Epoch 65/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5312
 Epoch 66/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5246
 Epoch 67/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5263
 Epoch 68/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5280
 Epoch 69/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5275
 Epoch 70/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5289
 Epoch 71/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5252
 Epoch 72/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5254
 Epoch 73/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5269
 Epoch 74/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5255
 Epoch 75/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5272
 Epoch 76/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5278
 Epoch 77/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5250
 Epoch 78/200
 22868/22868 [=====] - 0s 13us/step - loss: 0.5332
 Epoch 79/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5287
Epoch 80/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5268
Epoch 81/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5274
Epoch 82/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5253
Epoch 83/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 84/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 85/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5265
Epoch 86/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5300
Epoch 87/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 88/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5268
Epoch 89/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5285
Epoch 90/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5289
Epoch 91/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5255
Epoch 92/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5291
Epoch 93/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5256
Epoch 94/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5286
Epoch 95/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5250
Epoch 96/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5235
Epoch 97/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5239
Epoch 98/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5284
Epoch 99/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5241
Epoch 100/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5291
Epoch 101/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5264
Epoch 102/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5302
Epoch 103/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5258
Epoch 104/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5219
Epoch 105/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5271
Epoch 106/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 107/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 108/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5309
Epoch 109/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5288
Epoch 110/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5248
Epoch 111/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5262
Epoch 112/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5265
Epoch 113/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5259
Epoch 114/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5263
Epoch 115/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5229
Epoch 116/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5286
Epoch 117/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5258
Epoch 118/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5260
Epoch 119/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5248
Epoch 120/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5256
Epoch 121/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5243
Epoch 122/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5270
Epoch 123/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5244
Epoch 124/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5266
Epoch 125/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5235
Epoch 126/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5219
Epoch 127/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 128/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5232
Epoch 129/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5226
Epoch 130/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5235
Epoch 131/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5244
Epoch 132/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 133/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5227
Epoch 134/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5234
Epoch 135/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5294
Epoch 136/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5236
Epoch 137/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5269
Epoch 138/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5260
Epoch 139/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5252
Epoch 140/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5275
Epoch 141/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5243
Epoch 142/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5239
Epoch 143/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5252
Epoch 144/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5255
Epoch 145/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5230
Epoch 146/200
22868/22868 [=====] - 0s 13us/step - loss: 0.5232
Epoch 147/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5272
Epoch 148/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5215
Epoch 149/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5241
Epoch 150/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5242
Epoch 151/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5233
Epoch 152/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 153/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 154/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5241
Epoch 155/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 156/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5204
Epoch 157/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5229
Epoch 158/200
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Epoch 159/200
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Epoch 160/200
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Epoch 161/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5258
Epoch 162/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5210
Epoch 163/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5271
Epoch 164/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5243
Epoch 165/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5217
Epoch 166/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 167/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5262
Epoch 168/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5229
Epoch 169/200
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Epoch 170/200
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Epoch 171/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5269
Epoch 172/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5216
Epoch 173/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222
Epoch 174/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5233
Epoch 175/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5228
Epoch 176/200
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Epoch 177/200
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Epoch 178/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 179/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 180/200
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Epoch 181/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222
Epoch 182/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5211
Epoch 183/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5223
Epoch 184/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5257
Epoch 185/200
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Epoch 186/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5233
Epoch 187/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5211
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22868/22868 [=====] - 0s 14us/step - loss: 0.5290
Epoch 192/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 193/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5210
Epoch 194/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 195/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 196/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 197/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5203
Epoch 198/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 199/200

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22868/22868 [=====] - 0s 13us/step - loss: 0.5242
Epoch 200/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5232
22868/22868 [=====] - 1s 53us/step
Epoch 1/200
22868/22868 [=====] - 1s 46us/step - loss: 7.9630
Epoch 2/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 3/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 4/200
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Epoch 5/200
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Epoch 22/200
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Epoch 23/200
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22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 170/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 171/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 172/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 173/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 174/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 175/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 176/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 177/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 178/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 179/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 180/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 181/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 182/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 183/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 184/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 185/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 186/200
22868/22868 [=====] - 0s 13us/step - loss: 7.9712
Epoch 187/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 188/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712
Epoch 189/200
22868/22868 [=====] - 0s 13us/step - loss: 7.9712
Epoch 190/200
22868/22868 [=====] - 0s 14us/step - loss: 7.9712

Epoch 191/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 Epoch 192/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 Epoch 193/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 Epoch 194/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 Epoch 195/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 Epoch 196/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 Epoch 197/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 Epoch 198/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 Epoch 199/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 Epoch 200/200
 22868/22868 [=====] - 0s 14us/step - loss: 7.9712
 22868/22868 [=====] - 1s 53us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 47us/step - loss: 0.9084
 Epoch 2/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.7000
 Epoch 3/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6983
 Epoch 4/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.7001
 Epoch 5/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6958
 Epoch 6/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6948
 Epoch 7/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6945
 Epoch 8/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6934
 Epoch 9/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6920
 Epoch 10/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6894
 Epoch 11/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6854
 Epoch 12/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6793
 Epoch 13/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6675
 Epoch 14/200

```
22868/22868 [=====] - 0s 14us/step - loss: 0.6385
Epoch 15/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6447
Epoch 16/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6203
Epoch 17/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6143
Epoch 18/200
15200/22868 [=====>...] - ETA: 0s - loss: 0.5974
```

```
/Users/Broth/anaconda3/lib/python3.7/site-packages/keras/callbacks/callbacks.py:95: RuntimeWarning:
% (hook_name, delta_t_median), RuntimeWarning)
/Users/Broth/anaconda3/lib/python3.7/site-packages/keras/callbacks/callbacks.py:95: RuntimeWarning:
% (hook_name, delta_t_median), RuntimeWarning)
```

```
22868/22868 [=====] - 1s 26us/step - loss: 0.5933
Epoch 19/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5890
Epoch 20/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5745
Epoch 21/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6744
Epoch 22/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6422
Epoch 23/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6412
Epoch 24/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6339
Epoch 25/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6150
Epoch 26/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6427
Epoch 27/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5862
Epoch 28/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5948
Epoch 29/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5757
Epoch 30/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5771
Epoch 31/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5753
Epoch 32/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5659
Epoch 33/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5604
Epoch 34/200
```


22868/22868 [=====] - 0s 14us/step - loss: 0.5594
Epoch 35/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5559
Epoch 36/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5533
Epoch 37/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5507
Epoch 38/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5494
Epoch 39/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5476
Epoch 40/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5494
Epoch 41/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5439
Epoch 42/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5461
Epoch 43/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5402
Epoch 44/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5431
Epoch 45/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5381
Epoch 46/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5356
Epoch 47/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5370
Epoch 48/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5350
Epoch 49/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5350
Epoch 50/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5377
Epoch 51/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5336
Epoch 52/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5361
Epoch 53/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5313
Epoch 54/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5316
Epoch 55/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5314
Epoch 56/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5453
Epoch 57/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5360
Epoch 58/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5303
Epoch 59/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5339
Epoch 60/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5326
Epoch 61/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5312
Epoch 62/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5317
Epoch 63/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5276
Epoch 64/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5301
Epoch 65/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5322
Epoch 66/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5325
Epoch 67/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5308
Epoch 68/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5316
Epoch 69/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5293
Epoch 70/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5377
Epoch 71/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5323
Epoch 72/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5320
Epoch 73/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5260
Epoch 74/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5268
Epoch 75/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5282
Epoch 76/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5315
Epoch 77/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5276
Epoch 78/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5269
Epoch 79/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5282
Epoch 80/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5268
Epoch 81/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5343
Epoch 82/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5293
 Epoch 83/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5254
 Epoch 84/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5259
 Epoch 85/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5264
 Epoch 86/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5276
 Epoch 87/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5270
 Epoch 88/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5273
 Epoch 89/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5275
 Epoch 90/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5252
 Epoch 91/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5251
 Epoch 92/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5246
 Epoch 93/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5279
 Epoch 94/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5318
 Epoch 95/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5246
 Epoch 96/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5280
 Epoch 97/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5290
 Epoch 98/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5318
 Epoch 99/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5305
 Epoch 100/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5300
 Epoch 101/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5287
 Epoch 102/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5279
 Epoch 103/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5263
 Epoch 104/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5257
 Epoch 105/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5283
 Epoch 106/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5274
Epoch 107/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 108/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 109/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5269
Epoch 110/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5310
Epoch 111/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5264
Epoch 112/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5259
Epoch 113/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5297
Epoch 114/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5278
Epoch 115/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5240
Epoch 116/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 117/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5264
Epoch 118/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 119/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5296
Epoch 120/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5279
Epoch 121/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 122/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5259
Epoch 123/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 124/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5264
Epoch 125/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5279
Epoch 126/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 127/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 128/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5232
Epoch 129/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 130/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5264
Epoch 131/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5291
Epoch 132/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5294
Epoch 133/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5259
Epoch 134/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5257
Epoch 135/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5305
Epoch 136/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5217
Epoch 137/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 138/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5241
Epoch 139/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5226
Epoch 140/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5270
Epoch 141/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5269
Epoch 142/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 143/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5235
Epoch 144/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5258
Epoch 145/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 146/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5200
Epoch 147/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5253
Epoch 148/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5246
Epoch 149/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 150/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5217
Epoch 151/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 152/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 153/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 154/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 155/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 156/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5238
Epoch 157/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 158/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5263
Epoch 159/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5224
Epoch 160/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 161/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5259
Epoch 162/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5248
Epoch 163/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5255
Epoch 164/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 165/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5202
Epoch 166/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5216
Epoch 167/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5263
Epoch 168/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5242
Epoch 169/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5226
Epoch 170/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222
Epoch 171/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 172/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5256
Epoch 173/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 174/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 175/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 176/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5262
Epoch 177/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5228
Epoch 178/200

```

22868/22868 [=====] - 0s 14us/step - loss: 0.5239
Epoch 179/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5267
Epoch 180/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5259
Epoch 181/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5246
Epoch 182/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 183/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5213
Epoch 184/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5255
Epoch 185/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5223
Epoch 186/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5248
Epoch 187/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 188/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 189/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5235
Epoch 190/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5237
Epoch 191/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 192/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 193/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5217
Epoch 194/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5226
Epoch 195/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5210
Epoch 196/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 197/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5273
Epoch 198/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5226
Epoch 199/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5226
Epoch 200/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
22868/22868 [=====] - 1s 56us/step
Epoch 1/200
22868/22868 [=====] - 1s 49us/step - loss: 0.7745

```

Epoch 2/200
22868/22868 [=====] - 0s 16us/step - loss: 0.7015
Epoch 3/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6923: 0s - loss: 0.692
Epoch 4/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6931
Epoch 5/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6897
Epoch 6/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6863
Epoch 7/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6819
Epoch 8/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6761
Epoch 9/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6724
Epoch 10/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6835
Epoch 11/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6633
Epoch 12/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6618
Epoch 13/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6506
Epoch 14/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6534
Epoch 15/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6272
Epoch 16/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6250
Epoch 17/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6037
Epoch 18/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5895
Epoch 19/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5934
Epoch 20/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5817
Epoch 21/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6881
Epoch 22/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6872
Epoch 23/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6840
Epoch 24/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6559
Epoch 25/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6409

Epoch 26/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6281
Epoch 27/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5721
Epoch 28/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5718
Epoch 29/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5699
Epoch 30/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5645
Epoch 31/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5619
Epoch 32/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5564
Epoch 33/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5639
Epoch 34/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5576
Epoch 35/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5507
Epoch 36/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5519
Epoch 37/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5422
Epoch 38/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5452
Epoch 39/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5379
Epoch 40/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5414
Epoch 41/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5450
Epoch 42/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5372
Epoch 43/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5405
Epoch 44/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5395
Epoch 45/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5481
Epoch 46/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5354
Epoch 47/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5365
Epoch 48/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5369
Epoch 49/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5343

Epoch 50/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5360
Epoch 51/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5336
Epoch 52/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5341
Epoch 53/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5353
Epoch 54/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5337
Epoch 55/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5360
Epoch 56/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5286
Epoch 57/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5338
Epoch 58/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5318
Epoch 59/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5343
Epoch 60/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5326
Epoch 61/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5371
Epoch 62/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5278
Epoch 63/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5226
Epoch 64/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5317
Epoch 65/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5255
Epoch 66/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5293
Epoch 67/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5306
Epoch 68/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5310
Epoch 69/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5339
Epoch 70/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5297
Epoch 71/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5238
Epoch 72/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5326
Epoch 73/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5302

Epoch 74/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5291
Epoch 75/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5340
Epoch 76/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5270
Epoch 77/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5261
Epoch 78/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5256
Epoch 79/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 80/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5272
Epoch 81/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5281
Epoch 82/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5238
Epoch 83/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5269
Epoch 84/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 85/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5235
Epoch 86/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5266
Epoch 87/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5224
Epoch 88/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5262
Epoch 89/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 90/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 91/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 92/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5246
Epoch 93/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222
Epoch 94/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5267
Epoch 95/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5303
Epoch 96/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 97/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5244

Epoch 98/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5228
Epoch 99/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 100/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5213
Epoch 101/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5282
Epoch 102/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 103/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5242
Epoch 104/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 105/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 106/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222
Epoch 107/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5227
Epoch 108/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 109/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5188
Epoch 110/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5242
Epoch 111/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5272
Epoch 112/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5245
Epoch 113/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5266
Epoch 114/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5246
Epoch 115/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5240
Epoch 116/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5235
Epoch 117/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5233
Epoch 118/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5216
Epoch 119/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 120/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5220
Epoch 121/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236

Epoch 122/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5215
Epoch 123/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5277
Epoch 124/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 125/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 126/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5232
Epoch 127/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5206
Epoch 128/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5263
Epoch 129/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5284
Epoch 130/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5243
Epoch 131/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5261
Epoch 132/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5243
Epoch 133/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5206
Epoch 134/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5272
Epoch 135/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 136/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5215
Epoch 137/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5211
Epoch 138/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5259
Epoch 139/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5341
Epoch 140/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5223
Epoch 141/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 142/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5221
Epoch 143/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5242
Epoch 144/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5190
Epoch 145/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251

Epoch 146/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5227
Epoch 147/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5194
Epoch 148/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 149/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5221
Epoch 150/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5229
Epoch 151/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5196
Epoch 152/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5266
Epoch 153/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5210
Epoch 154/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5209
Epoch 155/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5205
Epoch 156/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5185
Epoch 157/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5180
Epoch 158/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 159/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5200
Epoch 160/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5211
Epoch 161/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5149
Epoch 162/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5221
Epoch 163/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5270
Epoch 164/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5292
Epoch 165/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5260
Epoch 166/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5277
Epoch 167/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5259
Epoch 168/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5253
Epoch 169/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5268

Epoch 170/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5253
Epoch 171/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5250
Epoch 172/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5273
Epoch 173/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5290
Epoch 174/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5243
Epoch 175/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 176/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5232
Epoch 177/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5233
Epoch 178/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5242
Epoch 179/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5286
Epoch 180/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5294
Epoch 181/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5276
Epoch 182/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5190
Epoch 183/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 184/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5224
Epoch 185/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5267
Epoch 186/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 187/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6849
Epoch 188/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6929
Epoch 189/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6915
Epoch 190/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6907
Epoch 191/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6899
Epoch 192/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6887
Epoch 193/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6889

Epoch 194/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6875
 Epoch 195/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6860
 Epoch 196/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6579
 Epoch 197/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6439
 Epoch 198/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6313
 Epoch 199/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6701
 Epoch 200/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6937
 22868/22868 [=====] - 1s 54us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 49us/step - loss: 0.7155
 Epoch 2/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6947
 Epoch 3/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6936
 Epoch 4/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6902
 Epoch 5/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6879
 Epoch 6/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6981
 Epoch 7/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6774
 Epoch 8/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6592
 Epoch 9/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6467
 Epoch 10/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6683
 Epoch 11/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.8972
 Epoch 12/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6972
 Epoch 13/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6948
 Epoch 14/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6951
 Epoch 15/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6948
 Epoch 16/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6949
 Epoch 17/200

22868/22868 [=====] - 0s 14us/step - loss: 0.6944
Epoch 18/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6941
Epoch 19/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6947
Epoch 20/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6941
Epoch 21/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6942
Epoch 22/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6942
Epoch 23/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6939
Epoch 24/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6940
Epoch 25/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6935
Epoch 26/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6933
Epoch 27/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6935
Epoch 28/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6931
Epoch 29/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6928
Epoch 30/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6930
Epoch 31/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6932
Epoch 32/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6926
Epoch 33/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6928
Epoch 34/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6927
Epoch 35/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6932
Epoch 36/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6924
Epoch 37/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6931
Epoch 38/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6929
Epoch 39/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6929
Epoch 40/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6925
Epoch 41/200

22868/22868 [=====] - 0s 14us/step - loss: 0.6930
Epoch 42/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6922
Epoch 43/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6925
Epoch 44/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6926
Epoch 45/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6916
Epoch 46/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6922
Epoch 47/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6898
Epoch 48/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6874
Epoch 49/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6825
Epoch 50/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6670
Epoch 51/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6459
Epoch 52/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6296
Epoch 53/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6398
Epoch 54/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6240
Epoch 55/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6508
Epoch 56/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6917
Epoch 57/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6143
Epoch 58/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6190
Epoch 59/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5878
Epoch 60/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6498
Epoch 61/200
22868/22868 [=====] - 0s 14us/step - loss: 0.7002
Epoch 62/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6930
Epoch 63/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6922
Epoch 64/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6918
Epoch 65/200

22868/22868 [=====] - 0s 14us/step - loss: 0.6920
 Epoch 66/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6918
 Epoch 67/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6916
 Epoch 68/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6906
 Epoch 69/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6885
 Epoch 70/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6871
 Epoch 71/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6841
 Epoch 72/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6738
 Epoch 73/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6545
 Epoch 74/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6642
 Epoch 75/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6411
 Epoch 76/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6444
 Epoch 77/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6296
 Epoch 78/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.7047
 Epoch 79/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6932
 Epoch 80/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6927
 Epoch 81/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6919
 Epoch 82/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6914
 Epoch 83/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6910
 Epoch 84/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6901
 Epoch 85/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6890
 Epoch 86/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6888
 Epoch 87/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6872
 Epoch 88/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6861
 Epoch 89/200

22868/22868 [=====] - 0s 14us/step - loss: 0.6856
 Epoch 90/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6834
 Epoch 91/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6801
 Epoch 92/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6763
 Epoch 93/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6651
 Epoch 94/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6348
 Epoch 95/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6404
 Epoch 96/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6592
 Epoch 97/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6124
 Epoch 98/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6100
 Epoch 99/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6054
 Epoch 100/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5882
 Epoch 101/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5809
 Epoch 102/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.7088
 Epoch 103/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6950
 Epoch 104/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6952
 Epoch 105/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6951
 Epoch 106/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6952
 Epoch 107/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6948
 Epoch 108/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6951
 Epoch 109/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6950
 Epoch 110/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6952
 Epoch 111/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6949
 Epoch 112/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6947
 Epoch 113/200

22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 114/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 115/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 116/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 117/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 118/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 119/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6953
Epoch 120/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 121/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6951
Epoch 122/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 123/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6951
Epoch 124/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6947
Epoch 125/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 126/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 127/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6947
Epoch 128/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6954
Epoch 129/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 130/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 131/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 132/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6952
Epoch 133/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 134/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 135/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6946
Epoch 136/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 137/200

22868/22868 [=====] - 0s 14us/step - loss: 0.6947
Epoch 138/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 139/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 140/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6954
Epoch 141/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6955
Epoch 142/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 143/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 144/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6953
Epoch 145/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6952
Epoch 146/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6953
Epoch 147/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 148/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 149/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 150/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 151/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6945
Epoch 152/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 153/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6956
Epoch 154/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 155/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 156/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 157/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6947
Epoch 158/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6947
Epoch 159/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 160/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6950
Epoch 161/200

22868/22868 [=====] - 0s 15us/step - loss: 0.6951
 Epoch 162/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.6947
 Epoch 163/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6955
 Epoch 164/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6951
 Epoch 165/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6951
 Epoch 166/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6957
 Epoch 167/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6948
 Epoch 168/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6945
 Epoch 169/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6946
 Epoch 170/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6945
 Epoch 171/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6950
 Epoch 172/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6946
 Epoch 173/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6949
 Epoch 174/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6951
 Epoch 175/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6953
 Epoch 176/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6950
 Epoch 177/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6952
 Epoch 178/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6948
 Epoch 179/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6947
 Epoch 180/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6950
 Epoch 181/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6946
 Epoch 182/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6950
 Epoch 183/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6949
 Epoch 184/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6950
 Epoch 185/200

```

22868/22868 [=====] - 0s 14us/step - loss: 0.6953
Epoch 186/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 187/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6951
Epoch 188/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6943
Epoch 189/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6946
Epoch 190/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 191/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 192/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 193/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 194/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 195/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
Epoch 196/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6949
Epoch 197/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6948
Epoch 198/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6951
Epoch 199/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6946
Epoch 200/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6950
22868/22868 [=====] - 1s 55us/step

```

```
In [36]: color = []
```

```

for score in scores:
    if score == min(scores):
        color.append('limegreen')
    else:
        color.append('dodgerblue')

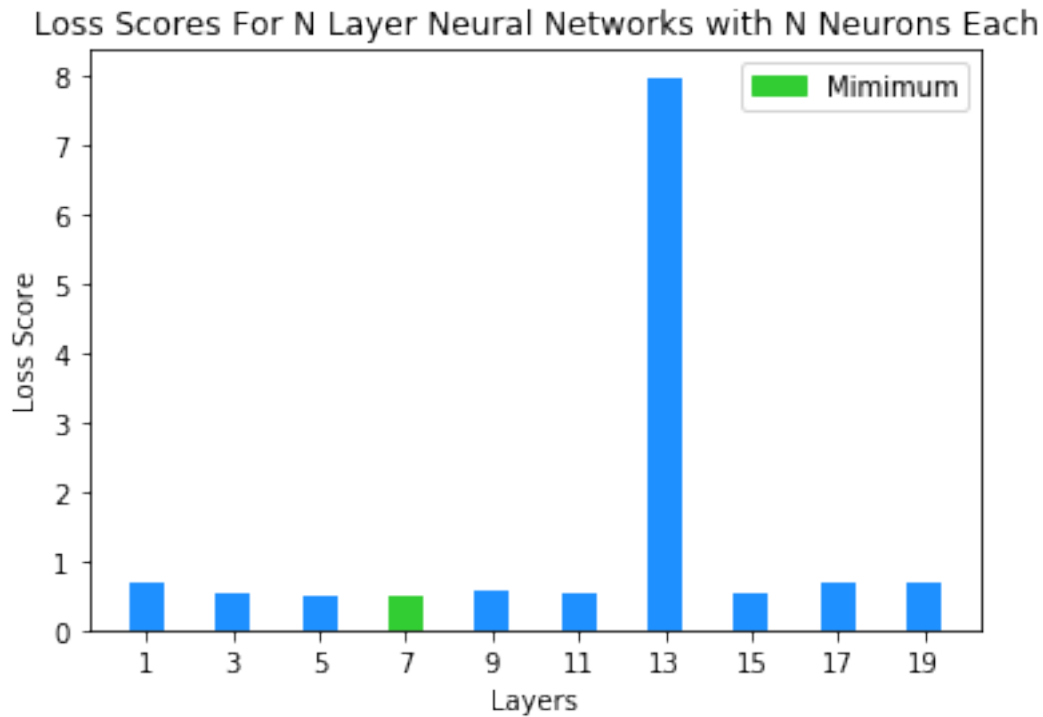
patch1 = mpatches.Patch(color='limegreen', label='Minimum')
plt.legend(handles=[patch1], loc = 'best')

plt.bar(neurons, scores, width = .8, color = color)
plt.xlabel('Neurons')
plt.ylabel('Loss Score')

```



```
plt.title('Loss Scores For 1 Layer Neural Networks with N Neurons Each')
plt.xticks(neurons)
plt.show()
```



Judging by the above graph, all numbers of neurons produce similarly low Loss Scores (with the exception of 13), with 7 neurons being the lowest.

2.0.3 Step 3. Determine optimal activation function

```
In [38]: act_funcs = ['tanh', 'sigmoid', 'relu', 'softplus', 'exponential']
        scores = []

        n = 7
        for act in act_funcs:
            model = Sequential()

            model.add(Dense(n, input_dim=11, activation=act)) #sigmoid, relu
            model.add(Dense(1, activation=act))

            sgd = SGD(lr=0.1)
            model.compile(loss='binary_crossentropy', optimizer='sgd')

            model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
            #print(model.predict_proba(X).reshape(4*n))
```

```
# evaluate the model
scores.append(model.evaluate(X, y))
```

```
Epoch 1/200
22868/22868 [=====] - 1s 50us/step - loss: 1.2574
Epoch 2/200
22868/22868 [=====] - 0s 15us/step - loss: 0.7045
Epoch 3/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6965
Epoch 4/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6959
Epoch 5/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6940
Epoch 6/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6933
Epoch 7/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6931
Epoch 8/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6934
Epoch 9/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6931
Epoch 10/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6927
Epoch 11/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6915
Epoch 12/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6906
Epoch 13/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6898
Epoch 14/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6881
Epoch 15/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6781
Epoch 16/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6376
Epoch 17/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6312
Epoch 18/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6147
Epoch 19/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6051
Epoch 20/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5933
Epoch 21/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5842
Epoch 22/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5749
```

Epoch 23/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5752
Epoch 24/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5656
Epoch 25/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5673
Epoch 26/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5556
Epoch 27/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5564
Epoch 28/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5510
Epoch 29/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5473
Epoch 30/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5453
Epoch 31/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5436
Epoch 32/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5420
Epoch 33/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5426
Epoch 34/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5933
Epoch 35/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5400
Epoch 36/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5400
Epoch 37/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5403
Epoch 38/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5385
Epoch 39/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5377
Epoch 40/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5380
Epoch 41/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5388
Epoch 42/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5343
Epoch 43/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5325
Epoch 44/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5341
Epoch 45/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5376
Epoch 46/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5307

Epoch 47/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5324
Epoch 48/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5332
Epoch 49/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5326
Epoch 50/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5289
Epoch 51/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5334
Epoch 52/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5327
Epoch 53/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5327
Epoch 54/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5313
Epoch 55/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5324
Epoch 56/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5310
Epoch 57/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5277
Epoch 58/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5321
Epoch 59/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5326
Epoch 60/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5311
Epoch 61/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5273
Epoch 62/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5277
Epoch 63/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5321
Epoch 64/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5277
Epoch 65/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5299
Epoch 66/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5261
Epoch 67/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5291
Epoch 68/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5300
Epoch 69/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5292
Epoch 70/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5282

Epoch 71/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5258
Epoch 72/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5257
Epoch 73/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5281
Epoch 74/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5272
Epoch 75/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5289
Epoch 76/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5265
Epoch 77/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5280
Epoch 78/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5288
Epoch 79/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5256
Epoch 80/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5252
Epoch 81/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5261
Epoch 82/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5285
Epoch 83/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5265
Epoch 84/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 85/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5292
Epoch 86/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 87/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5258
Epoch 88/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 89/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5270
Epoch 90/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5241
Epoch 91/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 92/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5251
Epoch 93/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5262
Epoch 94/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5262

Epoch 95/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5279
Epoch 96/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 97/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5259
Epoch 98/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5228
Epoch 99/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5273
Epoch 100/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5257
Epoch 101/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5283
Epoch 102/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5248
Epoch 103/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5242
Epoch 104/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5202
Epoch 105/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5245
Epoch 106/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 107/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5226
Epoch 108/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5206
Epoch 109/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 110/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5245
Epoch 111/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 112/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5269
Epoch 113/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5243
Epoch 114/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5269
Epoch 115/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5240
Epoch 116/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5261
Epoch 117/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5240
Epoch 118/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5229

Epoch 119/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5230
Epoch 120/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5237
Epoch 121/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5274
Epoch 122/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5227
Epoch 123/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 124/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5216
Epoch 125/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 126/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5235
Epoch 127/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 128/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5243
Epoch 129/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5218
Epoch 130/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5244
Epoch 131/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5245
Epoch 132/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5238
Epoch 133/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5233
Epoch 134/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5289
Epoch 135/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5226
Epoch 136/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5257
Epoch 137/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5265
Epoch 138/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5244
Epoch 139/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5259
Epoch 140/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 141/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5210
Epoch 142/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222

Epoch 143/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5237
Epoch 144/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5218
Epoch 145/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5239
Epoch 146/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5237
Epoch 147/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5228
Epoch 148/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5233
Epoch 149/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5229
Epoch 150/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5206
Epoch 151/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5246
Epoch 152/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5222
Epoch 153/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5247
Epoch 154/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5243
Epoch 155/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5271
Epoch 156/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5226
Epoch 157/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5255
Epoch 158/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5232
Epoch 159/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 160/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5233
Epoch 161/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5209
Epoch 162/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5220
Epoch 163/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5239
Epoch 164/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5234
Epoch 165/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5232
Epoch 166/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5233

Epoch 167/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5208
Epoch 168/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5225
Epoch 169/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5254
Epoch 170/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5232
Epoch 171/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5221
Epoch 172/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5227
Epoch 173/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 174/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5236
Epoch 175/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5220
Epoch 176/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5212
Epoch 177/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5231
Epoch 178/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5216
Epoch 179/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5219
Epoch 180/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5218
Epoch 181/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249
Epoch 182/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5230
Epoch 183/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5233
Epoch 184/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5223
Epoch 185/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5236
Epoch 186/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5213
Epoch 187/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5211
Epoch 188/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5233
Epoch 189/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5224
Epoch 190/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5249

Epoch 191/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5239
 Epoch 192/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5234
 Epoch 193/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5225
 Epoch 194/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5275
 Epoch 195/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5213
 Epoch 196/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5207
 Epoch 197/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5240
 Epoch 198/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5189
 Epoch 199/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5225
 Epoch 200/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5246
 22868/22868 [=====] - 1s 56us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 50us/step - loss: 0.6873
 Epoch 2/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6451
 Epoch 3/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6329
 Epoch 4/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6200
 Epoch 5/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.6084
 Epoch 6/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5976
 Epoch 7/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5882
 Epoch 8/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5790
 Epoch 9/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5718
 Epoch 10/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5640
 Epoch 11/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5566
 Epoch 12/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5549
 Epoch 13/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5475
 Epoch 14/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5423
 Epoch 15/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5411
 Epoch 16/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5308
 Epoch 17/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5298
 Epoch 18/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5316
 Epoch 19/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5268
 Epoch 20/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5252
 Epoch 21/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5241
 Epoch 22/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5197
 Epoch 23/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5175
 Epoch 24/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5217
 Epoch 25/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5214
 Epoch 26/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5197
 Epoch 27/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5164
 Epoch 28/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5148
 Epoch 29/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5148
 Epoch 30/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5145
 Epoch 31/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5183
 Epoch 32/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5133
 Epoch 33/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5092
 Epoch 34/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5090
 Epoch 35/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5095
 Epoch 36/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5100
 Epoch 37/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5066
 Epoch 38/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5080
Epoch 39/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5084
Epoch 40/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5076
Epoch 41/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5091
Epoch 42/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5076
Epoch 43/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5096
Epoch 44/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5056
Epoch 45/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5092
Epoch 46/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5095
Epoch 47/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5076
Epoch 48/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5109
Epoch 49/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5085
Epoch 50/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5076
Epoch 51/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5101
Epoch 52/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5082
Epoch 53/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5069
Epoch 54/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5093
Epoch 55/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5086
Epoch 56/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5060
Epoch 57/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5090
Epoch 58/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5054
Epoch 59/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5075
Epoch 60/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5082
Epoch 61/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5055
Epoch 62/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5072
 Epoch 63/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5049
 Epoch 64/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5044
 Epoch 65/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5062
 Epoch 66/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5055
 Epoch 67/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5063
 Epoch 68/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5057
 Epoch 69/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5047
 Epoch 70/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5029
 Epoch 71/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5034
 Epoch 72/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5052
 Epoch 73/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5040
 Epoch 74/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5057
 Epoch 75/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5068
 Epoch 76/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5067
 Epoch 77/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5077
 Epoch 78/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5040
 Epoch 79/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5036
 Epoch 80/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5077
 Epoch 81/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5043
 Epoch 82/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5036
 Epoch 83/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5079
 Epoch 84/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5043
 Epoch 85/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5024
 Epoch 86/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5028
Epoch 87/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5034
Epoch 88/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5029
Epoch 89/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5045
Epoch 90/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5025
Epoch 91/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5025
Epoch 92/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5074
Epoch 93/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5037
Epoch 94/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5015
Epoch 95/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5022
Epoch 96/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5023
Epoch 97/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5063
Epoch 98/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5064
Epoch 99/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5012
Epoch 100/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5017
Epoch 101/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5010
Epoch 102/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5041
Epoch 103/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5059
Epoch 104/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5047
Epoch 105/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5038
Epoch 106/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5026
Epoch 107/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5036
Epoch 108/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5011
Epoch 109/200
22868/22868 [=====] - 0s 14us/step - loss: 0.5043
Epoch 110/200

22868/22868 [=====] - 0s 14us/step - loss: 0.5022
 Epoch 111/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5031
 Epoch 112/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5051
 Epoch 113/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5008
 Epoch 114/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5051
 Epoch 115/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4991
 Epoch 116/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5007
 Epoch 117/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5002
 Epoch 118/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4998
 Epoch 119/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5019
 Epoch 120/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4998
 Epoch 121/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5023
 Epoch 122/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5023
 Epoch 123/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5015
 Epoch 124/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5013
 Epoch 125/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5025
 Epoch 126/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5015
 Epoch 127/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5008
 Epoch 128/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4987
 Epoch 129/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4991
 Epoch 130/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.4991
 Epoch 131/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4973
 Epoch 132/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5001
 Epoch 133/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4991
 Epoch 134/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5008
 Epoch 135/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4995
 Epoch 136/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4988
 Epoch 137/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5007
 Epoch 138/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4993
 Epoch 139/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4984
 Epoch 140/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5003
 Epoch 141/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.4991
 Epoch 142/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4956
 Epoch 143/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4984
 Epoch 144/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4996
 Epoch 145/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4983
 Epoch 146/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4992
 Epoch 147/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4971
 Epoch 148/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4972
 Epoch 149/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.5011
 Epoch 150/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4979
 Epoch 151/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4958
 Epoch 152/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.4984
 Epoch 153/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4998
 Epoch 154/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4946
 Epoch 155/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.4985
 Epoch 156/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.4960
 Epoch 157/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4941
 Epoch 158/200

22868/22868 [=====] - 0s 15us/step - loss: 0.4941
 Epoch 159/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4947
 Epoch 160/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4992
 Epoch 161/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4946
 Epoch 162/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4940
 Epoch 163/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4935
 Epoch 164/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.4923
 Epoch 165/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.4956
 Epoch 166/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4981
 Epoch 167/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4924
 Epoch 168/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.4976
 Epoch 169/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4960
 Epoch 170/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4928
 Epoch 171/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4943
 Epoch 172/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4940
 Epoch 173/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4932
 Epoch 174/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4936
 Epoch 175/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4952
 Epoch 176/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4941
 Epoch 177/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4938
 Epoch 178/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4922
 Epoch 179/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4963
 Epoch 180/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4918
 Epoch 181/200
 22868/22868 [=====] - 0s 14us/step - loss: 0.4952
 Epoch 182/200

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22868/22868 [=====] - 0s 14us/step - loss: 0.4955
Epoch 183/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4897
Epoch 184/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4938
Epoch 185/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4955
Epoch 186/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4912
Epoch 187/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4921
Epoch 188/200
22868/22868 [=====] - 0s 15us/step - loss: 0.4925
Epoch 189/200
22868/22868 [=====] - 0s 15us/step - loss: 0.4922
Epoch 190/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4922
Epoch 191/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4947
Epoch 192/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4891
Epoch 193/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4901
Epoch 194/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4912
Epoch 195/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4927
Epoch 196/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4915
Epoch 197/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4920
Epoch 198/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4888
Epoch 199/200
22868/22868 [=====] - 0s 15us/step - loss: 0.4941
Epoch 200/200
22868/22868 [=====] - 0s 14us/step - loss: 0.4963
22868/22868 [=====] - 1s 57us/step
Epoch 1/200
22868/22868 [=====] - 1s 51us/step - loss: 8.0583
Epoch 2/200
22868/22868 [=====] - 0s 14us/step - loss: 8.0647
Epoch 3/200
22868/22868 [=====] - 0s 14us/step - loss: 8.0621
Epoch 4/200
22868/22868 [=====] - 0s 14us/step - loss: 8.0591
Epoch 5/200
22868/22868 [=====] - 0s 14us/step - loss: 8.0598

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Epoch 6/200
22868/22868 [=====] - 0s 14us/step - loss: 8.0584
Epoch 7/200
22868/22868 [=====] - 0s 14us/step - loss: 8.0582
Epoch 8/200
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22868/22868 [=====] - 0s 14us/step - loss: nan

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Epoch 181/200
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22868/22868 [=====] - 0s 13us/step - loss: nan
Epoch 200/200
22868/22868 [=====] - 0s 13us/step - loss: nan
22868/22868 [=====] - 1s 57us/step

```

```
In [39]: color = []
```

```

    for score in scores:
        if score == min(scores):
            color.append('limegreen')

```

```

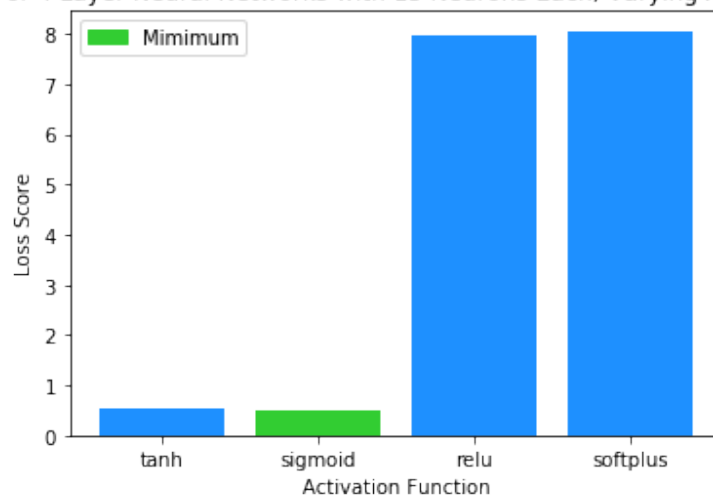
else:
    color.append('dodgerblue')

patch1 = mpatches.Patch(color='limegreen', label='Mimimum')
plt.legend(handles=[patch1], loc = 'best')

plt.bar(act_funcs, scores, width = .8, color = color)
plt.xlabel('Activation Function')
plt.ylabel('Loss Score')
plt.title('Loss Scores For 4 Layer Neural Networks with 15 Neurons Each, Varying Acti')
plt.show()

```

Loss Scores For 4 Layer Neural Networks with 15 Neurons Each, Varying Activation Functions



Judging from the above graph and printout, the sigmoid activation function performs best

2.0.4 Step 4. Determine optimal optimizer

```

In [40]: optimizers = ['SGD', 'RMSprop', 'Adadelata', 'Adamax']

scores = []

act = 'sigmoid'

### SGD ###
model = Sequential()

model.add(Dense(n, input_dim=11, activation=act)) #sigmoid, relu

model.add(Dense(1, activation=act))

sgd = SGD(lr=0.1)

```

```

model.compile(loss='binary_crossentropy', optimizer='sgd')

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### RMSprop ###
model = Sequential()

model.add(Dense(n, input_dim=11, activation=act)) #sigmoid, relu
model.add(Dense(1, activation=act))

rmsp = RMSprop(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer= rmsp)

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Adadelta ###
model = Sequential()

model.add(Dense(n, input_dim=11, activation=act)) #sigmoid, relu

model.add(Dense(1, activation=act))

adad = Adadelta(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer= adad)

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

### Adamax ###
model = Sequential()

model.add(Dense(n, input_dim=11, activation=act)) #sigmoid, relu

model.add(Dense(1, activation=act))

```

```

amax = Adamax(lr=0.1)
model.compile(loss='binary_crossentropy', optimizer= amax)

model.fit(X, y, batch_size=100, epochs=200) #160/4 = 40 per epoch
#print(model.predict_proba(X).reshape(4*n))

# evaluate the model
scores.append(model.evaluate(X, y))

```

```

Epoch 1/200
22868/22868 [=====] - 1s 53us/step - loss: 0.7190
Epoch 2/200
22868/22868 [=====] - 0s 15us/step - loss: 0.7009
Epoch 3/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6946
Epoch 4/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6902
Epoch 5/200
22868/22868 [=====] - 0s 14us/step - loss: 0.6868
Epoch 6/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6832
Epoch 7/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6795
Epoch 8/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6750
Epoch 9/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6691
Epoch 10/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6609
Epoch 11/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6500
Epoch 12/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6362
Epoch 13/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6205
Epoch 14/200
22868/22868 [=====] - 0s 15us/step - loss: 0.6059
Epoch 15/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5943
Epoch 16/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5830
Epoch 17/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5768
Epoch 18/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5654
Epoch 19/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5593
Epoch 20/200

```

22868/22868 [=====] - 0s 15us/step - loss: 0.5565
 Epoch 21/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5473
 Epoch 22/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5386
 Epoch 23/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5397
 Epoch 24/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5324
 Epoch 25/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5315
 Epoch 26/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5261
 Epoch 27/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5289
 Epoch 28/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5257
 Epoch 29/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5200
 Epoch 30/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5165
 Epoch 31/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5192
 Epoch 32/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5184
 Epoch 33/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5166
 Epoch 34/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5135
 Epoch 35/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5147
 Epoch 36/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5150
 Epoch 37/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5141
 Epoch 38/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5104
 Epoch 39/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5107
 Epoch 40/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5099
 Epoch 41/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5160
 Epoch 42/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5130
 Epoch 43/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5173
 Epoch 44/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5124
Epoch 45/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5117
Epoch 46/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5097
Epoch 47/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5097
Epoch 48/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5072
Epoch 49/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5107
Epoch 50/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5093
Epoch 51/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5076
Epoch 52/200
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Epoch 53/200
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Epoch 55/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5086
Epoch 56/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5092
Epoch 57/200
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Epoch 58/200
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22868/22868 [=====] - 0s 15us/step - loss: 0.5082
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5081
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5109
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5044
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22868/22868 [=====] - 0s 15us/step - loss: 0.5024
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5058
 Epoch 142/200
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 Epoch 143/200
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5035
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 Epoch 147/200
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 22868/22868 [=====] - 0s 15us/step - loss: 0.5032
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 Epoch 151/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5054
 Epoch 152/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5105
 Epoch 153/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5068
 Epoch 154/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5055
 Epoch 155/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5070
 Epoch 156/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5044
 Epoch 157/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5058
 Epoch 158/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5033
 Epoch 159/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5036
 Epoch 160/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5050
 Epoch 161/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5059
 Epoch 162/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5056
 Epoch 163/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5042
 Epoch 164/200

22868/22868 [=====] - 0s 15us/step - loss: 0.4998
Epoch 165/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5050
Epoch 166/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5014
Epoch 167/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5060
Epoch 168/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5064
Epoch 169/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5023
Epoch 170/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5045
Epoch 171/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5050
Epoch 172/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5027
Epoch 173/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5051
Epoch 174/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5032
Epoch 175/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5068
Epoch 176/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5030
Epoch 177/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5022
Epoch 178/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5025
Epoch 179/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5045
Epoch 180/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5023
Epoch 181/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5012
Epoch 182/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5025
Epoch 183/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5034
Epoch 184/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5064
Epoch 185/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5033
Epoch 186/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5018
Epoch 187/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5045
Epoch 188/200

22868/22868 [=====] - 0s 15us/step - loss: 0.5055
 Epoch 189/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5062
 Epoch 190/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5081
 Epoch 191/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5050
 Epoch 192/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5039
 Epoch 193/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5019
 Epoch 194/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5009
 Epoch 195/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5043
 Epoch 196/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5080
 Epoch 197/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5013
 Epoch 198/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5074
 Epoch 199/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5040
 Epoch 200/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5046
 22868/22868 [=====] - 1s 61us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 55us/step - loss: 0.6472
 Epoch 2/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5903
 Epoch 3/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.5750
 Epoch 4/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.5689
 Epoch 5/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.5640
 Epoch 6/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5618
 Epoch 7/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.5573
 Epoch 8/200
 22868/22868 [=====] - 0s 15us/step - loss: 0.5601
 Epoch 9/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.5656
 Epoch 10/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.5550
 Epoch 11/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.5528

Epoch 12/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5555
Epoch 13/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5559
Epoch 14/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5547
Epoch 15/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5513
Epoch 16/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5531
Epoch 17/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5518
Epoch 18/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5513
Epoch 19/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5473
Epoch 20/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5486
Epoch 21/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5539
Epoch 22/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5512
Epoch 23/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5509
Epoch 24/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5516
Epoch 25/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5496
Epoch 26/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5625
Epoch 27/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5526
Epoch 28/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5468
Epoch 29/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5556
Epoch 30/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5519
Epoch 31/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5506
Epoch 32/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5521
Epoch 33/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5490
Epoch 34/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5479
Epoch 35/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5501

Epoch 36/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5498
Epoch 37/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5498
Epoch 38/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5511
Epoch 39/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5518
Epoch 40/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5498
Epoch 41/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5465
Epoch 42/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5511
Epoch 43/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5584
Epoch 44/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5490
Epoch 45/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5482
Epoch 46/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5437
Epoch 47/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5517
Epoch 48/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5468
Epoch 49/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5465
Epoch 50/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5467
Epoch 51/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5508
Epoch 52/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5473
Epoch 53/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5486
Epoch 54/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5447
Epoch 55/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5536
Epoch 56/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5416
Epoch 57/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5436
Epoch 58/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5472
Epoch 59/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5465

Epoch 60/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5437
Epoch 61/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5551
Epoch 62/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5538
Epoch 63/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5454
Epoch 64/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5496
Epoch 65/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5455
Epoch 66/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5449
Epoch 67/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5450
Epoch 68/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5495
Epoch 69/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5594
Epoch 70/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5534
Epoch 71/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5538
Epoch 72/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5429
Epoch 73/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5469
Epoch 74/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5493
Epoch 75/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5473
Epoch 76/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5463
Epoch 77/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5512
Epoch 78/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5470
Epoch 79/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5522
Epoch 80/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5496
Epoch 81/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5465
Epoch 82/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5463
Epoch 83/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5456

Epoch 84/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5431
Epoch 85/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5420
Epoch 86/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5473
Epoch 87/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5468
Epoch 88/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5469
Epoch 89/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5553
Epoch 90/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5486
Epoch 91/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5539
Epoch 92/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5459
Epoch 93/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5494
Epoch 94/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5531
Epoch 95/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5553
Epoch 96/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5538
Epoch 97/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5462
Epoch 98/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5497
Epoch 99/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5446
Epoch 100/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5466
Epoch 101/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5453
Epoch 102/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5445
Epoch 103/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5568
Epoch 104/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5436
Epoch 105/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5491
Epoch 106/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5441
Epoch 107/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5477

Epoch 108/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5508
Epoch 109/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5565
Epoch 110/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5460
Epoch 111/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5546
Epoch 112/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5408
Epoch 113/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5446
Epoch 114/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5457
Epoch 115/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5412
Epoch 116/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5437
Epoch 117/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5442
Epoch 118/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5485
Epoch 119/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5445
Epoch 120/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5424
Epoch 121/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5422
Epoch 122/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5444
Epoch 123/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5473
Epoch 124/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5439
Epoch 125/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5446
Epoch 126/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5466
Epoch 127/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5422
Epoch 128/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5501
Epoch 129/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5474
Epoch 130/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5438
Epoch 131/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5490

Epoch 132/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5497
Epoch 133/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5440
Epoch 134/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5451
Epoch 135/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5477
Epoch 136/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5474
Epoch 137/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5492
Epoch 138/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5458
Epoch 139/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5415
Epoch 140/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5439
Epoch 141/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5438
Epoch 142/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5478
Epoch 143/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5462
Epoch 144/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5455
Epoch 145/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5432
Epoch 146/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5481
Epoch 147/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5460
Epoch 148/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5398
Epoch 149/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5418
Epoch 150/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5459
Epoch 151/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5414
Epoch 152/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5386
Epoch 153/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5452
Epoch 154/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5408
Epoch 155/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5392

Epoch 156/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5406
Epoch 157/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5477
Epoch 158/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5626
Epoch 159/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5446
Epoch 160/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5466
Epoch 161/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5464
Epoch 162/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5423
Epoch 163/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5448
Epoch 164/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5443
Epoch 165/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5442
Epoch 166/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5497
Epoch 167/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5446
Epoch 168/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5527
Epoch 169/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5452
Epoch 170/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5535
Epoch 171/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5453
Epoch 172/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5433
Epoch 173/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5460
Epoch 174/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5569
Epoch 175/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5440
Epoch 176/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5462
Epoch 177/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5440
Epoch 178/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5454
Epoch 179/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5436

Epoch 180/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5558
Epoch 181/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5435
Epoch 182/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5526
Epoch 183/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5392
Epoch 184/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5420
Epoch 185/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5653
Epoch 186/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5443
Epoch 187/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5446
Epoch 188/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5430
Epoch 189/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5467
Epoch 190/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5399
Epoch 191/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5486
Epoch 192/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5576
Epoch 193/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5445
Epoch 194/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5456
Epoch 195/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5420
Epoch 196/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5539
Epoch 197/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5418
Epoch 198/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5397
Epoch 199/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5445
Epoch 200/200
22868/22868 [=====] - 0s 15us/step - loss: 0.5503
22868/22868 [=====] - 1s 60us/step
Epoch 1/200
22868/22868 [=====] - 1s 58us/step - loss: 0.6965
Epoch 2/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6941
Epoch 3/200

22868/22868 [=====] - 0s 16us/step - loss: 0.6925
Epoch 4/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6911
Epoch 5/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6897
Epoch 6/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6883
Epoch 7/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6870
Epoch 8/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6857
Epoch 9/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6845
Epoch 10/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6833
Epoch 11/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6820
Epoch 12/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6808
Epoch 13/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6795
Epoch 14/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6782
Epoch 15/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6768
Epoch 16/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6753
Epoch 17/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6738
Epoch 18/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6722
Epoch 19/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6706
Epoch 20/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6688
Epoch 21/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6670
Epoch 22/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6650
Epoch 23/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6630
Epoch 24/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6608
Epoch 25/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6585
Epoch 26/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6560
Epoch 27/200

22868/22868 [=====] - 0s 17us/step - loss: 0.6535
 Epoch 28/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6509
 Epoch 29/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6482
 Epoch 30/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6454
 Epoch 31/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6424
 Epoch 32/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6393
 Epoch 33/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6360
 Epoch 34/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6327
 Epoch 35/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6293
 Epoch 36/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6258
 Epoch 37/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6222
 Epoch 38/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6185
 Epoch 39/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6147
 Epoch 40/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6111
 Epoch 41/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6074
 Epoch 42/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.6035
 Epoch 43/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5996
 Epoch 44/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.5957
 Epoch 45/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5918
 Epoch 46/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5879
 Epoch 47/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5840
 Epoch 48/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5801
 Epoch 49/200
 22868/22868 [=====] - 0s 19us/step - loss: 0.5761
 Epoch 50/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.5722
 Epoch 51/200

22868/22868 [=====] - 0s 18us/step - loss: 0.5681
Epoch 52/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5641
Epoch 53/200
22868/22868 [=====] - 1s 23us/step - loss: 0.5600
Epoch 54/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5560
Epoch 55/200
22868/22868 [=====] - 0s 19us/step - loss: 0.5520
Epoch 56/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5481
Epoch 57/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5443
Epoch 58/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5406
Epoch 59/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5370
Epoch 60/200
22868/22868 [=====] - 0s 18us/step - loss: 0.5337
Epoch 61/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5305
Epoch 62/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5275
Epoch 63/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5247
Epoch 64/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5220
Epoch 65/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5195
Epoch 66/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5171
Epoch 67/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5149
Epoch 68/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5128
Epoch 69/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5108
Epoch 70/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5090
Epoch 71/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5073
Epoch 72/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5056
Epoch 73/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5040
Epoch 74/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5026
Epoch 75/200

22868/22868 [=====] - 0s 17us/step - loss: 0.5012
 Epoch 76/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.5000
 Epoch 77/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4988
 Epoch 78/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4977
 Epoch 79/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4966
 Epoch 80/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4956
 Epoch 81/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4947
 Epoch 82/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4939
 Epoch 83/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.4930
 Epoch 84/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4923
 Epoch 85/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4915
 Epoch 86/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4908
 Epoch 87/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4902
 Epoch 88/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.4897
 Epoch 89/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4890
 Epoch 90/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.4885
 Epoch 91/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4881
 Epoch 92/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4876
 Epoch 93/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4872
 Epoch 94/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4868
 Epoch 95/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4863
 Epoch 96/200
 22868/22868 [=====] - 0s 18us/step - loss: 0.4860
 Epoch 97/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4856
 Epoch 98/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4852
 Epoch 99/200

22868/22868 [=====] - 0s 17us/step - loss: 0.4850
Epoch 100/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4845
Epoch 101/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4843
Epoch 102/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4840
Epoch 103/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4837
Epoch 104/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4834
Epoch 105/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4832
Epoch 106/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4829
Epoch 107/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4827
Epoch 108/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4826
Epoch 109/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4823
Epoch 110/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4821
Epoch 111/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4818
Epoch 112/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4817
Epoch 113/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4814
Epoch 114/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4814
Epoch 115/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4812
Epoch 116/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4810
Epoch 117/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4808
Epoch 118/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4806
Epoch 119/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4806
Epoch 120/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4804
Epoch 121/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4802
Epoch 122/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4802
Epoch 123/200

22868/22868 [=====] - 0s 16us/step - loss: 0.4800
Epoch 124/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4798
Epoch 125/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4798
Epoch 126/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4797
Epoch 127/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4795
Epoch 128/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4794
Epoch 129/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4792
Epoch 130/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4791
Epoch 131/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4790
Epoch 132/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4789
Epoch 133/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4788
Epoch 134/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4787
Epoch 135/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4786
Epoch 136/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4785
Epoch 137/200
22868/22868 [=====] - 0s 18us/step - loss: 0.4784
Epoch 138/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4784
Epoch 139/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4783
Epoch 140/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4781
Epoch 141/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4780
Epoch 142/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4779
Epoch 143/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4779
Epoch 144/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4778
Epoch 145/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4777
Epoch 146/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4776
Epoch 147/200

22868/22868 [=====] - 0s 17us/step - loss: 0.4775
Epoch 148/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4775
Epoch 149/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4774
Epoch 150/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4773
Epoch 151/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4772
Epoch 152/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4771
Epoch 153/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4771
Epoch 154/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4770
Epoch 155/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4769
Epoch 156/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4768
Epoch 157/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4768
Epoch 158/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4767
Epoch 159/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4766
Epoch 160/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4766
Epoch 161/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4765
Epoch 162/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4764
Epoch 163/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4763
Epoch 164/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4763
Epoch 165/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4762
Epoch 166/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4762
Epoch 167/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4761
Epoch 168/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4760
Epoch 169/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4759
Epoch 170/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4758
Epoch 171/200

22868/22868 [=====] - 0s 17us/step - loss: 0.4758
Epoch 172/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4758
Epoch 173/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4757
Epoch 174/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4756
Epoch 175/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4755
Epoch 176/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4756
Epoch 177/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4754
Epoch 178/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4754
Epoch 179/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4753
Epoch 180/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4753
Epoch 181/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4752
Epoch 182/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4751
Epoch 183/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4749
Epoch 184/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4749
Epoch 185/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4749
Epoch 186/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4749
Epoch 187/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4748
Epoch 188/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4747
Epoch 189/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4746
Epoch 190/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4745
Epoch 191/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4745
Epoch 192/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4744
Epoch 193/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4742
Epoch 194/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4743
Epoch 195/200

22868/22868 [=====] - 0s 17us/step - loss: 0.4742
 Epoch 196/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4741
 Epoch 197/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4740
 Epoch 198/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4739
 Epoch 199/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.4739
 Epoch 200/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.4738
 22868/22868 [=====] - 1s 60us/step
 Epoch 1/200
 22868/22868 [=====] - 1s 57us/step - loss: 0.6970
 Epoch 2/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6957
 Epoch 3/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6961
 Epoch 4/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6952
 Epoch 5/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6954
 Epoch 6/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6955
 Epoch 7/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6945
 Epoch 8/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6957
 Epoch 9/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6954
 Epoch 10/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6947
 Epoch 11/200
 22868/22868 [=====] - 0s 16us/step - loss: 0.6960
 Epoch 12/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6954
 Epoch 13/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6960
 Epoch 14/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6964
 Epoch 15/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6962
 Epoch 16/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6960
 Epoch 17/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6955
 Epoch 18/200
 22868/22868 [=====] - 0s 17us/step - loss: 0.6947

Epoch 19/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6955
Epoch 20/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6964
Epoch 21/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6942
Epoch 22/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6966
Epoch 23/200
22868/22868 [=====] - 0s 16us/step - loss: 0.6953
Epoch 24/200
22868/22868 [=====] - 0s 17us/step - loss: 0.6949
Epoch 25/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5656
Epoch 26/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5175
Epoch 27/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5209
Epoch 28/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5336
Epoch 29/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5297
Epoch 30/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5321
Epoch 31/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5217
Epoch 32/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5222
Epoch 33/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5233
Epoch 34/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5251
Epoch 35/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5303
Epoch 36/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5203
Epoch 37/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5225
Epoch 38/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5242
Epoch 39/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5263
Epoch 40/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5226
Epoch 41/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5332
Epoch 42/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5214

Epoch 43/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5252
Epoch 44/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5207
Epoch 45/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5170
Epoch 46/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5120
Epoch 47/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4922
Epoch 48/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4931
Epoch 49/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4955
Epoch 50/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4974
Epoch 51/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4923
Epoch 52/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4937
Epoch 53/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4900
Epoch 54/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4916
Epoch 55/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4932
Epoch 56/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4946
Epoch 57/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4945
Epoch 58/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4946
Epoch 59/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4964
Epoch 60/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4990
Epoch 61/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4993
Epoch 62/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4934
Epoch 63/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4979
Epoch 64/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4952
Epoch 65/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4966
Epoch 66/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4918

Epoch 67/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4950
Epoch 68/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4988
Epoch 69/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4913
Epoch 70/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4949
Epoch 71/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4970
Epoch 72/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5085
Epoch 73/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5057
Epoch 74/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5067
Epoch 75/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5028
Epoch 76/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4973
Epoch 77/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5014
Epoch 78/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4953
Epoch 79/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4964
Epoch 80/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4972
Epoch 81/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4982
Epoch 82/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4915
Epoch 83/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4970
Epoch 84/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4960
Epoch 85/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4928
Epoch 86/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4989
Epoch 87/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4974
Epoch 88/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4985
Epoch 89/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4962
Epoch 90/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4954

Epoch 91/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4974
Epoch 92/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4984
Epoch 93/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5003
Epoch 94/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4975
Epoch 95/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4927
Epoch 96/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4952
Epoch 97/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4932
Epoch 98/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4956
Epoch 99/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4964
Epoch 100/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4936
Epoch 101/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4970
Epoch 102/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5037
Epoch 103/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4945
Epoch 104/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5002
Epoch 105/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4954
Epoch 106/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5016
Epoch 107/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4935
Epoch 108/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4945
Epoch 109/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4989
Epoch 110/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4906
Epoch 111/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4997
Epoch 112/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4892
Epoch 113/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4915
Epoch 114/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5024

Epoch 115/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4946
Epoch 116/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4971
Epoch 117/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5005
Epoch 118/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5003
Epoch 119/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5010
Epoch 120/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4944
Epoch 121/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4953
Epoch 122/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4967
Epoch 123/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4954
Epoch 124/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4944
Epoch 125/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4953
Epoch 126/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4912
Epoch 127/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4941
Epoch 128/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4951
Epoch 129/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4935
Epoch 130/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4957
Epoch 131/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4914
Epoch 132/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4997
Epoch 133/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4941
Epoch 134/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4955
Epoch 135/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4996
Epoch 136/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4957
Epoch 137/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4960
Epoch 138/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4946

Epoch 139/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4937
Epoch 140/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5020
Epoch 141/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4931
Epoch 142/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4954
Epoch 143/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5026
Epoch 144/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4984
Epoch 145/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4950
Epoch 146/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4890
Epoch 147/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4888
Epoch 148/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4924
Epoch 149/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4899
Epoch 150/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4939
Epoch 151/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4911
Epoch 152/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4946
Epoch 153/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4930
Epoch 154/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4976
Epoch 155/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4945
Epoch 156/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4937
Epoch 157/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4926
Epoch 158/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4953
Epoch 159/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4963
Epoch 160/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4960
Epoch 161/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4936
Epoch 162/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4943

Epoch 163/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4949
Epoch 164/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5012
Epoch 165/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4940
Epoch 166/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4979
Epoch 167/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4975
Epoch 168/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4919
Epoch 169/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4911
Epoch 170/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4905
Epoch 171/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4936
Epoch 172/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5037
Epoch 173/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4960
Epoch 174/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4949
Epoch 175/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4903
Epoch 176/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4926
Epoch 177/200
22868/22868 [=====] - 0s 17us/step - loss: 0.5032
Epoch 178/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4903
Epoch 179/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4914
Epoch 180/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4917
Epoch 181/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4940
Epoch 182/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4933
Epoch 183/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4883
Epoch 184/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4995
Epoch 185/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4954
Epoch 186/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4949

```

Epoch 187/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4912
Epoch 188/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4970
Epoch 189/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4957
Epoch 190/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4983
Epoch 191/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4910
Epoch 192/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4952
Epoch 193/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4954
Epoch 194/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4911
Epoch 195/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4923
Epoch 196/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4931
Epoch 197/200
22868/22868 [=====] - 0s 16us/step - loss: 0.5028
Epoch 198/200
22868/22868 [=====] - 0s 16us/step - loss: 0.4946
Epoch 199/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4989
Epoch 200/200
22868/22868 [=====] - 0s 17us/step - loss: 0.4913
22868/22868 [=====] - 1s 63us/step

```

```
In [41]: color = []
```

```

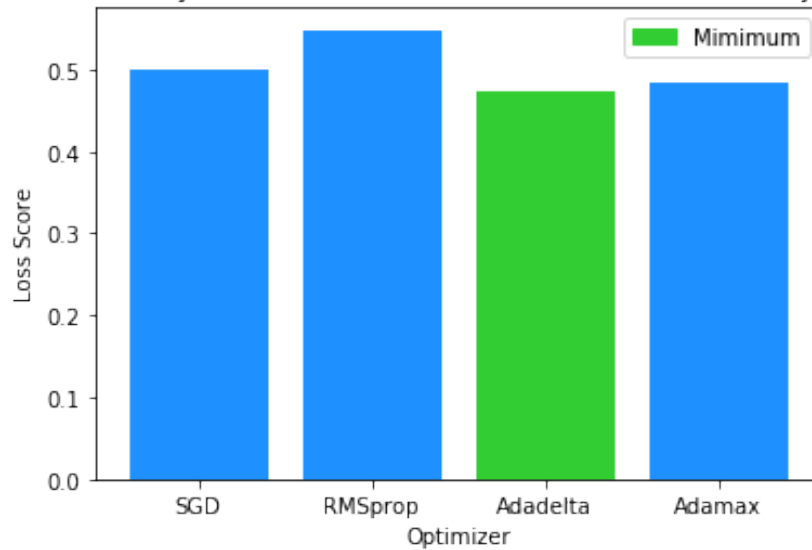
    for score in scores:
        if score == min(scores):
            color.append('limegreen')
        else:
            color.append('dodgerblue')

    patch1 = mpatches.Patch(color='limegreen', label='Mimimum')
    plt.legend(handles=[patch1], loc = 'best')

    plt.bar(optimizers, scores, width = .8, color = color)
    plt.xlabel('Optimizer')
    plt.ylabel('Loss Score')
    plt.title('Loss Scores For 4 Layer Neural Networks with 15 Neurons Each, Varying Optimizers')
    plt.show()

```

Loss Scores For 4 Layer Neural Networks with 15 Neurons Each, Varying Optimizers



Looking at the graph above, the Adadelata optimizer produces the best loss score.

2.0.5 Final Thoughts

Overall, I am a little disappointed that the model didn't perform better. I wanted to use large batch sizes and small epochs to speed up the process, and am wondering if that contributed to the loss score not being lower. Additionally, I wonder if using larger ranges for optimizing the number of layers and neurons would have improved model performance as well.