

Week 3 Programming Assignment-COMPLETED

May 18, 2021

1 Programming Assignment

1.1 Model validation on the Iris dataset

1.1.1 Instructions

In this notebook, you will build, compile and fit a neural network model to the Iris dataset. You will also implement validation, regularisation and callbacks to improve your model.

Some code cells are provided you in the notebook. You should avoid editing provided code, and make sure to execute the cells in order to avoid unexpected errors. Some cells begin with the line:

```
#### GRADED CELL ####
```

Don't move or edit this first line - this is what the automatic grader looks for to recognise graded cells. These cells require you to write your own code to complete them, and are automatically graded when you submit the notebook. Don't edit the function name or signature provided in these cells, otherwise the automatic grader might not function properly. Inside these graded cells, you can use any functions or classes that are imported below, but make sure you don't use any variables that are outside the scope of the function.

1.1.2 How to submit

Complete all the tasks you are asked for in the worksheet. When you have finished and are happy with your code, press the **Submit Assignment** button at the top of this notebook.

1.1.3 Let's get started!

We'll start running some imports, and loading the dataset. Do not edit the existing imports in the following cell. If you would like to make further Tensorflow imports, you should add them here.

```
[1]: ##### PACKAGE IMPORTS #####

# Run this cell first to import all required packages. Do not make any imports_
↳ elsewhere in the notebook
from numpy.random import seed
seed(8)
import tensorflow as tf
import numpy as np
import matplotlib.pyplot as plt
from sklearn import datasets, model_selection
```

```
%matplotlib inline

# If you would like to make further imports from tensorflow, add them here

from tensorflow.keras.layers import Dense, Conv2D, MaxPooling2D, Softmax,
↳BatchNormalization, Dropout
from tensorflow.keras import initializers, regularizers
from tensorflow.keras import callbacks
```

```
[2]: print(tf.__version__)
```

2.4.1

The Iris dataset In this assignment, you will use the [Iris dataset](#). It consists of 50 samples from each of three species of Iris (Iris setosa, Iris virginica and Iris versicolor). Four features were measured from each sample: the length and the width of the sepals and petals, in centimeters. For a reference, see the following papers:

- R. A. Fisher. “The use of multiple measurements in taxonomic problems”. Annals of Eugenics. 7 (2): 179–188, 1936.

Your goal is to construct a neural network that classifies each sample into the correct class, as well as applying validation and regularisation techniques.

Load and preprocess the data First read in the Iris dataset using `datasets.load_iris()`, and split the dataset into training and test sets.

```
[3]: ##### GRADED CELL #####

# Complete the following function.
# Make sure to not change the function name or arguments.

def read_in_and_split_data(iris_data):
    """
    This function takes the Iris dataset as loaded by sklearn.datasets.
    ↳load_iris(), and then
    splits so that the training set includes 90% of the full dataset, with the
    ↳test set
    making up the remaining 10%.
    Your function should return a tuple (train_data, test_data, train_targets,
    ↳test_targets)
    of appropriately split training and test data and targets.

    If you would like to import any further packages to aid you in this task,
    ↳please do so in the
    Package Imports cell above.
    """
```

```
[5]: # Run your function to generate the test and training data.
```

```
iris_data = datasets.load_iris()
train_data, test_data, train_targets, test_targets = _
→read_in_and_split_data(iris_data)
train_targets, test_targets, iris_data['target']
train_data
```

```
[5]: array([[7.2, 3. , 5.8, 1.6],
           [5.6, 3. , 4.5, 1.5],
           [5. , 3. , 1.6, 0.2],
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           [6.6, 2.9, 4.6, 1.3],
           [5.9, 3. , 4.2, 1.5],
           [6.7, 3.1, 5.6, 2.4],
           [5.4, 3.9, 1.3, 0.4],
           [6.8, 3.2, 5.9, 2.3],
           [5.5, 2.3, 4. , 1.3],
           [5.8, 2.8, 5.1, 2.4],
           [7.7, 2.6, 6.9, 2.3],
           [4.6, 3.1, 1.5, 0.2],
           [5.7, 2.5, 5. , 2. ],
           [4.3, 3. , 1.1, 0.1],
           [6.2, 2.9, 4.3, 1.3],
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           [5.5, 2.5, 4. , 1.3],
           [5.7, 3.8, 1.7, 0.3],
           [4.6, 3.6, 1. , 0.2],
           [6.4, 2.8, 5.6, 2.2],
           [5.2, 2.7, 3.9, 1.4],
           [6.5, 3.2, 5.1, 2. ],
           [6. , 2.9, 4.5, 1.5],
           [6.1, 3. , 4.6, 1.4],
           [5.7, 2.6, 3.5, 1. ],
           [6.3, 3.4, 5.6, 2.4],
           [6.9, 3.2, 5.7, 2.3],
           [7.4, 2.8, 6.1, 1.9],
           [6.5, 2.8, 4.6, 1.5],
           [7.1, 3. , 5.9, 2.1],
           [5.4, 3.7, 1.5, 0.2],
           [5. , 2.3, 3.3, 1. ],
           [4.9, 3.6, 1.4, 0.1],
           [7.3, 2.9, 6.3, 1.8],
```

[6.6, 3. , 4.4, 1.4],
[6.9, 3.1, 4.9, 1.5],
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[6.4, 3.1, 5.5, 1.8],
[5.8, 2.7, 5.1, 1.9],
[7.6, 3. , 6.6, 2.1],
[6.3, 2.9, 5.6, 1.8],
[4.9, 3.1, 1.5, 0.2],
[5.7, 3. , 4.2, 1.2],
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[5. , 3.6, 1.4, 0.2],
[4.8, 3.4, 1.6, 0.2],
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[5. , 3.3, 1.4, 0.2],
[4.4, 2.9, 1.4, 0.2],
[5.1, 3.3, 1.7, 0.5],
[4.5, 2.3, 1.3, 0.3],
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[4.4, 3.2, 1.3, 0.2],
[6.5, 3. , 5.5, 1.8],
[5. , 3.5, 1.6, 0.6],
[6.7, 3.3, 5.7, 2.1],

[6.2, 2.8, 4.8, 1.8],
 [5.9, 3. , 5.1, 1.8],
 [4.4, 3. , 1.3, 0.2],
 [6. , 2.7, 5.1, 1.6],
 [5.8, 2.7, 3.9, 1.2],
 [6.4, 2.7, 5.3, 1.9],
 [5.8, 4. , 1.2, 0.2],
 [6. , 2.2, 5. , 1.5],
 [4.9, 3. , 1.4, 0.2],
 [4.8, 3. , 1.4, 0.3],
 [5.4, 3.9, 1.7, 0.4],
 [5.4, 3.4, 1.7, 0.2],
 [7.9, 3.8, 6.4, 2.],
 [5.1, 3.5, 1.4, 0.2],
 [6.7, 3.1, 4.7, 1.5],
 [5.1, 3.5, 1.4, 0.3],
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 [5.5, 3.5, 1.3, 0.2],
 [5.1, 3.7, 1.5, 0.4],
 [5.2, 4.1, 1.5, 0.1],
 [5.6, 3. , 4.1, 1.3],
 [4.9, 2.4, 3.3, 1.],
 [6.5, 3. , 5.8, 2.2],
 [6.3, 2.5, 5. , 1.9],
 [6.7, 3.1, 4.4, 1.4],
 [5.5, 4.2, 1.4, 0.2],
 [6. , 3.4, 4.5, 1.6],
 [6.8, 2.8, 4.8, 1.4],
 [5.1, 3.4, 1.5, 0.2],
 [6.1, 2.6, 5.6, 1.4],
 [6.7, 3. , 5.2, 2.3],
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 [6.4, 2.8, 5.6, 2.1],
 [5.6, 2.9, 3.6, 1.3],
 [4.8, 3.4, 1.9, 0.2],
 [6. , 3. , 4.8, 1.8],
 [5.7, 2.9, 4.2, 1.3],
 [5.8, 2.6, 4. , 1.2],
 [4.6, 3.2, 1.4, 0.2],
 [5.1, 3.8, 1.5, 0.3],
 [6.1, 2.8, 4.7, 1.2],
 [6.2, 3.4, 5.4, 2.3],
 [5.2, 3.5, 1.5, 0.2],
 [6.4, 2.9, 4.3, 1.3],
 [4.6, 3.4, 1.4, 0.3],
 [5.7, 2.8, 4.1, 1.3],

```
[4.7, 3.2, 1.6, 0.2],
[7.7, 2.8, 6.7, 2. ]])
```

We will now convert the training and test targets using a one hot encoder.

```
[8]: # Convert targets to a one-hot encoding

train_targets = tf.keras.utils.to_categorical(np.array(train_targets))
test_targets = tf.keras.utils.to_categorical(np.array(test_targets))
```

Build the neural network model You can now construct a model to fit to the data. Using the Sequential API, build your model according to the following specifications:

- The model should use the `input_shape` in the function argument to set the input size in the first layer.
- The first layer should be a dense layer with 64 units.
- The weights of the first layer should be initialised with the He uniform initializer.
- The biases of the first layer should be all initially equal to one.
- There should then be a further four dense layers, each with 128 units.
- This should be followed with four dense layers, each with 64 units.
- All of these Dense layers should use the ReLU activation function.
- The output Dense layer should have 3 units and the softmax activation function.

In total, the network should have 10 layers.

```
[26]: ##### GRADED CELL #####

# Complete the following function.
# Make sure to not change the function name or arguments.

def get_model(input_shape):
    """
    This function should build a Sequential model according to the above
    → specification. Ensure the
    weights are initialised by providing the input_shape argument in the first
    → layer, given by the
    function argument.
    Your function should return the model.
    """
```

```
[21]: # Run your function to get the model

model = get_model(train_data[0].shape)
model.summary()
```

Model: "sequential_3"

Layer (type)	Output Shape	Param #
dense_30 (Dense)	(None, 64)	320
dense_31 (Dense)	(None, 128)	8320
dense_32 (Dense)	(None, 128)	16512
dense_33 (Dense)	(None, 128)	16512
dense_34 (Dense)	(None, 128)	16512
dense_35 (Dense)	(None, 64)	8256
dense_36 (Dense)	(None, 64)	4160
dense_37 (Dense)	(None, 64)	4160
dense_38 (Dense)	(None, 64)	4160
dense_39 (Dense)	(None, 3)	195

Total params: 79,107
 Trainable params: 79,107
 Non-trainable params: 0

Compile the model You should now compile the model using the `compile` method. Remember that you need to specify an optimizer, a loss function and a metric to judge the performance of your model.

```
[22]: ##### GRADED CELL #####

# Complete the following function.
# Make sure to not change the function name or arguments.

def compile_model(model):
    """
    This function takes in the model returned from your get_model function, and
    →compiles it with an optimiser,
    loss function and metric.
    Compile the model using the Adam optimiser (with learning rate set to 0.
    →0001),
    the categorical crossentropy loss function and accuracy as the only metric.
    Your function doesn't need to return anything; the model will be compiled
    →in-place.
    """
```

```
[23]: # Run your function to compile the model
```

```
compile_model(model)
```

Fit the model to the training data Now you should train the model on the Iris dataset, using the model's `fit` method. * Run the training for a fixed number of epochs, given by the function's `epochs` argument. * Return the training history to be used for plotting the learning curves. * Set the batch size to 40. * Set the validation set to be 15% of the training set.

```
[27]: ##### GRADED CELL #####
```

```
# Complete the following function.
```

```
# Make sure to not change the function name or arguments.
```

```
def train_model(model, train_data, train_targets, epochs):
```

```
    """
```

```
    This function should train the model for the given number of epochs on the  
train_data and train_targets.
```

```
    Your function should return the training history, as returned by model.fit.
```

```
    """
```

Run the following cell to run the training for 800 epochs.

```
[28]: # Run your function to train the model
```

```
history = train_model(model, train_data, train_targets, epochs=800)
```

Train on 114 samples, validate on 21 samples

Epoch 1/800

114/114 [=====] - 1s 5ms/sample - loss: 3.9904e-04 -
accuracy: 1.0000 - val_loss: 1.7613e-05 - val_accuracy: 1.0000

Epoch 2/800

114/114 [=====] - 0s 876us/sample - loss: 4.1455e-04 -
accuracy: 1.0000 - val_loss: 1.9946e-05 - val_accuracy: 1.0000

Epoch 3/800

114/114 [=====] - 0s 896us/sample - loss: 3.3048e-04 -
accuracy: 1.0000 - val_loss: 2.3350e-05 - val_accuracy: 1.0000

Epoch 4/800

114/114 [=====] - 0s 878us/sample - loss: 2.8980e-04 -
accuracy: 1.0000 - val_loss: 2.8990e-05 - val_accuracy: 1.0000

Epoch 5/800

114/114 [=====] - 0s 2ms/sample - loss: 3.1506e-04 -
accuracy: 1.0000 - val_loss: 3.6876e-05 - val_accuracy: 1.0000

Epoch 6/800

114/114 [=====] - 0s 955us/sample - loss: 3.2235e-04 -
accuracy: 1.0000 - val_loss: 3.6349e-05 - val_accuracy: 1.0000
Epoch 7/800

114/114 [=====] - 0s 895us/sample - loss: 3.1857e-04 -
accuracy: 1.0000 - val_loss: 3.4896e-05 - val_accuracy: 1.0000
Epoch 8/800

114/114 [=====] - 0s 915us/sample - loss: 3.0513e-04 -
accuracy: 1.0000 - val_loss: 2.9926e-05 - val_accuracy: 1.0000
Epoch 9/800

114/114 [=====] - 0s 850us/sample - loss: 2.9133e-04 -
accuracy: 1.0000 - val_loss: 2.5819e-05 - val_accuracy: 1.0000
Epoch 10/800

114/114 [=====] - 0s 2ms/sample - loss: 3.1343e-04 -
accuracy: 1.0000 - val_loss: 2.3220e-05 - val_accuracy: 1.0000
Epoch 11/800

114/114 [=====] - 0s 926us/sample - loss: 3.0736e-04 -
accuracy: 1.0000 - val_loss: 2.3691e-05 - val_accuracy: 1.0000
Epoch 12/800

114/114 [=====] - 0s 894us/sample - loss: 2.9844e-04 -
accuracy: 1.0000 - val_loss: 2.5359e-05 - val_accuracy: 1.0000
Epoch 13/800

114/114 [=====] - 0s 2ms/sample - loss: 3.0254e-04 -
accuracy: 1.0000 - val_loss: 2.9240e-05 - val_accuracy: 1.0000
Epoch 14/800

114/114 [=====] - 0s 901us/sample - loss: 2.9157e-04 -
accuracy: 1.0000 - val_loss: 2.9819e-05 - val_accuracy: 1.0000
Epoch 15/800

114/114 [=====] - 0s 884us/sample - loss: 2.9249e-04 -
accuracy: 1.0000 - val_loss: 2.9211e-05 - val_accuracy: 1.0000
Epoch 16/800

114/114 [=====] - 0s 2ms/sample - loss: 2.9040e-04 -
accuracy: 1.0000 - val_loss: 2.8865e-05 - val_accuracy: 1.0000
Epoch 17/800

114/114 [=====] - 0s 948us/sample - loss: 2.8904e-04 -
accuracy: 1.0000 - val_loss: 2.8661e-05 - val_accuracy: 1.0000
Epoch 18/800

114/114 [=====] - 0s 915us/sample - loss: 2.8638e-04 -
accuracy: 1.0000 - val_loss: 2.7515e-05 - val_accuracy: 1.0000
Epoch 19/800

114/114 [=====] - 0s 877us/sample - loss: 2.8993e-04 -
accuracy: 1.0000 - val_loss: 2.5682e-05 - val_accuracy: 1.0000
Epoch 20/800

114/114 [=====] - 0s 890us/sample - loss: 2.8685e-04 -
accuracy: 1.0000 - val_loss: 2.5410e-05 - val_accuracy: 1.0000
Epoch 21/800

114/114 [=====] - 0s 838us/sample - loss: 2.8518e-04 -
accuracy: 1.0000 - val_loss: 2.5069e-05 - val_accuracy: 1.0000
Epoch 22/800

114/114 [=====] - 0s 2ms/sample - loss: 2.8324e-04 -
accuracy: 1.0000 - val_loss: 2.5523e-05 - val_accuracy: 1.0000
Epoch 23/800
114/114 [=====] - 0s 889us/sample - loss: 2.8767e-04 -
accuracy: 1.0000 - val_loss: 2.7861e-05 - val_accuracy: 1.0000
Epoch 24/800
114/114 [=====] - 0s 885us/sample - loss: 2.8555e-04 -
accuracy: 1.0000 - val_loss: 2.8627e-05 - val_accuracy: 1.0000
Epoch 25/800
114/114 [=====] - 0s 947us/sample - loss: 2.8131e-04 -
accuracy: 1.0000 - val_loss: 2.7549e-05 - val_accuracy: 1.0000
Epoch 26/800
114/114 [=====] - 0s 875us/sample - loss: 2.7800e-04 -
accuracy: 1.0000 - val_loss: 2.6601e-05 - val_accuracy: 1.0000
Epoch 27/800
114/114 [=====] - 0s 918us/sample - loss: 2.7889e-04 -
accuracy: 1.0000 - val_loss: 2.5665e-05 - val_accuracy: 1.0000
Epoch 28/800
114/114 [=====] - 0s 877us/sample - loss: 2.7908e-04 -
accuracy: 1.0000 - val_loss: 2.5903e-05 - val_accuracy: 1.0000
Epoch 29/800
114/114 [=====] - 0s 874us/sample - loss: 2.9282e-04 -
accuracy: 1.0000 - val_loss: 2.3815e-05 - val_accuracy: 1.0000
Epoch 30/800
114/114 [=====] - 0s 987us/sample - loss: 2.8112e-04 -
accuracy: 1.0000 - val_loss: 2.4712e-05 - val_accuracy: 1.0000
Epoch 31/800
114/114 [=====] - 0s 885us/sample - loss: 2.7506e-04 -
accuracy: 1.0000 - val_loss: 2.6227e-05 - val_accuracy: 1.0000
Epoch 32/800
114/114 [=====] - 0s 893us/sample - loss: 2.7366e-04 -
accuracy: 1.0000 - val_loss: 2.6777e-05 - val_accuracy: 1.0000
Epoch 33/800
114/114 [=====] - 0s 968us/sample - loss: 2.7212e-04 -
accuracy: 1.0000 - val_loss: 2.6170e-05 - val_accuracy: 1.0000
Epoch 34/800
114/114 [=====] - 0s 881us/sample - loss: 2.7079e-04 -
accuracy: 1.0000 - val_loss: 2.5415e-05 - val_accuracy: 1.0000
Epoch 35/800
114/114 [=====] - 0s 907us/sample - loss: 2.7276e-04 -
accuracy: 1.0000 - val_loss: 2.4530e-05 - val_accuracy: 1.0000
Epoch 36/800
114/114 [=====] - 0s 871us/sample - loss: 2.6948e-04 -
accuracy: 1.0000 - val_loss: 2.4961e-05 - val_accuracy: 1.0000
Epoch 37/800
114/114 [=====] - 0s 976us/sample - loss: 2.7006e-04 -
accuracy: 1.0000 - val_loss: 2.4961e-05 - val_accuracy: 1.0000
Epoch 38/800

114/114 [=====] - 0s 905us/sample - loss: 2.7023e-04 -
 accuracy: 1.0000 - val_loss: 2.6096e-05 - val_accuracy: 1.0000
 Epoch 39/800
 114/114 [=====] - 0s 881us/sample - loss: 2.7087e-04 -
 accuracy: 1.0000 - val_loss: 2.5801e-05 - val_accuracy: 1.0000
 Epoch 40/800
 114/114 [=====] - 0s 2ms/sample - loss: 2.6616e-04 -
 accuracy: 1.0000 - val_loss: 2.4723e-05 - val_accuracy: 1.0000
 Epoch 41/800
 114/114 [=====] - 0s 947us/sample - loss: 2.6841e-04 -
 accuracy: 1.0000 - val_loss: 2.4025e-05 - val_accuracy: 1.0000
 Epoch 42/800
 114/114 [=====] - 0s 895us/sample - loss: 2.7240e-04 -
 accuracy: 1.0000 - val_loss: 2.4899e-05 - val_accuracy: 1.0000
 Epoch 43/800
 114/114 [=====] - 0s 891us/sample - loss: 2.6345e-04 -
 accuracy: 1.0000 - val_loss: 2.4763e-05 - val_accuracy: 1.0000
 Epoch 44/800
 114/114 [=====] - 0s 2ms/sample - loss: 2.6455e-04 -
 accuracy: 1.0000 - val_loss: 2.3651e-05 - val_accuracy: 1.0000
 Epoch 45/800
 114/114 [=====] - 0s 840us/sample - loss: 2.6765e-04 -
 accuracy: 1.0000 - val_loss: 2.2714e-05 - val_accuracy: 1.0000
 Epoch 46/800
 114/114 [=====] - 0s 937us/sample - loss: 2.7457e-04 -
 accuracy: 1.0000 - val_loss: 2.4797e-05 - val_accuracy: 1.0000
 Epoch 47/800
 114/114 [=====] - 0s 874us/sample - loss: 2.6192e-04 -
 accuracy: 1.0000 - val_loss: 2.4763e-05 - val_accuracy: 1.0000
 Epoch 48/800
 114/114 [=====] - 0s 2ms/sample - loss: 2.6367e-04 -
 accuracy: 1.0000 - val_loss: 2.3367e-05 - val_accuracy: 1.0000
 Epoch 49/800
 114/114 [=====] - 0s 932us/sample - loss: 2.7546e-04 -
 accuracy: 1.0000 - val_loss: 2.5081e-05 - val_accuracy: 1.0000
 Epoch 50/800
 114/114 [=====] - 0s 871us/sample - loss: 2.5775e-04 -
 accuracy: 1.0000 - val_loss: 2.3554e-05 - val_accuracy: 1.0000
 Epoch 51/800
 114/114 [=====] - 0s 2ms/sample - loss: 2.5988e-04 -
 accuracy: 1.0000 - val_loss: 2.1948e-05 - val_accuracy: 1.0000
 Epoch 52/800
 114/114 [=====] - 0s 904us/sample - loss: 2.6082e-04 -
 accuracy: 1.0000 - val_loss: 2.2363e-05 - val_accuracy: 1.0000
 Epoch 53/800
 114/114 [=====] - 0s 903us/sample - loss: 2.5557e-04 -
 accuracy: 1.0000 - val_loss: 2.2107e-05 - val_accuracy: 1.0000
 Epoch 54/800

114/114 [=====] - 0s 901us/sample - loss: 2.5442e-04 -
accuracy: 1.0000 - val_loss: 2.2782e-05 - val_accuracy: 1.0000
Epoch 55/800

114/114 [=====] - 0s 961us/sample - loss: 2.5354e-04 -
accuracy: 1.0000 - val_loss: 2.3032e-05 - val_accuracy: 1.0000
Epoch 56/800

114/114 [=====] - 0s 875us/sample - loss: 2.6833e-04 -
accuracy: 1.0000 - val_loss: 2.5166e-05 - val_accuracy: 1.0000
Epoch 57/800

114/114 [=====] - 0s 935us/sample - loss: 2.5791e-04 -
accuracy: 1.0000 - val_loss: 2.4712e-05 - val_accuracy: 1.0000
Epoch 58/800

114/114 [=====] - 0s 863us/sample - loss: 2.5236e-04 -
accuracy: 1.0000 - val_loss: 2.2578e-05 - val_accuracy: 1.0000
Epoch 59/800

114/114 [=====] - 0s 2ms/sample - loss: 2.5172e-04 -
accuracy: 1.0000 - val_loss: 2.1381e-05 - val_accuracy: 1.0000
Epoch 60/800

114/114 [=====] - 0s 886us/sample - loss: 2.5090e-04 -
accuracy: 1.0000 - val_loss: 2.1375e-05 - val_accuracy: 1.0000
Epoch 61/800

114/114 [=====] - 0s 893us/sample - loss: 2.5176e-04 -
accuracy: 1.0000 - val_loss: 2.1988e-05 - val_accuracy: 1.0000
Epoch 62/800

114/114 [=====] - 0s 903us/sample - loss: 2.4981e-04 -
accuracy: 1.0000 - val_loss: 2.2885e-05 - val_accuracy: 1.0000
Epoch 63/800

114/114 [=====] - 0s 2ms/sample - loss: 2.4899e-04 -
accuracy: 1.0000 - val_loss: 2.2533e-05 - val_accuracy: 1.0000
Epoch 64/800

114/114 [=====] - 0s 927us/sample - loss: 2.4673e-04 -
accuracy: 1.0000 - val_loss: 2.2340e-05 - val_accuracy: 1.0000
Epoch 65/800

114/114 [=====] - 0s 868us/sample - loss: 2.4718e-04 -
accuracy: 1.0000 - val_loss: 2.2022e-05 - val_accuracy: 1.0000
Epoch 66/800

114/114 [=====] - 0s 848us/sample - loss: 2.4391e-04 -
accuracy: 1.0000 - val_loss: 2.2975e-05 - val_accuracy: 1.0000
Epoch 67/800

114/114 [=====] - 0s 2ms/sample - loss: 2.5598e-04 -
accuracy: 1.0000 - val_loss: 2.4173e-05 - val_accuracy: 1.0000
Epoch 68/800

114/114 [=====] - 0s 903us/sample - loss: 2.4639e-04 -
accuracy: 1.0000 - val_loss: 2.3009e-05 - val_accuracy: 1.0000
Epoch 69/800

114/114 [=====] - 0s 855us/sample - loss: 2.4106e-04 -
accuracy: 1.0000 - val_loss: 2.1409e-05 - val_accuracy: 1.0000
Epoch 70/800

114/114 [=====] - 0s 920us/sample - loss: 2.4148e-04 -
accuracy: 1.0000 - val_loss: 2.0796e-05 - val_accuracy: 1.0000
Epoch 71/800

114/114 [=====] - 0s 2ms/sample - loss: 2.4045e-04 -
accuracy: 1.0000 - val_loss: 1.9832e-05 - val_accuracy: 1.0000
Epoch 72/800

114/114 [=====] - 0s 929us/sample - loss: 2.4299e-04 -
accuracy: 1.0000 - val_loss: 2.0354e-05 - val_accuracy: 1.0000
Epoch 73/800

114/114 [=====] - 0s 871us/sample - loss: 2.4006e-04 -
accuracy: 1.0000 - val_loss: 2.0365e-05 - val_accuracy: 1.0000
Epoch 74/800

114/114 [=====] - 0s 918us/sample - loss: 2.4249e-04 -
accuracy: 1.0000 - val_loss: 2.0495e-05 - val_accuracy: 1.0000
Epoch 75/800

114/114 [=====] - 0s 2ms/sample - loss: 2.3949e-04 -
accuracy: 1.0000 - val_loss: 2.0887e-05 - val_accuracy: 1.0000
Epoch 76/800

114/114 [=====] - 0s 951us/sample - loss: 2.3926e-04 -
accuracy: 1.0000 - val_loss: 2.1676e-05 - val_accuracy: 1.0000
Epoch 77/800

114/114 [=====] - 0s 917us/sample - loss: 2.3893e-04 -
accuracy: 1.0000 - val_loss: 2.1784e-05 - val_accuracy: 1.0000
Epoch 78/800

114/114 [=====] - 0s 869us/sample - loss: 2.4123e-04 -
accuracy: 1.0000 - val_loss: 2.0064e-05 - val_accuracy: 1.0000
Epoch 79/800

114/114 [=====] - 0s 863us/sample - loss: 2.3482e-04 -
accuracy: 1.0000 - val_loss: 1.9934e-05 - val_accuracy: 1.0000
Epoch 80/800

114/114 [=====] - 0s 894us/sample - loss: 2.3578e-04 -
accuracy: 1.0000 - val_loss: 2.0098e-05 - val_accuracy: 1.0000
Epoch 81/800

114/114 [=====] - 0s 2ms/sample - loss: 2.3422e-04 -
accuracy: 1.0000 - val_loss: 1.9849e-05 - val_accuracy: 1.0000
Epoch 82/800

114/114 [=====] - 0s 895us/sample - loss: 2.3409e-04 -
accuracy: 1.0000 - val_loss: 2.0944e-05 - val_accuracy: 1.0000
Epoch 83/800

114/114 [=====] - 0s 872us/sample - loss: 2.3246e-04 -
accuracy: 1.0000 - val_loss: 2.1313e-05 - val_accuracy: 1.0000
Epoch 84/800

114/114 [=====] - 0s 2ms/sample - loss: 2.3446e-04 -
accuracy: 1.0000 - val_loss: 2.1454e-05 - val_accuracy: 1.0000
Epoch 85/800

114/114 [=====] - 0s 957us/sample - loss: 2.3511e-04 -
accuracy: 1.0000 - val_loss: 2.0178e-05 - val_accuracy: 1.0000
Epoch 86/800

114/114 [=====] - 0s 869us/sample - loss: 2.3083e-04 - accuracy: 1.0000 - val_loss: 1.9746e-05 - val_accuracy: 1.0000
Epoch 87/800
114/114 [=====] - 0s 881us/sample - loss: 2.2831e-04 - accuracy: 1.0000 - val_loss: 2.0320e-05 - val_accuracy: 1.0000
Epoch 88/800
114/114 [=====] - 0s 880us/sample - loss: 2.2878e-04 - accuracy: 1.0000 - val_loss: 2.0382e-05 - val_accuracy: 1.0000
Epoch 89/800
114/114 [=====] - 0s 2ms/sample - loss: 2.2778e-04 - accuracy: 1.0000 - val_loss: 2.1273e-05 - val_accuracy: 1.0000
Epoch 90/800
114/114 [=====] - 0s 900us/sample - loss: 2.2725e-04 - accuracy: 1.0000 - val_loss: 2.1347e-05 - val_accuracy: 1.0000
Epoch 91/800
114/114 [=====] - 0s 869us/sample - loss: 2.2532e-04 - accuracy: 1.0000 - val_loss: 2.0393e-05 - val_accuracy: 1.0000
Epoch 92/800
114/114 [=====] - 0s 923us/sample - loss: 2.2393e-04 - accuracy: 1.0000 - val_loss: 1.9468e-05 - val_accuracy: 1.0000
Epoch 93/800
114/114 [=====] - 0s 920us/sample - loss: 2.2940e-04 - accuracy: 1.0000 - val_loss: 1.9701e-05 - val_accuracy: 1.0000
Epoch 94/800
114/114 [=====] - 0s 917us/sample - loss: 2.2371e-04 - accuracy: 1.0000 - val_loss: 1.9077e-05 - val_accuracy: 1.0000
Epoch 95/800
114/114 [=====] - 0s 899us/sample - loss: 2.2498e-04 - accuracy: 1.0000 - val_loss: 1.8487e-05 - val_accuracy: 1.0000
Epoch 96/800
114/114 [=====] - 0s 885us/sample - loss: 2.2301e-04 - accuracy: 1.0000 - val_loss: 1.8560e-05 - val_accuracy: 1.0000
Epoch 97/800
114/114 [=====] - 0s 2ms/sample - loss: 2.2192e-04 - accuracy: 1.0000 - val_loss: 1.8912e-05 - val_accuracy: 1.0000
Epoch 98/800
114/114 [=====] - 0s 951us/sample - loss: 2.2126e-04 - accuracy: 1.0000 - val_loss: 1.9309e-05 - val_accuracy: 1.0000
Epoch 99/800
114/114 [=====] - 0s 895us/sample - loss: 2.2038e-04 - accuracy: 1.0000 - val_loss: 1.9905e-05 - val_accuracy: 1.0000
Epoch 100/800
114/114 [=====] - 0s 2ms/sample - loss: 2.1956e-04 - accuracy: 1.0000 - val_loss: 1.9831e-05 - val_accuracy: 1.0000
Epoch 101/800
114/114 [=====] - 0s 911us/sample - loss: 2.2054e-04 - accuracy: 1.0000 - val_loss: 1.8986e-05 - val_accuracy: 1.0000
Epoch 102/800

114/114 [=====] - 0s 908us/sample - loss: 2.2077e-04 -
accuracy: 1.0000 - val_loss: 1.9139e-05 - val_accuracy: 1.0000
Epoch 103/800
114/114 [=====] - 0s 896us/sample - loss: 2.1643e-04 -
accuracy: 1.0000 - val_loss: 1.8980e-05 - val_accuracy: 1.0000
Epoch 104/800
114/114 [=====] - 0s 945us/sample - loss: 2.1785e-04 -
accuracy: 1.0000 - val_loss: 1.9224e-05 - val_accuracy: 1.0000
Epoch 105/800
114/114 [=====] - 0s 931us/sample - loss: 2.1625e-04 -
accuracy: 1.0000 - val_loss: 1.9065e-05 - val_accuracy: 1.0000
Epoch 106/800
114/114 [=====] - 0s 875us/sample - loss: 2.1404e-04 -
accuracy: 1.0000 - val_loss: 1.8657e-05 - val_accuracy: 1.0000
Epoch 107/800
114/114 [=====] - 0s 892us/sample - loss: 2.1438e-04 -
accuracy: 1.0000 - val_loss: 1.7998e-05 - val_accuracy: 1.0000
Epoch 108/800
114/114 [=====] - 0s 948us/sample - loss: 2.1383e-04 -
accuracy: 1.0000 - val_loss: 1.8220e-05 - val_accuracy: 1.0000
Epoch 109/800
114/114 [=====] - 0s 882us/sample - loss: 2.1323e-04 -
accuracy: 1.0000 - val_loss: 1.8203e-05 - val_accuracy: 1.0000
Epoch 110/800
114/114 [=====] - 0s 913us/sample - loss: 2.1545e-04 -
accuracy: 1.0000 - val_loss: 1.8838e-05 - val_accuracy: 1.0000
Epoch 111/800
114/114 [=====] - 0s 907us/sample - loss: 2.1174e-04 -
accuracy: 1.0000 - val_loss: 1.8486e-05 - val_accuracy: 1.0000
Epoch 112/800
114/114 [=====] - 0s 2ms/sample - loss: 2.1385e-04 -
accuracy: 1.0000 - val_loss: 1.7567e-05 - val_accuracy: 1.0000
Epoch 113/800
114/114 [=====] - 0s 927us/sample - loss: 2.1365e-04 -
accuracy: 1.0000 - val_loss: 1.8271e-05 - val_accuracy: 1.0000
Epoch 114/800
114/114 [=====] - 0s 902us/sample - loss: 2.1176e-04 -
accuracy: 1.0000 - val_loss: 1.7788e-05 - val_accuracy: 1.0000
Epoch 115/800
114/114 [=====] - 0s 887us/sample - loss: 2.1003e-04 -
accuracy: 1.0000 - val_loss: 1.8367e-05 - val_accuracy: 1.0000
Epoch 116/800
114/114 [=====] - 0s 2ms/sample - loss: 2.0903e-04 -
accuracy: 1.0000 - val_loss: 1.8163e-05 - val_accuracy: 1.0000
Epoch 117/800
114/114 [=====] - 0s 939us/sample - loss: 2.0741e-04 -
accuracy: 1.0000 - val_loss: 1.7822e-05 - val_accuracy: 1.0000
Epoch 118/800

114/114 [=====] - 0s 913us/sample - loss: 2.0801e-04 -
accuracy: 1.0000 - val_loss: 1.7380e-05 - val_accuracy: 1.0000
Epoch 119/800
114/114 [=====] - 0s 893us/sample - loss: 2.0673e-04 -
accuracy: 1.0000 - val_loss: 1.7590e-05 - val_accuracy: 1.0000
Epoch 120/800
114/114 [=====] - 0s 2ms/sample - loss: 2.0609e-04 -
accuracy: 1.0000 - val_loss: 1.7766e-05 - val_accuracy: 1.0000
Epoch 121/800
114/114 [=====] - 0s 975us/sample - loss: 2.0645e-04 -
accuracy: 1.0000 - val_loss: 1.7630e-05 - val_accuracy: 1.0000
Epoch 122/800
114/114 [=====] - 0s 875us/sample - loss: 2.0666e-04 -
accuracy: 1.0000 - val_loss: 1.7482e-05 - val_accuracy: 1.0000
Epoch 123/800
114/114 [=====] - 0s 900us/sample - loss: 2.0557e-04 -
accuracy: 1.0000 - val_loss: 1.8322e-05 - val_accuracy: 1.0000
Epoch 124/800
114/114 [=====] - 0s 878us/sample - loss: 2.0561e-04 -
accuracy: 1.0000 - val_loss: 1.8537e-05 - val_accuracy: 1.0000
Epoch 125/800
114/114 [=====] - 0s 925us/sample - loss: 2.1079e-04 -
accuracy: 1.0000 - val_loss: 1.7164e-05 - val_accuracy: 1.0000
Epoch 126/800
114/114 [=====] - 0s 929us/sample - loss: 2.0161e-04 -
accuracy: 1.0000 - val_loss: 1.7045e-05 - val_accuracy: 1.0000
Epoch 127/800
114/114 [=====] - 0s 841us/sample - loss: 2.0513e-04 -
accuracy: 1.0000 - val_loss: 1.7993e-05 - val_accuracy: 1.0000
Epoch 128/800
114/114 [=====] - 0s 924us/sample - loss: 2.0181e-04 -
accuracy: 1.0000 - val_loss: 1.7414e-05 - val_accuracy: 1.0000
Epoch 129/800
114/114 [=====] - 0s 852us/sample - loss: 2.0103e-04 -
accuracy: 1.0000 - val_loss: 1.7198e-05 - val_accuracy: 1.0000
Epoch 130/800
114/114 [=====] - 0s 2ms/sample - loss: 1.9990e-04 -
accuracy: 1.0000 - val_loss: 1.6483e-05 - val_accuracy: 1.0000
Epoch 131/800
114/114 [=====] - 0s 920us/sample - loss: 2.0454e-04 -
accuracy: 1.0000 - val_loss: 1.5887e-05 - val_accuracy: 1.0000
Epoch 132/800
114/114 [=====] - 0s 889us/sample - loss: 1.9853e-04 -
accuracy: 1.0000 - val_loss: 1.6512e-05 - val_accuracy: 1.0000
Epoch 133/800
114/114 [=====] - 0s 2ms/sample - loss: 1.9790e-04 -
accuracy: 1.0000 - val_loss: 1.6994e-05 - val_accuracy: 1.0000
Epoch 134/800

114/114 [=====] - 0s 916us/sample - loss: 1.9797e-04 -
accuracy: 1.0000 - val_loss: 1.7261e-05 - val_accuracy: 1.0000
Epoch 135/800
114/114 [=====] - 0s 897us/sample - loss: 1.9790e-04 -
accuracy: 1.0000 - val_loss: 1.6937e-05 - val_accuracy: 1.0000
Epoch 136/800
114/114 [=====] - 0s 873us/sample - loss: 1.9631e-04 -
accuracy: 1.0000 - val_loss: 1.6143e-05 - val_accuracy: 1.0000
Epoch 137/800
114/114 [=====] - 0s 2ms/sample - loss: 1.9494e-04 -
accuracy: 1.0000 - val_loss: 1.5626e-05 - val_accuracy: 1.0000
Epoch 138/800
114/114 [=====] - 0s 964us/sample - loss: 1.9489e-04 -
accuracy: 1.0000 - val_loss: 1.5218e-05 - val_accuracy: 1.0000
Epoch 139/800
114/114 [=====] - 0s 876us/sample - loss: 2.0028e-04 -
accuracy: 1.0000 - val_loss: 1.4786e-05 - val_accuracy: 1.0000
Epoch 140/800
114/114 [=====] - 0s 899us/sample - loss: 1.9582e-04 -
accuracy: 1.0000 - val_loss: 1.5870e-05 - val_accuracy: 1.0000
Epoch 141/800
114/114 [=====] - 0s 874us/sample - loss: 1.9255e-04 -
accuracy: 1.0000 - val_loss: 1.6222e-05 - val_accuracy: 1.0000
Epoch 142/800
114/114 [=====] - 0s 975us/sample - loss: 1.9332e-04 -
accuracy: 1.0000 - val_loss: 1.7170e-05 - val_accuracy: 1.0000
Epoch 143/800
114/114 [=====] - 0s 886us/sample - loss: 1.9361e-04 -
accuracy: 1.0000 - val_loss: 1.7334e-05 - val_accuracy: 1.0000
Epoch 144/800
114/114 [=====] - 0s 881us/sample - loss: 1.9295e-04 -
accuracy: 1.0000 - val_loss: 1.6909e-05 - val_accuracy: 1.0000
Epoch 145/800
114/114 [=====] - 0s 893us/sample - loss: 1.9935e-04 -
accuracy: 1.0000 - val_loss: 1.5552e-05 - val_accuracy: 1.0000
Epoch 146/800
114/114 [=====] - 0s 926us/sample - loss: 1.8893e-04 -
accuracy: 1.0000 - val_loss: 1.5496e-05 - val_accuracy: 1.0000
Epoch 147/800
114/114 [=====] - 0s 912us/sample - loss: 1.9058e-04 -
accuracy: 1.0000 - val_loss: 1.5859e-05 - val_accuracy: 1.0000
Epoch 148/800
114/114 [=====] - 0s 905us/sample - loss: 1.9157e-04 -
accuracy: 1.0000 - val_loss: 1.6211e-05 - val_accuracy: 1.0000
Epoch 149/800
114/114 [=====] - 0s 860us/sample - loss: 1.9303e-04 -
accuracy: 1.0000 - val_loss: 1.5132e-05 - val_accuracy: 1.0000
Epoch 150/800

114/114 [=====] - 0s 903us/sample - loss: 1.8954e-04 -
accuracy: 1.0000 - val_loss: 1.4752e-05 - val_accuracy: 1.0000
Epoch 151/800

114/114 [=====] - 0s 975us/sample - loss: 1.8697e-04 -
accuracy: 1.0000 - val_loss: 1.5263e-05 - val_accuracy: 1.0000
Epoch 152/800

114/114 [=====] - 0s 876us/sample - loss: 1.8628e-04 -
accuracy: 1.0000 - val_loss: 1.5518e-05 - val_accuracy: 1.0000
Epoch 153/800

114/114 [=====] - 0s 910us/sample - loss: 1.9678e-04 -
accuracy: 1.0000 - val_loss: 1.7175e-05 - val_accuracy: 1.0000
Epoch 154/800

114/114 [=====] - 0s 873us/sample - loss: 1.8792e-04 -
accuracy: 1.0000 - val_loss: 1.6795e-05 - val_accuracy: 1.0000
Epoch 155/800

114/114 [=====] - 0s 2ms/sample - loss: 1.8538e-04 -
accuracy: 1.0000 - val_loss: 1.6057e-05 - val_accuracy: 1.0000
Epoch 156/800

114/114 [=====] - 0s 887us/sample - loss: 1.9548e-04 -
accuracy: 1.0000 - val_loss: 1.4298e-05 - val_accuracy: 1.0000
Epoch 157/800

114/114 [=====] - 0s 867us/sample - loss: 1.9216e-04 -
accuracy: 1.0000 - val_loss: 1.3753e-05 - val_accuracy: 1.0000
Epoch 158/800

114/114 [=====] - 0s 913us/sample - loss: 1.8593e-04 -
accuracy: 1.0000 - val_loss: 1.4922e-05 - val_accuracy: 1.0000
Epoch 159/800

114/114 [=====] - 0s 2ms/sample - loss: 1.8198e-04 -
accuracy: 1.0000 - val_loss: 1.5779e-05 - val_accuracy: 1.0000
Epoch 160/800

114/114 [=====] - 0s 932us/sample - loss: 1.8176e-04 -
accuracy: 1.0000 - val_loss: 1.5989e-05 - val_accuracy: 1.0000
Epoch 161/800

114/114 [=====] - 0s 893us/sample - loss: 1.8451e-04 -
accuracy: 1.0000 - val_loss: 1.5870e-05 - val_accuracy: 1.0000
Epoch 162/800

114/114 [=====] - 0s 897us/sample - loss: 1.8071e-04 -
accuracy: 1.0000 - val_loss: 1.6074e-05 - val_accuracy: 1.0000
Epoch 163/800

114/114 [=====] - 0s 2ms/sample - loss: 1.8046e-04 -
accuracy: 1.0000 - val_loss: 1.5791e-05 - val_accuracy: 1.0000
Epoch 164/800

114/114 [=====] - 0s 915us/sample - loss: 1.8740e-04 -
accuracy: 1.0000 - val_loss: 1.4678e-05 - val_accuracy: 1.0000
Epoch 165/800

114/114 [=====] - 0s 906us/sample - loss: 1.8122e-04 -
accuracy: 1.0000 - val_loss: 1.5314e-05 - val_accuracy: 1.0000
Epoch 166/800

114/114 [=====] - 0s 900us/sample - loss: 1.7974e-04 -
accuracy: 1.0000 - val_loss: 1.4917e-05 - val_accuracy: 1.0000
Epoch 167/800
114/114 [=====] - 0s 2ms/sample - loss: 1.7719e-04 -
accuracy: 1.0000 - val_loss: 1.5149e-05 - val_accuracy: 1.0000
Epoch 168/800
114/114 [=====] - 0s 903us/sample - loss: 1.7842e-04 -
accuracy: 1.0000 - val_loss: 1.4837e-05 - val_accuracy: 1.0000
Epoch 169/800
114/114 [=====] - 0s 948us/sample - loss: 1.7778e-04 -
accuracy: 1.0000 - val_loss: 1.5110e-05 - val_accuracy: 1.0000
Epoch 170/800
114/114 [=====] - 0s 874us/sample - loss: 1.7690e-04 -
accuracy: 1.0000 - val_loss: 1.5405e-05 - val_accuracy: 1.0000
Epoch 171/800
114/114 [=====] - 0s 964us/sample - loss: 1.7536e-04 -
accuracy: 1.0000 - val_loss: 1.4951e-05 - val_accuracy: 1.0000
Epoch 172/800
114/114 [=====] - 0s 921us/sample - loss: 1.7777e-04 -
accuracy: 1.0000 - val_loss: 1.4349e-05 - val_accuracy: 1.0000
Epoch 173/800
114/114 [=====] - 0s 878us/sample - loss: 1.7368e-04 -
accuracy: 1.0000 - val_loss: 1.4133e-05 - val_accuracy: 1.0000
Epoch 174/800
114/114 [=====] - 0s 2ms/sample - loss: 1.7781e-04 -
accuracy: 1.0000 - val_loss: 1.4673e-05 - val_accuracy: 1.0000
Epoch 175/800
114/114 [=====] - 0s 939us/sample - loss: 1.7385e-04 -
accuracy: 1.0000 - val_loss: 1.4037e-05 - val_accuracy: 1.0000
Epoch 176/800
114/114 [=====] - 0s 889us/sample - loss: 1.7372e-04 -
accuracy: 1.0000 - val_loss: 1.3736e-05 - val_accuracy: 1.0000
Epoch 177/800
114/114 [=====] - 0s 862us/sample - loss: 1.7435e-04 -
accuracy: 1.0000 - val_loss: 1.3696e-05 - val_accuracy: 1.0000
Epoch 178/800
114/114 [=====] - 0s 2ms/sample - loss: 1.7160e-04 -
accuracy: 1.0000 - val_loss: 1.4151e-05 - val_accuracy: 1.0000
Epoch 179/800
114/114 [=====] - 0s 909us/sample - loss: 1.7105e-04 -
accuracy: 1.0000 - val_loss: 1.4173e-05 - val_accuracy: 1.0000
Epoch 180/800
114/114 [=====] - 0s 908us/sample - loss: 1.7312e-04 -
accuracy: 1.0000 - val_loss: 1.4650e-05 - val_accuracy: 1.0000
Epoch 181/800
114/114 [=====] - 0s 881us/sample - loss: 1.7009e-04 -
accuracy: 1.0000 - val_loss: 1.4054e-05 - val_accuracy: 1.0000
Epoch 182/800

114/114 [=====] - 0s 2ms/sample - loss: 1.6985e-04 -
accuracy: 1.0000 - val_loss: 1.3685e-05 - val_accuracy: 1.0000
Epoch 183/800
114/114 [=====] - 0s 875us/sample - loss: 1.6842e-04 -
accuracy: 1.0000 - val_loss: 1.3532e-05 - val_accuracy: 1.0000
Epoch 184/800
114/114 [=====] - 0s 943us/sample - loss: 1.7132e-04 -
accuracy: 1.0000 - val_loss: 1.3850e-05 - val_accuracy: 1.0000
Epoch 185/800
114/114 [=====] - 0s 838us/sample - loss: 1.7211e-04 -
accuracy: 1.0000 - val_loss: 1.4145e-05 - val_accuracy: 1.0000
Epoch 186/800
114/114 [=====] - 0s 2ms/sample - loss: 1.7098e-04 -
accuracy: 1.0000 - val_loss: 1.3186e-05 - val_accuracy: 1.0000
Epoch 187/800
114/114 [=====] - 0s 967us/sample - loss: 1.6899e-04 -
accuracy: 1.0000 - val_loss: 1.2896e-05 - val_accuracy: 1.0000
Epoch 188/800
114/114 [=====] - 0s 906us/sample - loss: 1.6741e-04 -
accuracy: 1.0000 - val_loss: 1.3373e-05 - val_accuracy: 1.0000
Epoch 189/800
114/114 [=====] - 0s 856us/sample - loss: 1.6772e-04 -
accuracy: 1.0000 - val_loss: 1.3538e-05 - val_accuracy: 1.0000
Epoch 190/800
114/114 [=====] - 0s 889us/sample - loss: 1.6831e-04 -
accuracy: 1.0000 - val_loss: 1.3946e-05 - val_accuracy: 1.0000
Epoch 191/800
114/114 [=====] - 0s 951us/sample - loss: 1.6638e-04 -
accuracy: 1.0000 - val_loss: 1.3935e-05 - val_accuracy: 1.0000
Epoch 192/800
114/114 [=====] - 0s 896us/sample - loss: 1.6791e-04 -
accuracy: 1.0000 - val_loss: 1.3152e-05 - val_accuracy: 1.0000
Epoch 193/800
114/114 [=====] - 0s 915us/sample - loss: 1.6817e-04 -
accuracy: 1.0000 - val_loss: 1.3526e-05 - val_accuracy: 1.0000
Epoch 194/800
114/114 [=====] - 0s 874us/sample - loss: 1.6416e-04 -
accuracy: 1.0000 - val_loss: 1.3157e-05 - val_accuracy: 1.0000
Epoch 195/800
114/114 [=====] - 0s 2ms/sample - loss: 1.6305e-04 -
accuracy: 1.0000 - val_loss: 1.3157e-05 - val_accuracy: 1.0000
Epoch 196/800
114/114 [=====] - 0s 895us/sample - loss: 1.6318e-04 -
accuracy: 1.0000 - val_loss: 1.2771e-05 - val_accuracy: 1.0000
Epoch 197/800
114/114 [=====] - 0s 905us/sample - loss: 1.6179e-04 -
accuracy: 1.0000 - val_loss: 1.2936e-05 - val_accuracy: 1.0000
Epoch 198/800

114/114 [=====] - 0s 859us/sample - loss: 1.6360e-04 -
accuracy: 1.0000 - val_loss: 1.3021e-05 - val_accuracy: 1.0000
Epoch 199/800
114/114 [=====] - 0s 899us/sample - loss: 1.6112e-04 -
accuracy: 1.0000 - val_loss: 1.3271e-05 - val_accuracy: 1.0000
Epoch 200/800
114/114 [=====] - 0s 2ms/sample - loss: 1.6228e-04 -
accuracy: 1.0000 - val_loss: 1.2822e-05 - val_accuracy: 1.0000
Epoch 201/800
114/114 [=====] - 0s 919us/sample - loss: 1.6170e-04 -
accuracy: 1.0000 - val_loss: 1.2993e-05 - val_accuracy: 1.0000
Epoch 202/800
114/114 [=====] - 0s 844us/sample - loss: 1.6037e-04 -
accuracy: 1.0000 - val_loss: 1.3214e-05 - val_accuracy: 1.0000
Epoch 203/800
114/114 [=====] - 0s 944us/sample - loss: 1.5997e-04 -
accuracy: 1.0000 - val_loss: 1.2981e-05 - val_accuracy: 1.0000
Epoch 204/800
114/114 [=====] - 0s 855us/sample - loss: 1.6031e-04 -
accuracy: 1.0000 - val_loss: 1.2607e-05 - val_accuracy: 1.0000
Epoch 205/800
114/114 [=====] - 0s 2ms/sample - loss: 1.6189e-04 -
accuracy: 1.0000 - val_loss: 1.2351e-05 - val_accuracy: 1.0000
Epoch 206/800
114/114 [=====] - 0s 934us/sample - loss: 1.5864e-04 -
accuracy: 1.0000 - val_loss: 1.3101e-05 - val_accuracy: 1.0000
Epoch 207/800
114/114 [=====] - 0s 890us/sample - loss: 1.5695e-04 -
accuracy: 1.0000 - val_loss: 1.3373e-05 - val_accuracy: 1.0000
Epoch 208/800
114/114 [=====] - 0s 888us/sample - loss: 1.5747e-04 -
accuracy: 1.0000 - val_loss: 1.3129e-05 - val_accuracy: 1.0000
Epoch 209/800
114/114 [=====] - 0s 867us/sample - loss: 1.5693e-04 -
accuracy: 1.0000 - val_loss: 1.2896e-05 - val_accuracy: 1.0000
Epoch 210/800
114/114 [=====] - 0s 2ms/sample - loss: 1.5800e-04 -
accuracy: 1.0000 - val_loss: 1.2363e-05 - val_accuracy: 1.0000
Epoch 211/800
114/114 [=====] - 0s 943us/sample - loss: 1.5834e-04 -
accuracy: 1.0000 - val_loss: 1.1880e-05 - val_accuracy: 1.0000
Epoch 212/800
114/114 [=====] - 0s 875us/sample - loss: 1.5588e-04 -
accuracy: 1.0000 - val_loss: 1.1926e-05 - val_accuracy: 1.0000
Epoch 213/800
114/114 [=====] - 0s 897us/sample - loss: 1.5580e-04 -
accuracy: 1.0000 - val_loss: 1.2505e-05 - val_accuracy: 1.0000
Epoch 214/800

114/114 [=====] - 0s 2ms/sample - loss: 1.5415e-04 -
accuracy: 1.0000 - val_loss: 1.2800e-05 - val_accuracy: 1.0000
Epoch 215/800
114/114 [=====] - 0s 918us/sample - loss: 1.5412e-04 -
accuracy: 1.0000 - val_loss: 1.2788e-05 - val_accuracy: 1.0000
Epoch 216/800
114/114 [=====] - 0s 899us/sample - loss: 1.5840e-04 -
accuracy: 1.0000 - val_loss: 1.2051e-05 - val_accuracy: 1.0000
Epoch 217/800
114/114 [=====] - 0s 891us/sample - loss: 1.5334e-04 -
accuracy: 1.0000 - val_loss: 1.2436e-05 - val_accuracy: 1.0000
Epoch 218/800
114/114 [=====] - 0s 2ms/sample - loss: 1.5271e-04 -
accuracy: 1.0000 - val_loss: 1.2510e-05 - val_accuracy: 1.0000
Epoch 219/800
114/114 [=====] - 0s 930us/sample - loss: 1.5111e-04 -
accuracy: 1.0000 - val_loss: 1.2136e-05 - val_accuracy: 1.0000
Epoch 220/800
114/114 [=====] - 0s 855us/sample - loss: 1.5377e-04 -
accuracy: 1.0000 - val_loss: 1.1614e-05 - val_accuracy: 1.0000
Epoch 221/800
114/114 [=====] - 0s 927us/sample - loss: 1.5166e-04 -
accuracy: 1.0000 - val_loss: 1.1591e-05 - val_accuracy: 1.0000
Epoch 222/800
114/114 [=====] - 0s 2ms/sample - loss: 1.5156e-04 -
accuracy: 1.0000 - val_loss: 1.2056e-05 - val_accuracy: 1.0000
Epoch 223/800
114/114 [=====] - 0s 880us/sample - loss: 1.5274e-04 -
accuracy: 1.0000 - val_loss: 1.2845e-05 - val_accuracy: 1.0000
Epoch 224/800
114/114 [=====] - 0s 911us/sample - loss: 1.5159e-04 -
accuracy: 1.0000 - val_loss: 1.2771e-05 - val_accuracy: 1.0000
Epoch 225/800
114/114 [=====] - 0s 883us/sample - loss: 1.5165e-04 -
accuracy: 1.0000 - val_loss: 1.1999e-05 - val_accuracy: 1.0000
Epoch 226/800
114/114 [=====] - 0s 2ms/sample - loss: 1.5016e-04 -
accuracy: 1.0000 - val_loss: 1.1625e-05 - val_accuracy: 1.0000
Epoch 227/800
114/114 [=====] - 0s 946us/sample - loss: 1.4928e-04 -
accuracy: 1.0000 - val_loss: 1.1369e-05 - val_accuracy: 1.0000
Epoch 228/800
114/114 [=====] - 0s 906us/sample - loss: 1.4925e-04 -
accuracy: 1.0000 - val_loss: 1.1727e-05 - val_accuracy: 1.0000
Epoch 229/800
114/114 [=====] - 0s 878us/sample - loss: 1.4674e-04 -
accuracy: 1.0000 - val_loss: 1.1750e-05 - val_accuracy: 1.0000
Epoch 230/800

114/114 [=====] - 0s 2ms/sample - loss: 1.4742e-04 -
accuracy: 1.0000 - val_loss: 1.1841e-05 - val_accuracy: 1.0000
Epoch 231/800

114/114 [=====] - 0s 903us/sample - loss: 1.4617e-04 -
accuracy: 1.0000 - val_loss: 1.1540e-05 - val_accuracy: 1.0000
Epoch 232/800

114/114 [=====] - 0s 912us/sample - loss: 1.4758e-04 -
accuracy: 1.0000 - val_loss: 1.1421e-05 - val_accuracy: 1.0000
Epoch 233/800

114/114 [=====] - 0s 874us/sample - loss: 1.4544e-04 -
accuracy: 1.0000 - val_loss: 1.1483e-05 - val_accuracy: 1.0000
Epoch 234/800

114/114 [=====] - 0s 2ms/sample - loss: 1.4576e-04 -
accuracy: 1.0000 - val_loss: 1.1494e-05 - val_accuracy: 1.0000
Epoch 235/800

114/114 [=====] - 0s 900us/sample - loss: 1.4511e-04 -
accuracy: 1.0000 - val_loss: 1.1608e-05 - val_accuracy: 1.0000
Epoch 236/800

114/114 [=====] - 0s 899us/sample - loss: 1.4461e-04 -
accuracy: 1.0000 - val_loss: 1.1341e-05 - val_accuracy: 1.0000
Epoch 237/800

114/114 [=====] - 0s 889us/sample - loss: 1.4410e-04 -
accuracy: 1.0000 - val_loss: 1.1432e-05 - val_accuracy: 1.0000
Epoch 238/800

114/114 [=====] - 0s 847us/sample - loss: 1.4301e-04 -
accuracy: 1.0000 - val_loss: 1.1455e-05 - val_accuracy: 1.0000
Epoch 239/800

114/114 [=====] - 0s 2ms/sample - loss: 1.4301e-04 -
accuracy: 1.0000 - val_loss: 1.1250e-05 - val_accuracy: 1.0000
Epoch 240/800

114/114 [=====] - 0s 915us/sample - loss: 1.4424e-04 -
accuracy: 1.0000 - val_loss: 1.1466e-05 - val_accuracy: 1.0000
Epoch 241/800

114/114 [=====] - 0s 900us/sample - loss: 1.4161e-04 -
accuracy: 1.0000 - val_loss: 1.1250e-05 - val_accuracy: 1.0000
Epoch 242/800

114/114 [=====] - 0s 902us/sample - loss: 1.4153e-04 -
accuracy: 1.0000 - val_loss: 1.1216e-05 - val_accuracy: 1.0000
Epoch 243/800

114/114 [=====] - 0s 2ms/sample - loss: 1.4247e-04 -
accuracy: 1.0000 - val_loss: 1.0802e-05 - val_accuracy: 1.0000
Epoch 244/800

114/114 [=====] - 0s 914us/sample - loss: 1.4063e-04 -
accuracy: 1.0000 - val_loss: 1.0842e-05 - val_accuracy: 1.0000
Epoch 245/800

114/114 [=====] - 0s 892us/sample - loss: 1.4045e-04 -
accuracy: 1.0000 - val_loss: 1.0870e-05 - val_accuracy: 1.0000
Epoch 246/800

114/114 [=====] - 0s 860us/sample - loss: 1.3974e-04 -
accuracy: 1.0000 - val_loss: 1.1256e-05 - val_accuracy: 1.0000
Epoch 247/800
114/114 [=====] - 0s 2ms/sample - loss: 1.4598e-04 -
accuracy: 1.0000 - val_loss: 1.1920e-05 - val_accuracy: 1.0000
Epoch 248/800
114/114 [=====] - 0s 959us/sample - loss: 1.4127e-04 -
accuracy: 1.0000 - val_loss: 1.1625e-05 - val_accuracy: 1.0000
Epoch 249/800
114/114 [=====] - 0s 901us/sample - loss: 1.3931e-04 -
accuracy: 1.0000 - val_loss: 1.0768e-05 - val_accuracy: 1.0000
Epoch 250/800
114/114 [=====] - 0s 866us/sample - loss: 1.3987e-04 -
accuracy: 1.0000 - val_loss: 1.0251e-05 - val_accuracy: 1.0000
Epoch 251/800
114/114 [=====] - 0s 882us/sample - loss: 1.3856e-04 -
accuracy: 1.0000 - val_loss: 1.0331e-05 - val_accuracy: 1.0000
Epoch 252/800
114/114 [=====] - 0s 2ms/sample - loss: 1.4121e-04 -
accuracy: 1.0000 - val_loss: 1.0921e-05 - val_accuracy: 1.0000
Epoch 253/800
114/114 [=====] - 0s 883us/sample - loss: 1.3791e-04 -
accuracy: 1.0000 - val_loss: 1.0734e-05 - val_accuracy: 1.0000
Epoch 254/800
114/114 [=====] - 0s 881us/sample - loss: 1.3680e-04 -
accuracy: 1.0000 - val_loss: 1.0688e-05 - val_accuracy: 1.0000
Epoch 255/800
114/114 [=====] - 0s 872us/sample - loss: 1.3674e-04 -
accuracy: 1.0000 - val_loss: 1.0932e-05 - val_accuracy: 1.0000
Epoch 256/800
114/114 [=====] - 0s 2ms/sample - loss: 1.3672e-04 -
accuracy: 1.0000 - val_loss: 1.0643e-05 - val_accuracy: 1.0000
Epoch 257/800
114/114 [=====] - 0s 914us/sample - loss: 1.3515e-04 -
accuracy: 1.0000 - val_loss: 1.0688e-05 - val_accuracy: 1.0000
Epoch 258/800
114/114 [=====] - 0s 933us/sample - loss: 1.3562e-04 -
accuracy: 1.0000 - val_loss: 1.0904e-05 - val_accuracy: 1.0000
Epoch 259/800
114/114 [=====] - 0s 851us/sample - loss: 1.3517e-04 -
accuracy: 1.0000 - val_loss: 1.0802e-05 - val_accuracy: 1.0000
Epoch 260/800
114/114 [=====] - 0s 2ms/sample - loss: 1.3510e-04 -
accuracy: 1.0000 - val_loss: 1.0388e-05 - val_accuracy: 1.0000
Epoch 261/800
114/114 [=====] - 0s 885us/sample - loss: 1.3582e-04 -
accuracy: 1.0000 - val_loss: 1.0637e-05 - val_accuracy: 1.0000
Epoch 262/800

114/114 [=====] - 0s 966us/sample - loss: 1.3453e-04 -
accuracy: 1.0000 - val_loss: 1.0598e-05 - val_accuracy: 1.0000
Epoch 263/800

114/114 [=====] - 0s 859us/sample - loss: 1.3843e-04 -
accuracy: 1.0000 - val_loss: 1.0019e-05 - val_accuracy: 1.0000
Epoch 264/800

114/114 [=====] - 0s 888us/sample - loss: 1.3344e-04 -
accuracy: 1.0000 - val_loss: 1.0109e-05 - val_accuracy: 1.0000
Epoch 265/800

114/114 [=====] - 0s 2ms/sample - loss: 1.3244e-04 -
accuracy: 1.0000 - val_loss: 1.0575e-05 - val_accuracy: 1.0000
Epoch 266/800

114/114 [=====] - 0s 892us/sample - loss: 1.3172e-04 -
accuracy: 1.0000 - val_loss: 1.0728e-05 - val_accuracy: 1.0000
Epoch 267/800

114/114 [=====] - 0s 894us/sample - loss: 1.3280e-04 -
accuracy: 1.0000 - val_loss: 1.0768e-05 - val_accuracy: 1.0000
Epoch 268/800

114/114 [=====] - 0s 897us/sample - loss: 1.3439e-04 -
accuracy: 1.0000 - val_loss: 1.0160e-05 - val_accuracy: 1.0000
Epoch 269/800

114/114 [=====] - 0s 2ms/sample - loss: 1.3154e-04 -
accuracy: 1.0000 - val_loss: 1.0172e-05 - val_accuracy: 1.0000
Epoch 270/800

114/114 [=====] - 0s 944us/sample - loss: 1.3081e-04 -
accuracy: 1.0000 - val_loss: 1.0234e-05 - val_accuracy: 1.0000
Epoch 271/800

114/114 [=====] - 0s 894us/sample - loss: 1.3146e-04 -
accuracy: 1.0000 - val_loss: 1.0195e-05 - val_accuracy: 1.0000
Epoch 272/800

114/114 [=====] - 0s 883us/sample - loss: 1.3111e-04 -
accuracy: 1.0000 - val_loss: 9.6951e-06 - val_accuracy: 1.0000
Epoch 273/800

114/114 [=====] - 0s 886us/sample - loss: 1.3060e-04 -
accuracy: 1.0000 - val_loss: 9.6667e-06 - val_accuracy: 1.0000
Epoch 274/800

114/114 [=====] - 0s 948us/sample - loss: 1.2952e-04 -
accuracy: 1.0000 - val_loss: 9.9221e-06 - val_accuracy: 1.0000
Epoch 275/800

114/114 [=====] - 0s 925us/sample - loss: 1.2882e-04 -
accuracy: 1.0000 - val_loss: 9.8937e-06 - val_accuracy: 1.0000
Epoch 276/800

114/114 [=====] - 0s 846us/sample - loss: 1.2797e-04 -
accuracy: 1.0000 - val_loss: 9.9959e-06 - val_accuracy: 1.0000
Epoch 277/800

114/114 [=====] - 0s 909us/sample - loss: 1.2851e-04 -
accuracy: 1.0000 - val_loss: 1.0013e-05 - val_accuracy: 1.0000
Epoch 278/800

114/114 [=====] - 0s 2ms/sample - loss: 1.2678e-04 -
accuracy: 1.0000 - val_loss: 1.0189e-05 - val_accuracy: 1.0000
Epoch 279/800
114/114 [=====] - 0s 903us/sample - loss: 1.2759e-04 -
accuracy: 1.0000 - val_loss: 1.0484e-05 - val_accuracy: 1.0000
Epoch 280/800
114/114 [=====] - 0s 874us/sample - loss: 1.2842e-04 -
accuracy: 1.0000 - val_loss: 1.0495e-05 - val_accuracy: 1.0000
Epoch 281/800
114/114 [=====] - 0s 882us/sample - loss: 1.2693e-04 -
accuracy: 1.0000 - val_loss: 9.9221e-06 - val_accuracy: 1.0000
Epoch 282/800
114/114 [=====] - 0s 894us/sample - loss: 1.2727e-04 -
accuracy: 1.0000 - val_loss: 9.4624e-06 - val_accuracy: 1.0000
Epoch 283/800
114/114 [=====] - 0s 2ms/sample - loss: 1.2664e-04 -
accuracy: 1.0000 - val_loss: 9.3091e-06 - val_accuracy: 1.0000
Epoch 284/800
114/114 [=====] - 0s 912us/sample - loss: 1.2553e-04 -
accuracy: 1.0000 - val_loss: 9.3716e-06 - val_accuracy: 1.0000
Epoch 285/800
114/114 [=====] - 0s 899us/sample - loss: 1.2485e-04 -
accuracy: 1.0000 - val_loss: 9.6610e-06 - val_accuracy: 1.0000
Epoch 286/800
114/114 [=====] - 0s 2ms/sample - loss: 1.2431e-04 -
accuracy: 1.0000 - val_loss: 9.7178e-06 - val_accuracy: 1.0000
Epoch 287/800
114/114 [=====] - 0s 957us/sample - loss: 1.2391e-04 -
accuracy: 1.0000 - val_loss: 9.8426e-06 - val_accuracy: 1.0000
Epoch 288/800
114/114 [=====] - 0s 868us/sample - loss: 1.2499e-04 -
accuracy: 1.0000 - val_loss: 9.5645e-06 - val_accuracy: 1.0000
Epoch 289/800
114/114 [=====] - 0s 922us/sample - loss: 1.2329e-04 -
accuracy: 1.0000 - val_loss: 9.6780e-06 - val_accuracy: 1.0000
Epoch 290/800
114/114 [=====] - 0s 2ms/sample - loss: 1.2336e-04 -
accuracy: 1.0000 - val_loss: 9.4964e-06 - val_accuracy: 1.0000
Epoch 291/800
114/114 [=====] - 0s 947us/sample - loss: 1.2222e-04 -
accuracy: 1.0000 - val_loss: 9.5134e-06 - val_accuracy: 1.0000
Epoch 292/800
114/114 [=====] - 0s 921us/sample - loss: 1.2229e-04 -
accuracy: 1.0000 - val_loss: 9.4624e-06 - val_accuracy: 1.0000
Epoch 293/800
114/114 [=====] - 0s 858us/sample - loss: 1.2153e-04 -
accuracy: 1.0000 - val_loss: 9.6099e-06 - val_accuracy: 1.0000
Epoch 294/800

114/114 [=====] - 0s 870us/sample - loss: 1.2139e-04 -
accuracy: 1.0000 - val_loss: 9.4851e-06 - val_accuracy: 1.0000
Epoch 295/800

114/114 [=====] - 0s 933us/sample - loss: 1.2144e-04 -
accuracy: 1.0000 - val_loss: 9.5645e-06 - val_accuracy: 1.0000
Epoch 296/800

114/114 [=====] - 0s 948us/sample - loss: 1.2179e-04 -
accuracy: 1.0000 - val_loss: 9.2410e-06 - val_accuracy: 1.0000
Epoch 297/800

114/114 [=====] - 0s 858us/sample - loss: 1.2103e-04 -
accuracy: 1.0000 - val_loss: 9.2807e-06 - val_accuracy: 1.0000
Epoch 298/800

114/114 [=====] - 0s 881us/sample - loss: 1.2066e-04 -
accuracy: 1.0000 - val_loss: 9.3488e-06 - val_accuracy: 1.0000
Epoch 299/800

114/114 [=====] - 0s 2ms/sample - loss: 1.2101e-04 -
accuracy: 1.0000 - val_loss: 9.0537e-06 - val_accuracy: 1.0000
Epoch 300/800

114/114 [=====] - 0s 903us/sample - loss: 1.1937e-04 -
accuracy: 1.0000 - val_loss: 9.0423e-06 - val_accuracy: 1.0000
Epoch 301/800

114/114 [=====] - 0s 850us/sample - loss: 1.1980e-04 -
accuracy: 1.0000 - val_loss: 8.9402e-06 - val_accuracy: 1.0000
Epoch 302/800

114/114 [=====] - 0s 913us/sample - loss: 1.1861e-04 -
accuracy: 1.0000 - val_loss: 9.0253e-06 - val_accuracy: 1.0000
Epoch 303/800

114/114 [=====] - 0s 907us/sample - loss: 1.1807e-04 -
accuracy: 1.0000 - val_loss: 9.4056e-06 - val_accuracy: 1.0000
Epoch 304/800

114/114 [=====] - 0s 2ms/sample - loss: 1.1892e-04 -
accuracy: 1.0000 - val_loss: 9.5588e-06 - val_accuracy: 1.0000
Epoch 305/800

114/114 [=====] - 0s 965us/sample - loss: 1.1882e-04 -
accuracy: 1.0000 - val_loss: 9.2637e-06 - val_accuracy: 1.0000
Epoch 306/800

114/114 [=====] - 0s 871us/sample - loss: 1.2276e-04 -
accuracy: 1.0000 - val_loss: 8.7756e-06 - val_accuracy: 1.0000
Epoch 307/800

114/114 [=====] - 0s 892us/sample - loss: 1.2150e-04 -
accuracy: 1.0000 - val_loss: 9.2921e-06 - val_accuracy: 1.0000
Epoch 308/800

114/114 [=====] - 0s 2ms/sample - loss: 1.1737e-04 -
accuracy: 1.0000 - val_loss: 9.2807e-06 - val_accuracy: 1.0000
Epoch 309/800

114/114 [=====] - 0s 951us/sample - loss: 1.1754e-04 -
accuracy: 1.0000 - val_loss: 8.9799e-06 - val_accuracy: 1.0000
Epoch 310/800

114/114 [=====] - 0s 856us/sample - loss: 1.1609e-04 - accuracy: 1.0000 - val_loss: 8.7813e-06 - val_accuracy: 1.0000
Epoch 311/800
114/114 [=====] - 0s 874us/sample - loss: 1.1738e-04 - accuracy: 1.0000 - val_loss: 8.9515e-06 - val_accuracy: 1.0000
Epoch 312/800
114/114 [=====] - 0s 916us/sample - loss: 1.1641e-04 - accuracy: 1.0000 - val_loss: 8.7415e-06 - val_accuracy: 1.0000
Epoch 313/800
114/114 [=====] - 0s 887us/sample - loss: 1.1538e-04 - accuracy: 1.0000 - val_loss: 8.6791e-06 - val_accuracy: 1.0000
Epoch 314/800
114/114 [=====] - 0s 2ms/sample - loss: 1.1480e-04 - accuracy: 1.0000 - val_loss: 8.8777e-06 - val_accuracy: 1.0000
Epoch 315/800
114/114 [=====] - 0s 906us/sample - loss: 1.1514e-04 - accuracy: 1.0000 - val_loss: 8.9629e-06 - val_accuracy: 1.0000
Epoch 316/800
114/114 [=====] - 0s 901us/sample - loss: 1.1660e-04 - accuracy: 1.0000 - val_loss: 8.7585e-06 - val_accuracy: 1.0000
Epoch 317/800
114/114 [=====] - 0s 860us/sample - loss: 1.1382e-04 - accuracy: 1.0000 - val_loss: 8.8721e-06 - val_accuracy: 1.0000
Epoch 318/800
114/114 [=====] - 0s 879us/sample - loss: 1.1340e-04 - accuracy: 1.0000 - val_loss: 8.8891e-06 - val_accuracy: 1.0000
Epoch 319/800
114/114 [=====] - 0s 2ms/sample - loss: 1.1292e-04 - accuracy: 1.0000 - val_loss: 8.8437e-06 - val_accuracy: 1.0000
Epoch 320/800
114/114 [=====] - 0s 959us/sample - loss: 1.1264e-04 - accuracy: 1.0000 - val_loss: 8.6961e-06 - val_accuracy: 1.0000
Epoch 321/800
114/114 [=====] - 0s 875us/sample - loss: 1.1432e-04 - accuracy: 1.0000 - val_loss: 8.4918e-06 - val_accuracy: 1.0000
Epoch 322/800
114/114 [=====] - 0s 873us/sample - loss: 1.1176e-04 - accuracy: 1.0000 - val_loss: 8.4691e-06 - val_accuracy: 1.0000
Epoch 323/800
114/114 [=====] - 0s 890us/sample - loss: 1.1279e-04 - accuracy: 1.0000 - val_loss: 8.2761e-06 - val_accuracy: 1.0000
Epoch 324/800
114/114 [=====] - 0s 885us/sample - loss: 1.1386e-04 - accuracy: 1.0000 - val_loss: 8.6337e-06 - val_accuracy: 1.0000
Epoch 325/800
114/114 [=====] - 0s 898us/sample - loss: 1.1159e-04 - accuracy: 1.0000 - val_loss: 8.5656e-06 - val_accuracy: 1.0000
Epoch 326/800

114/114 [=====] - 0s 945us/sample - loss: 1.1066e-04 - accuracy: 1.0000 - val_loss: 8.5145e-06 - val_accuracy: 1.0000
Epoch 327/800
114/114 [=====] - 0s 892us/sample - loss: 1.1008e-04 - accuracy: 1.0000 - val_loss: 8.5031e-06 - val_accuracy: 1.0000
Epoch 328/800
114/114 [=====] - 0s 2ms/sample - loss: 1.1076e-04 - accuracy: 1.0000 - val_loss: 8.3555e-06 - val_accuracy: 1.0000
Epoch 329/800
114/114 [=====] - 0s 907us/sample - loss: 1.0971e-04 - accuracy: 1.0000 - val_loss: 8.4237e-06 - val_accuracy: 1.0000
Epoch 330/800
114/114 [=====] - 0s 926us/sample - loss: 1.1269e-04 - accuracy: 1.0000 - val_loss: 8.7188e-06 - val_accuracy: 1.0000
Epoch 331/800
114/114 [=====] - 0s 888us/sample - loss: 1.0994e-04 - accuracy: 1.0000 - val_loss: 8.6110e-06 - val_accuracy: 1.0000
Epoch 332/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0867e-04 - accuracy: 1.0000 - val_loss: 8.2420e-06 - val_accuracy: 1.0000
Epoch 333/800
114/114 [=====] - 0s 934us/sample - loss: 1.0891e-04 - accuracy: 1.0000 - val_loss: 7.9015e-06 - val_accuracy: 1.0000
Epoch 334/800
114/114 [=====] - 0s 868us/sample - loss: 1.0863e-04 - accuracy: 1.0000 - val_loss: 7.8390e-06 - val_accuracy: 1.0000
Epoch 335/800
114/114 [=====] - 0s 912us/sample - loss: 1.1132e-04 - accuracy: 1.0000 - val_loss: 7.7085e-06 - val_accuracy: 1.0000
Epoch 336/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0779e-04 - accuracy: 1.0000 - val_loss: 8.1342e-06 - val_accuracy: 1.0000
Epoch 337/800
114/114 [=====] - 0s 902us/sample - loss: 1.0706e-04 - accuracy: 1.0000 - val_loss: 8.5031e-06 - val_accuracy: 1.0000
Epoch 338/800
114/114 [=====] - 0s 879us/sample - loss: 1.0757e-04 - accuracy: 1.0000 - val_loss: 8.5201e-06 - val_accuracy: 1.0000
Epoch 339/800
114/114 [=====] - 0s 888us/sample - loss: 1.0799e-04 - accuracy: 1.0000 - val_loss: 8.5712e-06 - val_accuracy: 1.0000
Epoch 340/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0681e-04 - accuracy: 1.0000 - val_loss: 8.2988e-06 - val_accuracy: 1.0000
Epoch 341/800
114/114 [=====] - 0s 946us/sample - loss: 1.0635e-04 - accuracy: 1.0000 - val_loss: 8.1058e-06 - val_accuracy: 1.0000
Epoch 342/800

114/114 [=====] - 0s 880us/sample - loss: 1.0664e-04 -
accuracy: 1.0000 - val_loss: 7.6744e-06 - val_accuracy: 1.0000
Epoch 343/800
114/114 [=====] - 0s 902us/sample - loss: 1.0812e-04 -
accuracy: 1.0000 - val_loss: 7.2714e-06 - val_accuracy: 1.0000
Epoch 344/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0828e-04 -
accuracy: 1.0000 - val_loss: 7.2487e-06 - val_accuracy: 1.0000
Epoch 345/800
114/114 [=====] - 0s 915us/sample - loss: 1.0813e-04 -
accuracy: 1.0000 - val_loss: 7.8277e-06 - val_accuracy: 1.0000
Epoch 346/800
114/114 [=====] - 0s 956us/sample - loss: 1.0613e-04 -
accuracy: 1.0000 - val_loss: 8.2363e-06 - val_accuracy: 1.0000
Epoch 347/800
114/114 [=====] - 0s 874us/sample - loss: 1.0490e-04 -
accuracy: 1.0000 - val_loss: 8.3045e-06 - val_accuracy: 1.0000
Epoch 348/800
114/114 [=====] - 0s 888us/sample - loss: 1.0478e-04 -
accuracy: 1.0000 - val_loss: 8.1001e-06 - val_accuracy: 1.0000
Epoch 349/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0436e-04 -
accuracy: 1.0000 - val_loss: 8.0150e-06 - val_accuracy: 1.0000
Epoch 350/800
114/114 [=====] - 0s 889us/sample - loss: 1.0845e-04 -
accuracy: 1.0000 - val_loss: 7.4587e-06 - val_accuracy: 1.0000
Epoch 351/800
114/114 [=====] - 0s 873us/sample - loss: 1.0418e-04 -
accuracy: 1.0000 - val_loss: 7.3906e-06 - val_accuracy: 1.0000
Epoch 352/800
114/114 [=====] - 0s 951us/sample - loss: 1.0433e-04 -
accuracy: 1.0000 - val_loss: 7.4701e-06 - val_accuracy: 1.0000
Epoch 353/800
114/114 [=====] - 0s 894us/sample - loss: 1.0402e-04 -
accuracy: 1.0000 - val_loss: 7.5382e-06 - val_accuracy: 1.0000
Epoch 354/800
114/114 [=====] - 0s 912us/sample - loss: 1.0283e-04 -
accuracy: 1.0000 - val_loss: 7.8390e-06 - val_accuracy: 1.0000
Epoch 355/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0204e-04 -
accuracy: 1.0000 - val_loss: 8.1853e-06 - val_accuracy: 1.0000
Epoch 356/800
114/114 [=====] - 0s 942us/sample - loss: 1.0345e-04 -
accuracy: 1.0000 - val_loss: 8.2931e-06 - val_accuracy: 1.0000
Epoch 357/800
114/114 [=====] - 0s 913us/sample - loss: 1.0245e-04 -
accuracy: 1.0000 - val_loss: 8.0320e-06 - val_accuracy: 1.0000
Epoch 358/800

114/114 [=====] - 0s 886us/sample - loss: 1.0762e-04 -
accuracy: 1.0000 - val_loss: 7.3282e-06 - val_accuracy: 1.0000
Epoch 359/800

114/114 [=====] - 0s 2ms/sample - loss: 1.0166e-04 -
accuracy: 1.0000 - val_loss: 7.3793e-06 - val_accuracy: 1.0000
Epoch 360/800

114/114 [=====] - 0s 886us/sample - loss: 1.0210e-04 -
accuracy: 1.0000 - val_loss: 7.2033e-06 - val_accuracy: 1.0000
Epoch 361/800

114/114 [=====] - 0s 913us/sample - loss: 1.0046e-04 -
accuracy: 1.0000 - val_loss: 7.4020e-06 - val_accuracy: 1.0000
Epoch 362/800

114/114 [=====] - 0s 888us/sample - loss: 1.0072e-04 -
accuracy: 1.0000 - val_loss: 7.6290e-06 - val_accuracy: 1.0000
Epoch 363/800

114/114 [=====] - 0s 870us/sample - loss: 1.0054e-04 -
accuracy: 1.0000 - val_loss: 7.7539e-06 - val_accuracy: 1.0000
Epoch 364/800

114/114 [=====] - 0s 868us/sample - loss: 1.0017e-04 -
accuracy: 1.0000 - val_loss: 7.6914e-06 - val_accuracy: 1.0000
Epoch 365/800

114/114 [=====] - 0s 2ms/sample - loss: 9.9109e-05 -
accuracy: 1.0000 - val_loss: 7.5609e-06 - val_accuracy: 1.0000
Epoch 366/800

114/114 [=====] - 0s 860us/sample - loss: 1.0023e-04 -
accuracy: 1.0000 - val_loss: 7.1636e-06 - val_accuracy: 1.0000
Epoch 367/800

114/114 [=====] - 0s 918us/sample - loss: 1.0117e-04 -
accuracy: 1.0000 - val_loss: 6.9763e-06 - val_accuracy: 1.0000
Epoch 368/800

114/114 [=====] - 0s 863us/sample - loss: 9.9328e-05 -
accuracy: 1.0000 - val_loss: 7.3339e-06 - val_accuracy: 1.0000
Epoch 369/800

114/114 [=====] - 0s 2ms/sample - loss: 9.8137e-05 -
accuracy: 1.0000 - val_loss: 7.4474e-06 - val_accuracy: 1.0000
Epoch 370/800

114/114 [=====] - 0s 918us/sample - loss: 9.7847e-05 -
accuracy: 1.0000 - val_loss: 7.6914e-06 - val_accuracy: 1.0000
Epoch 371/800

114/114 [=====] - 0s 894us/sample - loss: 9.9604e-05 -
accuracy: 1.0000 - val_loss: 7.5950e-06 - val_accuracy: 1.0000
Epoch 372/800

114/114 [=====] - 0s 909us/sample - loss: 9.7502e-05 -
accuracy: 1.0000 - val_loss: 7.6006e-06 - val_accuracy: 1.0000
Epoch 373/800

114/114 [=====] - 0s 2ms/sample - loss: 9.8188e-05 -
accuracy: 1.0000 - val_loss: 7.4587e-06 - val_accuracy: 1.0000
Epoch 374/800

114/114 [=====] - 0s 947us/sample - loss: 9.7841e-05 -
accuracy: 1.0000 - val_loss: 7.5609e-06 - val_accuracy: 1.0000
Epoch 375/800

114/114 [=====] - 0s 886us/sample - loss: 9.6841e-05 -
accuracy: 1.0000 - val_loss: 7.2941e-06 - val_accuracy: 1.0000
Epoch 376/800

114/114 [=====] - 0s 900us/sample - loss: 9.6198e-05 -
accuracy: 1.0000 - val_loss: 7.1352e-06 - val_accuracy: 1.0000
Epoch 377/800

114/114 [=====] - 0s 860us/sample - loss: 9.5998e-05 -
accuracy: 1.0000 - val_loss: 6.9422e-06 - val_accuracy: 1.0000
Epoch 378/800

114/114 [=====] - 0s 2ms/sample - loss: 9.6479e-05 -
accuracy: 1.0000 - val_loss: 6.8230e-06 - val_accuracy: 1.0000
Epoch 379/800

114/114 [=====] - 0s 939us/sample - loss: 9.6200e-05 -
accuracy: 1.0000 - val_loss: 6.8457e-06 - val_accuracy: 1.0000
Epoch 380/800

114/114 [=====] - 0s 922us/sample - loss: 9.6226e-05 -
accuracy: 1.0000 - val_loss: 7.1920e-06 - val_accuracy: 1.0000
Epoch 381/800

114/114 [=====] - 0s 900us/sample - loss: 9.4835e-05 -
accuracy: 1.0000 - val_loss: 7.2828e-06 - val_accuracy: 1.0000
Epoch 382/800

114/114 [=====] - 0s 2ms/sample - loss: 9.6592e-05 -
accuracy: 1.0000 - val_loss: 7.4871e-06 - val_accuracy: 1.0000
Epoch 383/800

114/114 [=====] - 0s 916us/sample - loss: 9.5799e-05 -
accuracy: 1.0000 - val_loss: 7.1238e-06 - val_accuracy: 1.0000
Epoch 384/800

114/114 [=====] - 0s 881us/sample - loss: 9.3773e-05 -
accuracy: 1.0000 - val_loss: 7.0103e-06 - val_accuracy: 1.0000
Epoch 385/800

114/114 [=====] - 0s 891us/sample - loss: 9.5640e-05 -
accuracy: 1.0000 - val_loss: 6.8117e-06 - val_accuracy: 1.0000
Epoch 386/800

114/114 [=====] - 0s 899us/sample - loss: 9.3947e-05 -
accuracy: 1.0000 - val_loss: 6.9876e-06 - val_accuracy: 1.0000
Epoch 387/800

114/114 [=====] - 0s 2ms/sample - loss: 9.4601e-05 -
accuracy: 1.0000 - val_loss: 7.2317e-06 - val_accuracy: 1.0000
Epoch 388/800

114/114 [=====] - 0s 947us/sample - loss: 9.4231e-05 -
accuracy: 1.0000 - val_loss: 7.0614e-06 - val_accuracy: 1.0000
Epoch 389/800

114/114 [=====] - 0s 852us/sample - loss: 9.4494e-05 -
accuracy: 1.0000 - val_loss: 7.2941e-06 - val_accuracy: 1.0000
Epoch 390/800

114/114 [=====] - 0s 914us/sample - loss: 9.3994e-05 -
accuracy: 1.0000 - val_loss: 7.1125e-06 - val_accuracy: 1.0000
Epoch 391/800
114/114 [=====] - 0s 881us/sample - loss: 9.2402e-05 -
accuracy: 1.0000 - val_loss: 7.0046e-06 - val_accuracy: 1.0000
Epoch 392/800
114/114 [=====] - 0s 2ms/sample - loss: 9.2428e-05 -
accuracy: 1.0000 - val_loss: 6.7322e-06 - val_accuracy: 1.0000
Epoch 393/800
114/114 [=====] - 0s 911us/sample - loss: 9.2122e-05 -
accuracy: 1.0000 - val_loss: 6.6754e-06 - val_accuracy: 1.0000
Epoch 394/800
114/114 [=====] - 0s 884us/sample - loss: 9.1912e-05 -
accuracy: 1.0000 - val_loss: 6.6584e-06 - val_accuracy: 1.0000
Epoch 395/800
114/114 [=====] - 0s 916us/sample - loss: 9.4016e-05 -
accuracy: 1.0000 - val_loss: 6.9649e-06 - val_accuracy: 1.0000
Epoch 396/800
114/114 [=====] - 0s 897us/sample - loss: 9.1555e-05 -
accuracy: 1.0000 - val_loss: 6.8060e-06 - val_accuracy: 1.0000
Epoch 397/800
114/114 [=====] - 0s 971us/sample - loss: 9.0776e-05 -
accuracy: 1.0000 - val_loss: 6.7833e-06 - val_accuracy: 1.0000
Epoch 398/800
114/114 [=====] - 0s 860us/sample - loss: 9.2077e-05 -
accuracy: 1.0000 - val_loss: 6.6754e-06 - val_accuracy: 1.0000
Epoch 399/800
114/114 [=====] - 0s 918us/sample - loss: 9.0250e-05 -
accuracy: 1.0000 - val_loss: 6.8968e-06 - val_accuracy: 1.0000
Epoch 400/800
114/114 [=====] - 0s 872us/sample - loss: 8.9921e-05 -
accuracy: 1.0000 - val_loss: 6.9252e-06 - val_accuracy: 1.0000
Epoch 401/800
114/114 [=====] - 0s 2ms/sample - loss: 8.9864e-05 -
accuracy: 1.0000 - val_loss: 6.8400e-06 - val_accuracy: 1.0000
Epoch 402/800
114/114 [=====] - 0s 964us/sample - loss: 8.9644e-05 -
accuracy: 1.0000 - val_loss: 6.6471e-06 - val_accuracy: 1.0000
Epoch 403/800
114/114 [=====] - 0s 850us/sample - loss: 8.9038e-05 -
accuracy: 1.0000 - val_loss: 6.5165e-06 - val_accuracy: 1.0000
Epoch 404/800
114/114 [=====] - 0s 908us/sample - loss: 8.8828e-05 -
accuracy: 1.0000 - val_loss: 6.4484e-06 - val_accuracy: 1.0000
Epoch 405/800
114/114 [=====] - 0s 871us/sample - loss: 8.9449e-05 -
accuracy: 1.0000 - val_loss: 6.3689e-06 - val_accuracy: 1.0000
Epoch 406/800

114/114 [=====] - 0s 2ms/sample - loss: 8.9026e-05 -
 accuracy: 1.0000 - val_loss: 6.4938e-06 - val_accuracy: 1.0000
 Epoch 407/800
 114/114 [=====] - 0s 919us/sample - loss: 8.8193e-05 -
 accuracy: 1.0000 - val_loss: 6.4711e-06 - val_accuracy: 1.0000
 Epoch 408/800
 114/114 [=====] - 0s 894us/sample - loss: 9.0497e-05 -
 accuracy: 1.0000 - val_loss: 6.6811e-06 - val_accuracy: 1.0000
 Epoch 409/800
 114/114 [=====] - 0s 910us/sample - loss: 9.0725e-05 -
 accuracy: 1.0000 - val_loss: 6.3576e-06 - val_accuracy: 1.0000
 Epoch 410/800
 114/114 [=====] - 0s 2ms/sample - loss: 8.8899e-05 -
 accuracy: 1.0000 - val_loss: 6.5562e-06 - val_accuracy: 1.0000
 Epoch 411/800
 114/114 [=====] - 0s 949us/sample - loss: 8.8040e-05 -
 accuracy: 1.0000 - val_loss: 6.4597e-06 - val_accuracy: 1.0000
 Epoch 412/800
 114/114 [=====] - 0s 903us/sample - loss: 8.6774e-05 -
 accuracy: 1.0000 - val_loss: 6.4654e-06 - val_accuracy: 1.0000
 Epoch 413/800
 114/114 [=====] - 0s 870us/sample - loss: 8.7559e-05 -
 accuracy: 1.0000 - val_loss: 6.5449e-06 - val_accuracy: 1.0000
 Epoch 414/800
 114/114 [=====] - 0s 882us/sample - loss: 8.8632e-05 -
 accuracy: 1.0000 - val_loss: 6.2440e-06 - val_accuracy: 1.0000
 Epoch 415/800
 114/114 [=====] - 0s 2ms/sample - loss: 8.8203e-05 -
 accuracy: 1.0000 - val_loss: 6.4143e-06 - val_accuracy: 1.0000
 Epoch 416/800
 114/114 [=====] - 0s 918us/sample - loss: 8.7593e-05 -
 accuracy: 1.0000 - val_loss: 6.2213e-06 - val_accuracy: 1.0000
 Epoch 417/800
 114/114 [=====] - 0s 879us/sample - loss: 8.6318e-05 -
 accuracy: 1.0000 - val_loss: 6.2838e-06 - val_accuracy: 1.0000
 Epoch 418/800
 114/114 [=====] - 0s 877us/sample - loss: 8.6252e-05 -
 accuracy: 1.0000 - val_loss: 6.1419e-06 - val_accuracy: 1.0000
 Epoch 419/800
 114/114 [=====] - 0s 2ms/sample - loss: 8.6687e-05 -
 accuracy: 1.0000 - val_loss: 6.3235e-06 - val_accuracy: 1.0000
 Epoch 420/800
 114/114 [=====] - 0s 890us/sample - loss: 8.5439e-05 -
 accuracy: 1.0000 - val_loss: 6.3462e-06 - val_accuracy: 1.0000
 Epoch 421/800
 114/114 [=====] - 0s 880us/sample - loss: 8.5349e-05 -
 accuracy: 1.0000 - val_loss: 6.1930e-06 - val_accuracy: 1.0000
 Epoch 422/800

114/114 [=====] - 0s 911us/sample - loss: 8.4799e-05 -
 accuracy: 1.0000 - val_loss: 6.0738e-06 - val_accuracy: 1.0000
 Epoch 423/800
 114/114 [=====] - 0s 864us/sample - loss: 8.7745e-05 -
 accuracy: 1.0000 - val_loss: 5.8694e-06 - val_accuracy: 1.0000
 Epoch 424/800
 114/114 [=====] - 0s 2ms/sample - loss: 8.6285e-05 -
 accuracy: 1.0000 - val_loss: 6.2951e-06 - val_accuracy: 1.0000
 Epoch 425/800
 114/114 [=====] - 0s 957us/sample - loss: 8.4082e-05 -
 accuracy: 1.0000 - val_loss: 6.3973e-06 - val_accuracy: 1.0000
 Epoch 426/800
 114/114 [=====] - 0s 887us/sample - loss: 8.4532e-05 -
 accuracy: 1.0000 - val_loss: 6.3689e-06 - val_accuracy: 1.0000
 Epoch 427/800
 114/114 [=====] - 0s 881us/sample - loss: 8.3599e-05 -
 accuracy: 1.0000 - val_loss: 6.1873e-06 - val_accuracy: 1.0000
 Epoch 428/800
 114/114 [=====] - 0s 871us/sample - loss: 8.3835e-05 -
 accuracy: 1.0000 - val_loss: 5.9489e-06 - val_accuracy: 1.0000
 Epoch 429/800
 114/114 [=====] - 0s 2ms/sample - loss: 8.2973e-05 -
 accuracy: 1.0000 - val_loss: 5.8751e-06 - val_accuracy: 1.0000
 Epoch 430/800
 114/114 [=====] - 0s 904us/sample - loss: 8.3123e-05 -
 accuracy: 1.0000 - val_loss: 5.8467e-06 - val_accuracy: 1.0000
 Epoch 431/800
 114/114 [=====] - 0s 880us/sample - loss: 8.3685e-05 -
 accuracy: 1.0000 - val_loss: 6.0681e-06 - val_accuracy: 1.0000
 Epoch 432/800
 114/114 [=====] - 0s 2ms/sample - loss: 8.2499e-05 -
 accuracy: 1.0000 - val_loss: 6.0454e-06 - val_accuracy: 1.0000
 Epoch 433/800
 114/114 [=====] - 0s 891us/sample - loss: 8.2198e-05 -
 accuracy: 1.0000 - val_loss: 6.1419e-06 - val_accuracy: 1.0000
 Epoch 434/800
 114/114 [=====] - 0s 895us/sample - loss: 8.1823e-05 -
 accuracy: 1.0000 - val_loss: 6.1532e-06 - val_accuracy: 1.0000
 Epoch 435/800
 114/114 [=====] - 0s 887us/sample - loss: 8.2896e-05 -
 accuracy: 1.0000 - val_loss: 5.8978e-06 - val_accuracy: 1.0000
 Epoch 436/800
 114/114 [=====] - 0s 852us/sample - loss: 8.3457e-05 -
 accuracy: 1.0000 - val_loss: 6.0624e-06 - val_accuracy: 1.0000
 Epoch 437/800
 114/114 [=====] - 0s 2ms/sample - loss: 8.1610e-05 -
 accuracy: 1.0000 - val_loss: 6.0454e-06 - val_accuracy: 1.0000
 Epoch 438/800

114/114 [=====] - 0s 936us/sample - loss: 8.0889e-05 -
accuracy: 1.0000 - val_loss: 5.8524e-06 - val_accuracy: 1.0000
Epoch 439/800

114/114 [=====] - 0s 893us/sample - loss: 8.0580e-05 -
accuracy: 1.0000 - val_loss: 5.7900e-06 - val_accuracy: 1.0000
Epoch 440/800

114/114 [=====] - 0s 902us/sample - loss: 8.0433e-05 -
accuracy: 1.0000 - val_loss: 5.7559e-06 - val_accuracy: 1.0000
Epoch 441/800

114/114 [=====] - 0s 2ms/sample - loss: 8.0891e-05 -
accuracy: 1.0000 - val_loss: 5.7105e-06 - val_accuracy: 1.0000
Epoch 442/800

114/114 [=====] - 0s 973us/sample - loss: 8.1925e-05 -
accuracy: 1.0000 - val_loss: 5.6878e-06 - val_accuracy: 1.0000
Epoch 443/800

114/114 [=====] - 0s 901us/sample - loss: 7.9896e-05 -
accuracy: 1.0000 - val_loss: 5.9489e-06 - val_accuracy: 1.0000
Epoch 444/800

114/114 [=====] - 0s 2ms/sample - loss: 7.9579e-05 -
accuracy: 1.0000 - val_loss: 6.0965e-06 - val_accuracy: 1.0000
Epoch 445/800

114/114 [=====] - 0s 887us/sample - loss: 8.2042e-05 -
accuracy: 1.0000 - val_loss: 6.2667e-06 - val_accuracy: 1.0000
Epoch 446/800

114/114 [=====] - 0s 894us/sample - loss: 8.0648e-05 -
accuracy: 1.0000 - val_loss: 6.1305e-06 - val_accuracy: 1.0000
Epoch 447/800

114/114 [=====] - 0s 2ms/sample - loss: 7.9315e-05 -
accuracy: 1.0000 - val_loss: 5.8808e-06 - val_accuracy: 1.0000
Epoch 448/800

114/114 [=====] - 0s 886us/sample - loss: 8.1127e-05 -
accuracy: 1.0000 - val_loss: 5.5289e-06 - val_accuracy: 1.0000
Epoch 449/800

114/114 [=====] - 0s 899us/sample - loss: 7.9149e-05 -
accuracy: 1.0000 - val_loss: 5.5345e-06 - val_accuracy: 1.0000
Epoch 450/800

114/114 [=====] - 0s 895us/sample - loss: 7.9024e-05 -
accuracy: 1.0000 - val_loss: 5.5175e-06 - val_accuracy: 1.0000
Epoch 451/800

114/114 [=====] - 0s 2ms/sample - loss: 7.8404e-05 -
accuracy: 1.0000 - val_loss: 5.5856e-06 - val_accuracy: 1.0000
Epoch 452/800

114/114 [=====] - 0s 887us/sample - loss: 7.8875e-05 -
accuracy: 1.0000 - val_loss: 5.8070e-06 - val_accuracy: 1.0000
Epoch 453/800

114/114 [=====] - 0s 917us/sample - loss: 7.8336e-05 -
accuracy: 1.0000 - val_loss: 5.9602e-06 - val_accuracy: 1.0000
Epoch 454/800

114/114 [=====] - 0s 882us/sample - loss: 7.8672e-05 -
accuracy: 1.0000 - val_loss: 5.7899e-06 - val_accuracy: 1.0000
Epoch 455/800

114/114 [=====] - 0s 854us/sample - loss: 7.8184e-05 -
accuracy: 1.0000 - val_loss: 5.8808e-06 - val_accuracy: 1.0000
Epoch 456/800

114/114 [=====] - 0s 968us/sample - loss: 8.0119e-05 -
accuracy: 1.0000 - val_loss: 5.5743e-06 - val_accuracy: 1.0000
Epoch 457/800

114/114 [=====] - 0s 847us/sample - loss: 7.8854e-05 -
accuracy: 1.0000 - val_loss: 5.4437e-06 - val_accuracy: 1.0000
Epoch 458/800

114/114 [=====] - 0s 921us/sample - loss: 7.6872e-05 -
accuracy: 1.0000 - val_loss: 5.6253e-06 - val_accuracy: 1.0000
Epoch 459/800

114/114 [=====] - 0s 885us/sample - loss: 7.6527e-05 -
accuracy: 1.0000 - val_loss: 5.7105e-06 - val_accuracy: 1.0000
Epoch 460/800

114/114 [=====] - 0s 2ms/sample - loss: 7.6568e-05 -
accuracy: 1.0000 - val_loss: 5.7786e-06 - val_accuracy: 1.0000
Epoch 461/800

114/114 [=====] - 0s 931us/sample - loss: 7.6030e-05 -
accuracy: 1.0000 - val_loss: 5.7048e-06 - val_accuracy: 1.0000
Epoch 462/800

114/114 [=====] - 0s 893us/sample - loss: 7.6958e-05 -
accuracy: 1.0000 - val_loss: 5.6764e-06 - val_accuracy: 1.0000
Epoch 463/800

114/114 [=====] - 0s 869us/sample - loss: 7.6300e-05 -
accuracy: 1.0000 - val_loss: 5.3983e-06 - val_accuracy: 1.0000
Epoch 464/800

114/114 [=====] - 0s 967us/sample - loss: 7.6297e-05 -
accuracy: 1.0000 - val_loss: 5.2337e-06 - val_accuracy: 1.0000
Epoch 465/800

114/114 [=====] - 0s 856us/sample - loss: 7.7693e-05 -
accuracy: 1.0000 - val_loss: 5.4551e-06 - val_accuracy: 1.0000
Epoch 466/800

114/114 [=====] - 0s 906us/sample - loss: 7.5634e-05 -
accuracy: 1.0000 - val_loss: 5.3415e-06 - val_accuracy: 1.0000
Epoch 467/800

114/114 [=====] - 0s 901us/sample - loss: 7.5289e-05 -
accuracy: 1.0000 - val_loss: 5.4891e-06 - val_accuracy: 1.0000
Epoch 468/800

114/114 [=====] - 0s 916us/sample - loss: 7.4796e-05 -
accuracy: 1.0000 - val_loss: 5.5856e-06 - val_accuracy: 1.0000
Epoch 469/800

114/114 [=====] - 0s 931us/sample - loss: 7.4660e-05 -
accuracy: 1.0000 - val_loss: 5.5118e-06 - val_accuracy: 1.0000
Epoch 470/800

114/114 [=====] - 0s 888us/sample - loss: 7.5881e-05 - accuracy: 1.0000 - val_loss: 5.6878e-06 - val_accuracy: 1.0000
Epoch 471/800

114/114 [=====] - 0s 876us/sample - loss: 7.4408e-05 - accuracy: 1.0000 - val_loss: 5.5572e-06 - val_accuracy: 1.0000
Epoch 472/800

114/114 [=====] - 0s 2ms/sample - loss: 7.3752e-05 - accuracy: 1.0000 - val_loss: 5.4210e-06 - val_accuracy: 1.0000
Epoch 473/800

114/114 [=====] - 0s 908us/sample - loss: 7.3124e-05 - accuracy: 1.0000 - val_loss: 5.2280e-06 - val_accuracy: 1.0000
Epoch 474/800

114/114 [=====] - 0s 914us/sample - loss: 7.4073e-05 - accuracy: 1.0000 - val_loss: 5.0180e-06 - val_accuracy: 1.0000
Epoch 475/800

114/114 [=====] - 0s 1ms/sample - loss: 7.3957e-05 - accuracy: 1.0000 - val_loss: 4.9783e-06 - val_accuracy: 1.0000
Epoch 476/800

114/114 [=====] - 0s 2ms/sample - loss: 7.5095e-05 - accuracy: 1.0000 - val_loss: 4.9896e-06 - val_accuracy: 1.0000
Epoch 477/800

114/114 [=====] - 0s 893us/sample - loss: 7.2611e-05 - accuracy: 1.0000 - val_loss: 5.2621e-06 - val_accuracy: 1.0000
Epoch 478/800

114/114 [=====] - 0s 901us/sample - loss: 7.4240e-05 - accuracy: 1.0000 - val_loss: 5.7275e-06 - val_accuracy: 1.0000
Epoch 479/800

114/114 [=====] - 0s 897us/sample - loss: 7.3585e-05 - accuracy: 1.0000 - val_loss: 5.7162e-06 - val_accuracy: 1.0000
Epoch 480/800

114/114 [=====] - 0s 862us/sample - loss: 7.3583e-05 - accuracy: 1.0000 - val_loss: 5.7389e-06 - val_accuracy: 1.0000
Epoch 481/800

114/114 [=====] - 0s 2ms/sample - loss: 7.2845e-05 - accuracy: 1.0000 - val_loss: 5.5288e-06 - val_accuracy: 1.0000
Epoch 482/800

114/114 [=====] - 0s 952us/sample - loss: 7.3771e-05 - accuracy: 1.0000 - val_loss: 5.1769e-06 - val_accuracy: 1.0000
Epoch 483/800

114/114 [=====] - 0s 853us/sample - loss: 7.2306e-05 - accuracy: 1.0000 - val_loss: 5.0520e-06 - val_accuracy: 1.0000
Epoch 484/800

114/114 [=====] - 0s 920us/sample - loss: 7.3975e-05 - accuracy: 1.0000 - val_loss: 5.2677e-06 - val_accuracy: 1.0000
Epoch 485/800

114/114 [=====] - 0s 2ms/sample - loss: 7.1235e-05 - accuracy: 1.0000 - val_loss: 5.1996e-06 - val_accuracy: 1.0000
Epoch 486/800

114/114 [=====] - 0s 950us/sample - loss: 7.0901e-05 -
 accuracy: 1.0000 - val_loss: 5.2053e-06 - val_accuracy: 1.0000
 Epoch 487/800
 114/114 [=====] - 0s 912us/sample - loss: 7.1031e-05 -
 accuracy: 1.0000 - val_loss: 5.1883e-06 - val_accuracy: 1.0000
 Epoch 488/800
 114/114 [=====] - 0s 891us/sample - loss: 7.2416e-05 -
 accuracy: 1.0000 - val_loss: 5.3302e-06 - val_accuracy: 1.0000
 Epoch 489/800
 114/114 [=====] - 0s 2ms/sample - loss: 7.1120e-05 -
 accuracy: 1.0000 - val_loss: 5.1542e-06 - val_accuracy: 1.0000
 Epoch 490/800
 114/114 [=====] - 0s 884us/sample - loss: 7.0224e-05 -
 accuracy: 1.0000 - val_loss: 5.1372e-06 - val_accuracy: 1.0000
 Epoch 491/800
 114/114 [=====] - 0s 903us/sample - loss: 7.0175e-05 -
 accuracy: 1.0000 - val_loss: 5.1429e-06 - val_accuracy: 1.0000
 Epoch 492/800
 114/114 [=====] - 0s 892us/sample - loss: 7.0666e-05 -
 accuracy: 1.0000 - val_loss: 4.9726e-06 - val_accuracy: 1.0000
 Epoch 493/800
 114/114 [=====] - 0s 886us/sample - loss: 6.9807e-05 -
 accuracy: 1.0000 - val_loss: 5.0293e-06 - val_accuracy: 1.0000
 Epoch 494/800
 114/114 [=====] - 0s 2ms/sample - loss: 6.9547e-05 -
 accuracy: 1.0000 - val_loss: 5.0293e-06 - val_accuracy: 1.0000
 Epoch 495/800
 114/114 [=====] - 0s 963us/sample - loss: 6.9838e-05 -
 accuracy: 1.0000 - val_loss: 5.1656e-06 - val_accuracy: 1.0000
 Epoch 496/800
 114/114 [=====] - 0s 862us/sample - loss: 6.9531e-05 -
 accuracy: 1.0000 - val_loss: 5.1939e-06 - val_accuracy: 1.0000
 Epoch 497/800
 114/114 [=====] - 0s 934us/sample - loss: 6.9633e-05 -
 accuracy: 1.0000 - val_loss: 5.0293e-06 - val_accuracy: 1.0000
 Epoch 498/800
 114/114 [=====] - 0s 865us/sample - loss: 6.8851e-05 -
 accuracy: 1.0000 - val_loss: 5.0577e-06 - val_accuracy: 1.0000
 Epoch 499/800
 114/114 [=====] - 0s 861us/sample - loss: 6.9024e-05 -
 accuracy: 1.0000 - val_loss: 4.9782e-06 - val_accuracy: 1.0000
 Epoch 500/800
 114/114 [=====] - 0s 2ms/sample - loss: 7.0167e-05 -
 accuracy: 1.0000 - val_loss: 5.1656e-06 - val_accuracy: 1.0000
 Epoch 501/800
 114/114 [=====] - 0s 923us/sample - loss: 6.8867e-05 -
 accuracy: 1.0000 - val_loss: 4.9839e-06 - val_accuracy: 1.0000
 Epoch 502/800

114/114 [=====] - 0s 904us/sample - loss: 6.8897e-05 - accuracy: 1.0000 - val_loss: 5.0464e-06 - val_accuracy: 1.0000
Epoch 503/800
114/114 [=====] - 0s 877us/sample - loss: 6.8060e-05 - accuracy: 1.0000 - val_loss: 4.8704e-06 - val_accuracy: 1.0000
Epoch 504/800
114/114 [=====] - 0s 2ms/sample - loss: 7.0619e-05 - accuracy: 1.0000 - val_loss: 4.6547e-06 - val_accuracy: 1.0000
Epoch 505/800
114/114 [=====] - 0s 965us/sample - loss: 6.8188e-05 - accuracy: 1.0000 - val_loss: 4.7739e-06 - val_accuracy: 1.0000
Epoch 506/800
114/114 [=====] - 0s 913us/sample - loss: 6.8911e-05 - accuracy: 1.0000 - val_loss: 5.0350e-06 - val_accuracy: 1.0000
Epoch 507/800
114/114 [=====] - 0s 856us/sample - loss: 6.9250e-05 - accuracy: 1.0000 - val_loss: 5.1542e-06 - val_accuracy: 1.0000
Epoch 508/800
114/114 [=====] - 0s 2ms/sample - loss: 6.7474e-05 - accuracy: 1.0000 - val_loss: 4.9726e-06 - val_accuracy: 1.0000
Epoch 509/800
114/114 [=====] - 0s 969us/sample - loss: 6.9972e-05 - accuracy: 1.0000 - val_loss: 4.6320e-06 - val_accuracy: 1.0000
Epoch 510/800
114/114 [=====] - 0s 904us/sample - loss: 6.6954e-05 - accuracy: 1.0000 - val_loss: 4.6036e-06 - val_accuracy: 1.0000
Epoch 511/800
114/114 [=====] - 0s 864us/sample - loss: 6.7051e-05 - accuracy: 1.0000 - val_loss: 4.7115e-06 - val_accuracy: 1.0000
Epoch 512/800
114/114 [=====] - 0s 2ms/sample - loss: 6.6483e-05 - accuracy: 1.0000 - val_loss: 4.7058e-06 - val_accuracy: 1.0000
Epoch 513/800
114/114 [=====] - 0s 898us/sample - loss: 6.6426e-05 - accuracy: 1.0000 - val_loss: 4.8704e-06 - val_accuracy: 1.0000
Epoch 514/800
114/114 [=====] - 0s 875us/sample - loss: 6.6177e-05 - accuracy: 1.0000 - val_loss: 4.8420e-06 - val_accuracy: 1.0000
Epoch 515/800
114/114 [=====] - 0s 944us/sample - loss: 6.7289e-05 - accuracy: 1.0000 - val_loss: 4.9839e-06 - val_accuracy: 1.0000
Epoch 516/800
114/114 [=====] - 0s 2ms/sample - loss: 6.6614e-05 - accuracy: 1.0000 - val_loss: 4.7966e-06 - val_accuracy: 1.0000
Epoch 517/800
114/114 [=====] - 0s 882us/sample - loss: 6.6507e-05 - accuracy: 1.0000 - val_loss: 4.6036e-06 - val_accuracy: 1.0000
Epoch 518/800

114/114 [=====] - 0s 924us/sample - loss: 6.5369e-05 - accuracy: 1.0000 - val_loss: 4.6036e-06 - val_accuracy: 1.0000
Epoch 519/800
114/114 [=====] - 0s 890us/sample - loss: 6.5874e-05 - accuracy: 1.0000 - val_loss: 4.7512e-06 - val_accuracy: 1.0000
Epoch 520/800
114/114 [=====] - 0s 2ms/sample - loss: 6.5711e-05 - accuracy: 1.0000 - val_loss: 4.7285e-06 - val_accuracy: 1.0000
Epoch 521/800
114/114 [=====] - 0s 943us/sample - loss: 6.5296e-05 - accuracy: 1.0000 - val_loss: 4.7512e-06 - val_accuracy: 1.0000
Epoch 522/800
114/114 [=====] - 0s 867us/sample - loss: 6.4638e-05 - accuracy: 1.0000 - val_loss: 4.6206e-06 - val_accuracy: 1.0000
Epoch 523/800
114/114 [=====] - 0s 891us/sample - loss: 6.6416e-05 - accuracy: 1.0000 - val_loss: 4.4504e-06 - val_accuracy: 1.0000
Epoch 524/800
114/114 [=====] - 0s 886us/sample - loss: 6.5438e-05 - accuracy: 1.0000 - val_loss: 4.6490e-06 - val_accuracy: 1.0000
Epoch 525/800
114/114 [=====] - 0s 2ms/sample - loss: 6.5372e-05 - accuracy: 1.0000 - val_loss: 4.7171e-06 - val_accuracy: 1.0000
Epoch 526/800
114/114 [=====] - 0s 850us/sample - loss: 6.3892e-05 - accuracy: 1.0000 - val_loss: 4.6320e-06 - val_accuracy: 1.0000
Epoch 527/800
114/114 [=====] - 0s 913us/sample - loss: 6.3440e-05 - accuracy: 1.0000 - val_loss: 4.4958e-06 - val_accuracy: 1.0000
Epoch 528/800
114/114 [=====] - 0s 953us/sample - loss: 6.3573e-05 - accuracy: 1.0000 - val_loss: 4.4390e-06 - val_accuracy: 1.0000
Epoch 529/800
114/114 [=====] - 0s 918us/sample - loss: 6.4170e-05 - accuracy: 1.0000 - val_loss: 4.3141e-06 - val_accuracy: 1.0000
Epoch 530/800
114/114 [=====] - 0s 875us/sample - loss: 6.3815e-05 - accuracy: 1.0000 - val_loss: 4.4220e-06 - val_accuracy: 1.0000
Epoch 531/800
114/114 [=====] - 0s 949us/sample - loss: 6.2963e-05 - accuracy: 1.0000 - val_loss: 4.4731e-06 - val_accuracy: 1.0000
Epoch 532/800
114/114 [=====] - 0s 885us/sample - loss: 6.3008e-05 - accuracy: 1.0000 - val_loss: 4.4617e-06 - val_accuracy: 1.0000
Epoch 533/800
114/114 [=====] - 0s 903us/sample - loss: 6.2940e-05 - accuracy: 1.0000 - val_loss: 4.4333e-06 - val_accuracy: 1.0000
Epoch 534/800

114/114 [=====] - 0s 909us/sample - loss: 6.3043e-05 - accuracy: 1.0000 - val_loss: 4.4901e-06 - val_accuracy: 1.0000
Epoch 535/800
114/114 [=====] - 0s 2ms/sample - loss: 6.2527e-05 - accuracy: 1.0000 - val_loss: 4.4617e-06 - val_accuracy: 1.0000
Epoch 536/800
114/114 [=====] - 0s 881us/sample - loss: 6.3131e-05 - accuracy: 1.0000 - val_loss: 4.4617e-06 - val_accuracy: 1.0000
Epoch 537/800
114/114 [=====] - 0s 872us/sample - loss: 6.4603e-05 - accuracy: 1.0000 - val_loss: 4.6831e-06 - val_accuracy: 1.0000
Epoch 538/800
114/114 [=====] - 0s 2ms/sample - loss: 6.2324e-05 - accuracy: 1.0000 - val_loss: 4.5582e-06 - val_accuracy: 1.0000
Epoch 539/800
114/114 [=====] - 0s 890us/sample - loss: 6.2101e-05 - accuracy: 1.0000 - val_loss: 4.4163e-06 - val_accuracy: 1.0000
Epoch 540/800
114/114 [=====] - 0s 884us/sample - loss: 6.2764e-05 - accuracy: 1.0000 - val_loss: 4.2347e-06 - val_accuracy: 1.0000
Epoch 541/800
114/114 [=====] - 0s 886us/sample - loss: 6.2212e-05 - accuracy: 1.0000 - val_loss: 4.2176e-06 - val_accuracy: 1.0000
Epoch 542/800
114/114 [=====] - 0s 861us/sample - loss: 6.2095e-05 - accuracy: 1.0000 - val_loss: 4.3822e-06 - val_accuracy: 1.0000
Epoch 543/800
114/114 [=====] - 0s 991us/sample - loss: 6.1544e-05 - accuracy: 1.0000 - val_loss: 4.5014e-06 - val_accuracy: 1.0000
Epoch 544/800
114/114 [=====] - 0s 899us/sample - loss: 6.1647e-05 - accuracy: 1.0000 - val_loss: 4.5185e-06 - val_accuracy: 1.0000
Epoch 545/800
114/114 [=====] - 0s 864us/sample - loss: 6.1836e-05 - accuracy: 1.0000 - val_loss: 4.2687e-06 - val_accuracy: 1.0000
Epoch 546/800
114/114 [=====] - 0s 969us/sample - loss: 6.1389e-05 - accuracy: 1.0000 - val_loss: 4.2630e-06 - val_accuracy: 1.0000
Epoch 547/800
114/114 [=====] - 0s 886us/sample - loss: 6.2759e-05 - accuracy: 1.0000 - val_loss: 4.0700e-06 - val_accuracy: 1.0000
Epoch 548/800
114/114 [=====] - 0s 890us/sample - loss: 6.1103e-05 - accuracy: 1.0000 - val_loss: 4.2006e-06 - val_accuracy: 1.0000
Epoch 549/800
114/114 [=====] - 0s 2ms/sample - loss: 6.0679e-05 - accuracy: 1.0000 - val_loss: 4.3425e-06 - val_accuracy: 1.0000
Epoch 550/800

114/114 [=====] - 0s 920us/sample - loss: 6.0638e-05 -
 accuracy: 1.0000 - val_loss: 4.4276e-06 - val_accuracy: 1.0000
 Epoch 551/800
 114/114 [=====] - 0s 876us/sample - loss: 6.0840e-05 -
 accuracy: 1.0000 - val_loss: 4.2801e-06 - val_accuracy: 1.0000
 Epoch 552/800
 114/114 [=====] - 0s 926us/sample - loss: 6.0122e-05 -
 accuracy: 1.0000 - val_loss: 4.2403e-06 - val_accuracy: 1.0000
 Epoch 553/800
 114/114 [=====] - 0s 2ms/sample - loss: 5.9571e-05 -
 accuracy: 1.0000 - val_loss: 4.2801e-06 - val_accuracy: 1.0000
 Epoch 554/800
 114/114 [=====] - 0s 906us/sample - loss: 5.9309e-05 -
 accuracy: 1.0000 - val_loss: 4.3539e-06 - val_accuracy: 1.0000
 Epoch 555/800
 114/114 [=====] - 0s 880us/sample - loss: 6.0637e-05 -
 accuracy: 1.0000 - val_loss: 4.4504e-06 - val_accuracy: 1.0000
 Epoch 556/800
 114/114 [=====] - 0s 924us/sample - loss: 5.9953e-05 -
 accuracy: 1.0000 - val_loss: 4.2914e-06 - val_accuracy: 1.0000
 Epoch 557/800
 114/114 [=====] - 0s 859us/sample - loss: 5.9005e-05 -
 accuracy: 1.0000 - val_loss: 4.1609e-06 - val_accuracy: 1.0000
 Epoch 558/800
 114/114 [=====] - 0s 980us/sample - loss: 5.8652e-05 -
 accuracy: 1.0000 - val_loss: 4.1495e-06 - val_accuracy: 1.0000
 Epoch 559/800
 114/114 [=====] - 0s 899us/sample - loss: 5.9094e-05 -
 accuracy: 1.0000 - val_loss: 4.2006e-06 - val_accuracy: 1.0000
 Epoch 560/800
 114/114 [=====] - 0s 894us/sample - loss: 5.9288e-05 -
 accuracy: 1.0000 - val_loss: 4.0757e-06 - val_accuracy: 1.0000
 Epoch 561/800
 114/114 [=====] - 0s 956us/sample - loss: 5.8551e-05 -
 accuracy: 1.0000 - val_loss: 4.1665e-06 - val_accuracy: 1.0000
 Epoch 562/800
 114/114 [=====] - 0s 935us/sample - loss: 5.9001e-05 -
 accuracy: 1.0000 - val_loss: 4.2971e-06 - val_accuracy: 1.0000
 Epoch 563/800
 114/114 [=====] - 0s 871us/sample - loss: 5.7930e-05 -
 accuracy: 1.0000 - val_loss: 4.2119e-06 - val_accuracy: 1.0000
 Epoch 564/800
 114/114 [=====] - 0s 865us/sample - loss: 5.7753e-05 -
 accuracy: 1.0000 - val_loss: 4.1098e-06 - val_accuracy: 1.0000
 Epoch 565/800
 114/114 [=====] - 0s 2ms/sample - loss: 5.7717e-05 -
 accuracy: 1.0000 - val_loss: 4.0927e-06 - val_accuracy: 1.0000
 Epoch 566/800

114/114 [=====] - 0s 921us/sample - loss: 5.7539e-05 - accuracy: 1.0000 - val_loss: 4.0700e-06 - val_accuracy: 1.0000
Epoch 567/800
114/114 [=====] - 0s 898us/sample - loss: 5.7312e-05 - accuracy: 1.0000 - val_loss: 4.0303e-06 - val_accuracy: 1.0000
Epoch 568/800
114/114 [=====] - 0s 870us/sample - loss: 5.7363e-05 - accuracy: 1.0000 - val_loss: 3.9622e-06 - val_accuracy: 1.0000
Epoch 569/800
114/114 [=====] - 0s 2ms/sample - loss: 5.7057e-05 - accuracy: 1.0000 - val_loss: 3.9792e-06 - val_accuracy: 1.0000
Epoch 570/800
114/114 [=====] - 0s 889us/sample - loss: 5.7424e-05 - accuracy: 1.0000 - val_loss: 4.0246e-06 - val_accuracy: 1.0000
Epoch 571/800
114/114 [=====] - 0s 898us/sample - loss: 5.8055e-05 - accuracy: 1.0000 - val_loss: 3.9395e-06 - val_accuracy: 1.0000
Epoch 572/800
114/114 [=====] - 0s 876us/sample - loss: 5.6680e-05 - accuracy: 1.0000 - val_loss: 3.9735e-06 - val_accuracy: 1.0000
Epoch 573/800
114/114 [=====] - 0s 2ms/sample - loss: 5.6389e-05 - accuracy: 1.0000 - val_loss: 4.0814e-06 - val_accuracy: 1.0000
Epoch 574/800
114/114 [=====] - 0s 914us/sample - loss: 5.6734e-05 - accuracy: 1.0000 - val_loss: 4.1495e-06 - val_accuracy: 1.0000
Epoch 575/800
114/114 [=====] - 0s 902us/sample - loss: 5.7857e-05 - accuracy: 1.0000 - val_loss: 3.9792e-06 - val_accuracy: 1.0000
Epoch 576/800
114/114 [=====] - 0s 875us/sample - loss: 5.5934e-05 - accuracy: 1.0000 - val_loss: 3.9962e-06 - val_accuracy: 1.0000
Epoch 577/800
114/114 [=====] - 0s 2ms/sample - loss: 5.6030e-05 - accuracy: 1.0000 - val_loss: 3.9735e-06 - val_accuracy: 1.0000
Epoch 578/800
114/114 [=====] - 0s 931us/sample - loss: 5.5996e-05 - accuracy: 1.0000 - val_loss: 3.9849e-06 - val_accuracy: 1.0000
Epoch 579/800
114/114 [=====] - 0s 881us/sample - loss: 5.5491e-05 - accuracy: 1.0000 - val_loss: 4.0246e-06 - val_accuracy: 1.0000
Epoch 580/800
114/114 [=====] - 0s 922us/sample - loss: 5.5818e-05 - accuracy: 1.0000 - val_loss: 4.0417e-06 - val_accuracy: 1.0000
Epoch 581/800
114/114 [=====] - 0s 916us/sample - loss: 5.5521e-05 - accuracy: 1.0000 - val_loss: 3.9452e-06 - val_accuracy: 1.0000
Epoch 582/800

114/114 [=====] - 0s 881us/sample - loss: 5.5073e-05 - accuracy: 1.0000 - val_loss: 3.9225e-06 - val_accuracy: 1.0000
Epoch 583/800
114/114 [=====] - 0s 910us/sample - loss: 5.5313e-05 - accuracy: 1.0000 - val_loss: 3.9508e-06 - val_accuracy: 1.0000
Epoch 584/800
114/114 [=====] - 0s 872us/sample - loss: 5.5029e-05 - accuracy: 1.0000 - val_loss: 3.9452e-06 - val_accuracy: 1.0000
Epoch 585/800
114/114 [=====] - 0s 2ms/sample - loss: 5.4907e-05 - accuracy: 1.0000 - val_loss: 3.8998e-06 - val_accuracy: 1.0000
Epoch 586/800
114/114 [=====] - 0s 955us/sample - loss: 5.4772e-05 - accuracy: 1.0000 - val_loss: 3.7805e-06 - val_accuracy: 1.0000
Epoch 587/800
114/114 [=====] - 0s 863us/sample - loss: 5.6033e-05 - accuracy: 1.0000 - val_loss: 3.6613e-06 - val_accuracy: 1.0000
Epoch 588/800
114/114 [=====] - 0s 889us/sample - loss: 5.5044e-05 - accuracy: 1.0000 - val_loss: 3.7408e-06 - val_accuracy: 1.0000
Epoch 589/800
114/114 [=====] - 0s 2ms/sample - loss: 5.4334e-05 - accuracy: 1.0000 - val_loss: 3.7578e-06 - val_accuracy: 1.0000
Epoch 590/800
114/114 [=====] - 0s 967us/sample - loss: 5.4841e-05 - accuracy: 1.0000 - val_loss: 3.9111e-06 - val_accuracy: 1.0000
Epoch 591/800
114/114 [=====] - 0s 899us/sample - loss: 5.4044e-05 - accuracy: 1.0000 - val_loss: 3.9508e-06 - val_accuracy: 1.0000
Epoch 592/800
114/114 [=====] - 0s 883us/sample - loss: 5.4520e-05 - accuracy: 1.0000 - val_loss: 3.8316e-06 - val_accuracy: 1.0000
Epoch 593/800
114/114 [=====] - 0s 2ms/sample - loss: 5.3997e-05 - accuracy: 1.0000 - val_loss: 3.8770e-06 - val_accuracy: 1.0000
Epoch 594/800
114/114 [=====] - 0s 928us/sample - loss: 5.3429e-05 - accuracy: 1.0000 - val_loss: 3.8373e-06 - val_accuracy: 1.0000
Epoch 595/800
114/114 [=====] - 0s 895us/sample - loss: 5.3323e-05 - accuracy: 1.0000 - val_loss: 3.8033e-06 - val_accuracy: 1.0000
Epoch 596/800
114/114 [=====] - 0s 899us/sample - loss: 5.3348e-05 - accuracy: 1.0000 - val_loss: 3.8033e-06 - val_accuracy: 1.0000
Epoch 597/800
114/114 [=====] - 0s 2ms/sample - loss: 5.3214e-05 - accuracy: 1.0000 - val_loss: 3.7919e-06 - val_accuracy: 1.0000
Epoch 598/800

114/114 [=====] - 0s 963us/sample - loss: 5.3281e-05 -
accuracy: 1.0000 - val_loss: 3.7465e-06 - val_accuracy: 1.0000
Epoch 599/800

114/114 [=====] - 0s 913us/sample - loss: 5.3660e-05 -
accuracy: 1.0000 - val_loss: 3.8146e-06 - val_accuracy: 1.0000
Epoch 600/800

114/114 [=====] - 0s 2ms/sample - loss: 5.3113e-05 -
accuracy: 1.0000 - val_loss: 3.7181e-06 - val_accuracy: 1.0000
Epoch 601/800

114/114 [=====] - 0s 933us/sample - loss: 5.2834e-05 -
accuracy: 1.0000 - val_loss: 3.7578e-06 - val_accuracy: 1.0000
Epoch 602/800

114/114 [=====] - 0s 896us/sample - loss: 5.2362e-05 -
accuracy: 1.0000 - val_loss: 3.7408e-06 - val_accuracy: 1.0000
Epoch 603/800

114/114 [=====] - 0s 2ms/sample - loss: 5.2389e-05 -
accuracy: 1.0000 - val_loss: 3.6897e-06 - val_accuracy: 1.0000
Epoch 604/800

114/114 [=====] - 0s 921us/sample - loss: 5.2355e-05 -
accuracy: 1.0000 - val_loss: 3.6330e-06 - val_accuracy: 1.0000
Epoch 605/800

114/114 [=====] - 0s 922us/sample - loss: 5.2164e-05 -
accuracy: 1.0000 - val_loss: 3.6386e-06 - val_accuracy: 1.0000
Epoch 606/800

114/114 [=====] - 0s 880us/sample - loss: 5.2184e-05 -
accuracy: 1.0000 - val_loss: 3.6443e-06 - val_accuracy: 1.0000
Epoch 607/800

114/114 [=====] - 0s 2ms/sample - loss: 5.1880e-05 -
accuracy: 1.0000 - val_loss: 3.7805e-06 - val_accuracy: 1.0000
Epoch 608/800

114/114 [=====] - 0s 908us/sample - loss: 5.1971e-05 -
accuracy: 1.0000 - val_loss: 3.7522e-06 - val_accuracy: 1.0000
Epoch 609/800

114/114 [=====] - 0s 900us/sample - loss: 5.1792e-05 -
accuracy: 1.0000 - val_loss: 3.7635e-06 - val_accuracy: 1.0000
Epoch 610/800

114/114 [=====] - 0s 867us/sample - loss: 5.1783e-05 -
accuracy: 1.0000 - val_loss: 3.7238e-06 - val_accuracy: 1.0000
Epoch 611/800

114/114 [=====] - 0s 961us/sample - loss: 5.0914e-05 -
accuracy: 1.0000 - val_loss: 3.6159e-06 - val_accuracy: 1.0000
Epoch 612/800

114/114 [=====] - 0s 897us/sample - loss: 5.0933e-05 -
accuracy: 1.0000 - val_loss: 3.4854e-06 - val_accuracy: 1.0000
Epoch 613/800

114/114 [=====] - 0s 876us/sample - loss: 5.1086e-05 -
accuracy: 1.0000 - val_loss: 3.4456e-06 - val_accuracy: 1.0000
Epoch 614/800

114/114 [=====] - 0s 839us/sample - loss: 5.1316e-05 -
accuracy: 1.0000 - val_loss: 3.4740e-06 - val_accuracy: 1.0000
Epoch 615/800
114/114 [=====] - 0s 2ms/sample - loss: 5.2103e-05 -
accuracy: 1.0000 - val_loss: 3.4116e-06 - val_accuracy: 1.0000
Epoch 616/800
114/114 [=====] - 0s 942us/sample - loss: 5.0721e-05 -
accuracy: 1.0000 - val_loss: 3.4740e-06 - val_accuracy: 1.0000
Epoch 617/800
114/114 [=====] - 0s 883us/sample - loss: 5.1084e-05 -
accuracy: 1.0000 - val_loss: 3.5819e-06 - val_accuracy: 1.0000
Epoch 618/800
114/114 [=====] - 0s 870us/sample - loss: 5.0467e-05 -
accuracy: 1.0000 - val_loss: 3.5932e-06 - val_accuracy: 1.0000
Epoch 619/800
114/114 [=====] - 0s 919us/sample - loss: 5.0310e-05 -
accuracy: 1.0000 - val_loss: 3.6216e-06 - val_accuracy: 1.0000
Epoch 620/800
114/114 [=====] - 0s 926us/sample - loss: 5.0184e-05 -
accuracy: 1.0000 - val_loss: 3.6103e-06 - val_accuracy: 1.0000
Epoch 621/800
114/114 [=====] - 0s 854us/sample - loss: 5.1755e-05 -
accuracy: 1.0000 - val_loss: 3.4683e-06 - val_accuracy: 1.0000
Epoch 622/800
114/114 [=====] - 0s 915us/sample - loss: 4.9994e-05 -
accuracy: 1.0000 - val_loss: 3.5138e-06 - val_accuracy: 1.0000
Epoch 623/800
114/114 [=====] - 0s 887us/sample - loss: 4.9856e-05 -
accuracy: 1.0000 - val_loss: 3.5535e-06 - val_accuracy: 1.0000
Epoch 624/800
114/114 [=====] - 0s 2ms/sample - loss: 4.9646e-05 -
accuracy: 1.0000 - val_loss: 3.5592e-06 - val_accuracy: 1.0000
Epoch 625/800
114/114 [=====] - 0s 946us/sample - loss: 4.9432e-05 -
accuracy: 1.0000 - val_loss: 3.5194e-06 - val_accuracy: 1.0000
Epoch 626/800
114/114 [=====] - 0s 882us/sample - loss: 4.9562e-05 -
accuracy: 1.0000 - val_loss: 3.5024e-06 - val_accuracy: 1.0000
Epoch 627/800
114/114 [=====] - 0s 2ms/sample - loss: 5.1185e-05 -
accuracy: 1.0000 - val_loss: 3.3321e-06 - val_accuracy: 1.0000
Epoch 628/800
114/114 [=====] - 0s 911us/sample - loss: 4.9370e-05 -
accuracy: 1.0000 - val_loss: 3.3321e-06 - val_accuracy: 1.0000
Epoch 629/800
114/114 [=====] - 0s 876us/sample - loss: 4.9542e-05 -
accuracy: 1.0000 - val_loss: 3.4229e-06 - val_accuracy: 1.0000
Epoch 630/800

114/114 [=====] - 0s 904us/sample - loss: 4.8843e-05 - accuracy: 1.0000 - val_loss: 3.4683e-06 - val_accuracy: 1.0000
Epoch 631/800
114/114 [=====] - 0s 893us/sample - loss: 4.8826e-05 - accuracy: 1.0000 - val_loss: 3.5024e-06 - val_accuracy: 1.0000
Epoch 632/800
114/114 [=====] - 0s 876us/sample - loss: 4.8491e-05 - accuracy: 1.0000 - val_loss: 3.4967e-06 - val_accuracy: 1.0000
Epoch 633/800
114/114 [=====] - 0s 931us/sample - loss: 4.9311e-05 - accuracy: 1.0000 - val_loss: 3.5138e-06 - val_accuracy: 1.0000
Epoch 634/800
114/114 [=====] - 0s 896us/sample - loss: 4.8432e-05 - accuracy: 1.0000 - val_loss: 3.4683e-06 - val_accuracy: 1.0000
Epoch 635/800
114/114 [=====] - 0s 898us/sample - loss: 4.8024e-05 - accuracy: 1.0000 - val_loss: 3.3491e-06 - val_accuracy: 1.0000
Epoch 636/800
114/114 [=====] - 0s 893us/sample - loss: 4.8134e-05 - accuracy: 1.0000 - val_loss: 3.3208e-06 - val_accuracy: 1.0000
Epoch 637/800
114/114 [=====] - 0s 2ms/sample - loss: 4.8664e-05 - accuracy: 1.0000 - val_loss: 3.2413e-06 - val_accuracy: 1.0000
Epoch 638/800
114/114 [=====] - 0s 891us/sample - loss: 4.8722e-05 - accuracy: 1.0000 - val_loss: 3.2981e-06 - val_accuracy: 1.0000
Epoch 639/800
114/114 [=====] - 0s 924us/sample - loss: 4.7881e-05 - accuracy: 1.0000 - val_loss: 3.2981e-06 - val_accuracy: 1.0000
Epoch 640/800
114/114 [=====] - 0s 880us/sample - loss: 4.8029e-05 - accuracy: 1.0000 - val_loss: 3.3605e-06 - val_accuracy: 1.0000
Epoch 641/800
114/114 [=====] - 0s 2ms/sample - loss: 4.7403e-05 - accuracy: 1.0000 - val_loss: 3.3832e-06 - val_accuracy: 1.0000
Epoch 642/800
114/114 [=====] - 0s 928us/sample - loss: 4.7611e-05 - accuracy: 1.0000 - val_loss: 3.3605e-06 - val_accuracy: 1.0000
Epoch 643/800
114/114 [=====] - 0s 899us/sample - loss: 4.7321e-05 - accuracy: 1.0000 - val_loss: 3.3662e-06 - val_accuracy: 1.0000
Epoch 644/800
114/114 [=====] - 0s 881us/sample - loss: 4.6989e-05 - accuracy: 1.0000 - val_loss: 3.3718e-06 - val_accuracy: 1.0000
Epoch 645/800
114/114 [=====] - 0s 975us/sample - loss: 4.7076e-05 - accuracy: 1.0000 - val_loss: 3.3662e-06 - val_accuracy: 1.0000
Epoch 646/800

114/114 [=====] - 0s 915us/sample - loss: 4.6916e-05 - accuracy: 1.0000 - val_loss: 3.2981e-06 - val_accuracy: 1.0000
Epoch 647/800
114/114 [=====] - 0s 889us/sample - loss: 4.7267e-05 - accuracy: 1.0000 - val_loss: 3.2299e-06 - val_accuracy: 1.0000
Epoch 648/800
114/114 [=====] - 0s 2ms/sample - loss: 4.6892e-05 - accuracy: 1.0000 - val_loss: 3.2697e-06 - val_accuracy: 1.0000
Epoch 649/800
114/114 [=====] - 0s 857us/sample - loss: 4.7236e-05 - accuracy: 1.0000 - val_loss: 3.1959e-06 - val_accuracy: 1.0000
Epoch 650/800
114/114 [=====] - 0s 912us/sample - loss: 4.6528e-05 - accuracy: 1.0000 - val_loss: 3.2867e-06 - val_accuracy: 1.0000
Epoch 651/800
114/114 [=====] - 0s 890us/sample - loss: 4.6161e-05 - accuracy: 1.0000 - val_loss: 3.2981e-06 - val_accuracy: 1.0000
Epoch 652/800
114/114 [=====] - 0s 2ms/sample - loss: 4.6221e-05 - accuracy: 1.0000 - val_loss: 3.2981e-06 - val_accuracy: 1.0000
Epoch 653/800
114/114 [=====] - 0s 926us/sample - loss: 4.6329e-05 - accuracy: 1.0000 - val_loss: 3.2981e-06 - val_accuracy: 1.0000
Epoch 654/800
114/114 [=====] - 0s 883us/sample - loss: 4.6181e-05 - accuracy: 1.0000 - val_loss: 3.2810e-06 - val_accuracy: 1.0000
Epoch 655/800
114/114 [=====] - 0s 2ms/sample - loss: 4.5908e-05 - accuracy: 1.0000 - val_loss: 3.2526e-06 - val_accuracy: 1.0000
Epoch 656/800
114/114 [=====] - 0s 952us/sample - loss: 4.5706e-05 - accuracy: 1.0000 - val_loss: 3.1448e-06 - val_accuracy: 1.0000
Epoch 657/800
114/114 [=====] - 0s 889us/sample - loss: 4.5602e-05 - accuracy: 1.0000 - val_loss: 3.0937e-06 - val_accuracy: 1.0000
Epoch 658/800
114/114 [=====] - 0s 868us/sample - loss: 4.5581e-05 - accuracy: 1.0000 - val_loss: 3.0880e-06 - val_accuracy: 1.0000
Epoch 659/800
114/114 [=====] - 0s 2ms/sample - loss: 4.5550e-05 - accuracy: 1.0000 - val_loss: 3.1505e-06 - val_accuracy: 1.0000
Epoch 660/800
114/114 [=====] - 0s 915us/sample - loss: 4.5369e-05 - accuracy: 1.0000 - val_loss: 3.1959e-06 - val_accuracy: 1.0000
Epoch 661/800
114/114 [=====] - 0s 895us/sample - loss: 4.6399e-05 - accuracy: 1.0000 - val_loss: 3.2810e-06 - val_accuracy: 1.0000
Epoch 662/800

114/114 [=====] - 0s 860us/sample - loss: 4.5166e-05 -
accuracy: 1.0000 - val_loss: 3.1845e-06 - val_accuracy: 1.0000
Epoch 663/800
114/114 [=====] - 0s 899us/sample - loss: 4.5172e-05 -
accuracy: 1.0000 - val_loss: 3.1051e-06 - val_accuracy: 1.0000
Epoch 664/800
114/114 [=====] - 0s 2ms/sample - loss: 4.4788e-05 -
accuracy: 1.0000 - val_loss: 3.1164e-06 - val_accuracy: 1.0000
Epoch 665/800
114/114 [=====] - 0s 936us/sample - loss: 4.6154e-05 -
accuracy: 1.0000 - val_loss: 3.1959e-06 - val_accuracy: 1.0000
Epoch 666/800
114/114 [=====] - 0s 906us/sample - loss: 4.5416e-05 -
accuracy: 1.0000 - val_loss: 3.0937e-06 - val_accuracy: 1.0000
Epoch 667/800
114/114 [=====] - 0s 2ms/sample - loss: 4.4613e-05 -
accuracy: 1.0000 - val_loss: 3.0710e-06 - val_accuracy: 1.0000
Epoch 668/800
114/114 [=====] - 0s 961us/sample - loss: 4.4797e-05 -
accuracy: 1.0000 - val_loss: 3.0540e-06 - val_accuracy: 1.0000
Epoch 669/800
114/114 [=====] - 0s 880us/sample - loss: 4.4086e-05 -
accuracy: 1.0000 - val_loss: 3.1448e-06 - val_accuracy: 1.0000
Epoch 670/800
114/114 [=====] - 0s 882us/sample - loss: 4.4125e-05 -
accuracy: 1.0000 - val_loss: 3.1902e-06 - val_accuracy: 1.0000
Epoch 671/800
114/114 [=====] - 0s 957us/sample - loss: 4.4353e-05 -
accuracy: 1.0000 - val_loss: 3.1845e-06 - val_accuracy: 1.0000
Epoch 672/800
114/114 [=====] - 0s 881us/sample - loss: 4.4125e-05 -
accuracy: 1.0000 - val_loss: 3.1334e-06 - val_accuracy: 1.0000
Epoch 673/800
114/114 [=====] - 0s 908us/sample - loss: 4.4776e-05 -
accuracy: 1.0000 - val_loss: 3.0199e-06 - val_accuracy: 1.0000
Epoch 674/800
114/114 [=====] - 0s 899us/sample - loss: 4.3938e-05 -
accuracy: 1.0000 - val_loss: 3.0426e-06 - val_accuracy: 1.0000
Epoch 675/800
114/114 [=====] - 0s 2ms/sample - loss: 4.3808e-05 -
accuracy: 1.0000 - val_loss: 3.0369e-06 - val_accuracy: 1.0000
Epoch 676/800
114/114 [=====] - 0s 953us/sample - loss: 4.3449e-05 -
accuracy: 1.0000 - val_loss: 3.0653e-06 - val_accuracy: 1.0000
Epoch 677/800
114/114 [=====] - 0s 892us/sample - loss: 4.3596e-05 -
accuracy: 1.0000 - val_loss: 3.0710e-06 - val_accuracy: 1.0000
Epoch 678/800

114/114 [=====] - 0s 901us/sample - loss: 4.3971e-05 -
accuracy: 1.0000 - val_loss: 3.1278e-06 - val_accuracy: 1.0000
Epoch 679/800

114/114 [=====] - 0s 2ms/sample - loss: 4.3355e-05 -
accuracy: 1.0000 - val_loss: 3.0483e-06 - val_accuracy: 1.0000
Epoch 680/800

114/114 [=====] - 0s 922us/sample - loss: 4.3505e-05 -
accuracy: 1.0000 - val_loss: 2.9631e-06 - val_accuracy: 1.0000
Epoch 681/800

114/114 [=====] - 0s 912us/sample - loss: 4.3361e-05 -
accuracy: 1.0000 - val_loss: 3.0142e-06 - val_accuracy: 1.0000
Epoch 682/800

114/114 [=====] - 0s 884us/sample - loss: 4.2953e-05 -
accuracy: 1.0000 - val_loss: 2.9688e-06 - val_accuracy: 1.0000
Epoch 683/800

114/114 [=====] - 0s 2ms/sample - loss: 4.2837e-05 -
accuracy: 1.0000 - val_loss: 2.9575e-06 - val_accuracy: 1.0000
Epoch 684/800

114/114 [=====] - 0s 936us/sample - loss: 4.3125e-05 -
accuracy: 1.0000 - val_loss: 2.9461e-06 - val_accuracy: 1.0000
Epoch 685/800

114/114 [=====] - 0s 891us/sample - loss: 4.2640e-05 -
accuracy: 1.0000 - val_loss: 3.0426e-06 - val_accuracy: 1.0000
Epoch 686/800

114/114 [=====] - 0s 873us/sample - loss: 4.2307e-05 -
accuracy: 1.0000 - val_loss: 3.0767e-06 - val_accuracy: 1.0000
Epoch 687/800

114/114 [=====] - 0s 2ms/sample - loss: 4.3393e-05 -
accuracy: 1.0000 - val_loss: 3.1278e-06 - val_accuracy: 1.0000
Epoch 688/800

114/114 [=====] - 0s 955us/sample - loss: 4.2645e-05 -
accuracy: 1.0000 - val_loss: 3.0710e-06 - val_accuracy: 1.0000
Epoch 689/800

114/114 [=====] - 0s 905us/sample - loss: 4.2177e-05 -
accuracy: 1.0000 - val_loss: 2.9234e-06 - val_accuracy: 1.0000
Epoch 690/800

114/114 [=====] - 0s 899us/sample - loss: 4.1973e-05 -
accuracy: 1.0000 - val_loss: 2.8723e-06 - val_accuracy: 1.0000
Epoch 691/800

114/114 [=====] - 0s 2ms/sample - loss: 4.2098e-05 -
accuracy: 1.0000 - val_loss: 2.8666e-06 - val_accuracy: 1.0000
Epoch 692/800

114/114 [=====] - 0s 907us/sample - loss: 4.1917e-05 -
accuracy: 1.0000 - val_loss: 2.8610e-06 - val_accuracy: 1.0000
Epoch 693/800

114/114 [=====] - 0s 901us/sample - loss: 4.2213e-05 -
accuracy: 1.0000 - val_loss: 2.8269e-06 - val_accuracy: 1.0000
Epoch 694/800

114/114 [=====] - 0s 890us/sample - loss: 4.1718e-05 -
accuracy: 1.0000 - val_loss: 2.8780e-06 - val_accuracy: 1.0000
Epoch 695/800
114/114 [=====] - 0s 867us/sample - loss: 4.1407e-05 -
accuracy: 1.0000 - val_loss: 2.9575e-06 - val_accuracy: 1.0000
Epoch 696/800
114/114 [=====] - 0s 949us/sample - loss: 4.1696e-05 -
accuracy: 1.0000 - val_loss: 2.9972e-06 - val_accuracy: 1.0000
Epoch 697/800
114/114 [=====] - 0s 908us/sample - loss: 4.1659e-05 -
accuracy: 1.0000 - val_loss: 2.9802e-06 - val_accuracy: 1.0000
Epoch 698/800
114/114 [=====] - 0s 879us/sample - loss: 4.1153e-05 -
accuracy: 1.0000 - val_loss: 2.9121e-06 - val_accuracy: 1.0000
Epoch 699/800
114/114 [=====] - 0s 884us/sample - loss: 4.1506e-05 -
accuracy: 1.0000 - val_loss: 2.7929e-06 - val_accuracy: 1.0000
Epoch 700/800
114/114 [=====] - 0s 2ms/sample - loss: 4.1196e-05 -
accuracy: 1.0000 - val_loss: 2.7531e-06 - val_accuracy: 1.0000
Epoch 701/800
114/114 [=====] - 0s 956us/sample - loss: 4.1094e-05 -
accuracy: 1.0000 - val_loss: 2.7588e-06 - val_accuracy: 1.0000
Epoch 702/800
114/114 [=====] - 0s 892us/sample - loss: 4.1678e-05 -
accuracy: 1.0000 - val_loss: 2.8156e-06 - val_accuracy: 1.0000
Epoch 703/800
114/114 [=====] - 0s 2ms/sample - loss: 4.0861e-05 -
accuracy: 1.0000 - val_loss: 2.7815e-06 - val_accuracy: 1.0000
Epoch 704/800
114/114 [=====] - 0s 933us/sample - loss: 4.1084e-05 -
accuracy: 1.0000 - val_loss: 2.7531e-06 - val_accuracy: 1.0000
Epoch 705/800
114/114 [=====] - 0s 916us/sample - loss: 4.0905e-05 -
accuracy: 1.0000 - val_loss: 2.8383e-06 - val_accuracy: 1.0000
Epoch 706/800
114/114 [=====] - 0s 887us/sample - loss: 4.0345e-05 -
accuracy: 1.0000 - val_loss: 2.8894e-06 - val_accuracy: 1.0000
Epoch 707/800
114/114 [=====] - 0s 895us/sample - loss: 4.0455e-05 -
accuracy: 1.0000 - val_loss: 2.8780e-06 - val_accuracy: 1.0000
Epoch 708/800
114/114 [=====] - 0s 943us/sample - loss: 4.0305e-05 -
accuracy: 1.0000 - val_loss: 2.8553e-06 - val_accuracy: 1.0000
Epoch 709/800
114/114 [=====] - 0s 921us/sample - loss: 4.0409e-05 -
accuracy: 1.0000 - val_loss: 2.8780e-06 - val_accuracy: 1.0000
Epoch 710/800

```

114/114 [=====] - 0s 867us/sample - loss: 3.9954e-05 -
accuracy: 1.0000 - val_loss: 2.8496e-06 - val_accuracy: 1.0000
Epoch 711/800
114/114 [=====] - 0s 866us/sample - loss: 3.9801e-05 -
accuracy: 1.0000 - val_loss: 2.7929e-06 - val_accuracy: 1.0000
Epoch 712/800
114/114 [=====] - 0s 2ms/sample - loss: 4.0122e-05 -
accuracy: 1.0000 - val_loss: 2.7191e-06 - val_accuracy: 1.0000
Epoch 713/800
114/114 [=====] - 0s 911us/sample - loss: 4.0028e-05 -
accuracy: 1.0000 - val_loss: 2.6850e-06 - val_accuracy: 1.0000
Epoch 714/800
114/114 [=====] - 0s 868us/sample - loss: 3.9944e-05 -
accuracy: 1.0000 - val_loss: 2.7588e-06 - val_accuracy: 1.0000
Epoch 715/800
114/114 [=====] - 0s 919us/sample - loss: 3.9495e-05 -
accuracy: 1.0000 - val_loss: 2.8042e-06 - val_accuracy: 1.0000
Epoch 716/800
114/114 [=====] - 0s 2ms/sample - loss: 3.9592e-05 -
accuracy: 1.0000 - val_loss: 2.8553e-06 - val_accuracy: 1.0000
Epoch 717/800
114/114 [=====] - 0s 926us/sample - loss: 3.9657e-05 -
accuracy: 1.0000 - val_loss: 2.8439e-06 - val_accuracy: 1.0000
Epoch 718/800
114/114 [=====] - 0s 918us/sample - loss: 3.9172e-05 -
accuracy: 1.0000 - val_loss: 2.7588e-06 - val_accuracy: 1.0000
Epoch 719/800
114/114 [=====] - 0s 868us/sample - loss: 3.9487e-05 -
accuracy: 1.0000 - val_loss: 2.6509e-06 - val_accuracy: 1.0000
Epoch 720/800
114/114 [=====] - 0s 921us/sample - loss: 3.9398e-05 -
accuracy: 1.0000 - val_loss: 2.6793e-06 - val_accuracy: 1.0000
Epoch 721/800
114/114 [=====] - 0s 925us/sample - loss: 3.9065e-05 -
accuracy: 1.0000 - val_loss: 2.6566e-06 - val_accuracy: 1.0000
Epoch 722/800
114/114 [=====] - 0s 924us/sample - loss: 4.0381e-05 -
accuracy: 1.0000 - val_loss: 2.7418e-06 - val_accuracy: 1.0000
Epoch 723/800
114/114 [=====] - 0s 913us/sample - loss: 3.8689e-05 -
accuracy: 1.0000 - val_loss: 2.7191e-06 - val_accuracy: 1.0000
Epoch 724/800
114/114 [=====] - 0s 858us/sample - loss: 3.9235e-05 -
accuracy: 1.0000 - val_loss: 2.6226e-06 - val_accuracy: 1.0000
Epoch 725/800
114/114 [=====] - 0s 2ms/sample - loss: 3.8753e-05 -
accuracy: 1.0000 - val_loss: 2.6566e-06 - val_accuracy: 1.0000
Epoch 726/800

```

114/114 [=====] - 0s 934us/sample - loss: 3.9664e-05 - accuracy: 1.0000 - val_loss: 2.5885e-06 - val_accuracy: 1.0000
Epoch 727/800
114/114 [=====] - 0s 860us/sample - loss: 3.8302e-05 - accuracy: 1.0000 - val_loss: 2.6339e-06 - val_accuracy: 1.0000
Epoch 728/800
114/114 [=====] - 0s 890us/sample - loss: 3.8719e-05 - accuracy: 1.0000 - val_loss: 2.7418e-06 - val_accuracy: 1.0000
Epoch 729/800
114/114 [=====] - 0s 2ms/sample - loss: 3.8268e-05 - accuracy: 1.0000 - val_loss: 2.7474e-06 - val_accuracy: 1.0000
Epoch 730/800
114/114 [=====] - 0s 941us/sample - loss: 3.8488e-05 - accuracy: 1.0000 - val_loss: 2.6964e-06 - val_accuracy: 1.0000
Epoch 731/800
114/114 [=====] - 0s 878us/sample - loss: 3.7983e-05 - accuracy: 1.0000 - val_loss: 2.6680e-06 - val_accuracy: 1.0000
Epoch 732/800
114/114 [=====] - 0s 872us/sample - loss: 3.7807e-05 - accuracy: 1.0000 - val_loss: 2.6509e-06 - val_accuracy: 1.0000
Epoch 733/800
114/114 [=====] - 0s 2ms/sample - loss: 3.7672e-05 - accuracy: 1.0000 - val_loss: 2.6282e-06 - val_accuracy: 1.0000
Epoch 734/800
114/114 [=====] - 0s 867us/sample - loss: 3.7727e-05 - accuracy: 1.0000 - val_loss: 2.6226e-06 - val_accuracy: 1.0000
Epoch 735/800
114/114 [=====] - 0s 936us/sample - loss: 3.7475e-05 - accuracy: 1.0000 - val_loss: 2.5885e-06 - val_accuracy: 1.0000
Epoch 736/800
114/114 [=====] - 0s 895us/sample - loss: 3.8477e-05 - accuracy: 1.0000 - val_loss: 2.4977e-06 - val_accuracy: 1.0000
Epoch 737/800
114/114 [=====] - 0s 871us/sample - loss: 3.7617e-05 - accuracy: 1.0000 - val_loss: 2.5374e-06 - val_accuracy: 1.0000
Epoch 738/800
114/114 [=====] - 0s 2ms/sample - loss: 3.7418e-05 - accuracy: 1.0000 - val_loss: 2.5828e-06 - val_accuracy: 1.0000
Epoch 739/800
114/114 [=====] - 0s 945us/sample - loss: 3.7632e-05 - accuracy: 1.0000 - val_loss: 2.6396e-06 - val_accuracy: 1.0000
Epoch 740/800
114/114 [=====] - 0s 870us/sample - loss: 3.7141e-05 - accuracy: 1.0000 - val_loss: 2.6169e-06 - val_accuracy: 1.0000
Epoch 741/800
114/114 [=====] - 0s 896us/sample - loss: 3.7333e-05 - accuracy: 1.0000 - val_loss: 2.6169e-06 - val_accuracy: 1.0000
Epoch 742/800

114/114 [=====] - 0s 2ms/sample - loss: 3.6854e-05 -
accuracy: 1.0000 - val_loss: 2.5488e-06 - val_accuracy: 1.0000
Epoch 743/800

114/114 [=====] - 0s 919us/sample - loss: 3.6785e-05 -
accuracy: 1.0000 - val_loss: 2.5090e-06 - val_accuracy: 1.0000
Epoch 744/800

114/114 [=====] - 0s 883us/sample - loss: 3.7901e-05 -
accuracy: 1.0000 - val_loss: 2.4409e-06 - val_accuracy: 1.0000
Epoch 745/800

114/114 [=====] - 0s 904us/sample - loss: 3.6992e-05 -
accuracy: 1.0000 - val_loss: 2.4750e-06 - val_accuracy: 1.0000
Epoch 746/800

114/114 [=====] - 0s 2ms/sample - loss: 3.6759e-05 -
accuracy: 1.0000 - val_loss: 2.5488e-06 - val_accuracy: 1.0000
Epoch 747/800

114/114 [=====] - 0s 961us/sample - loss: 3.6908e-05 -
accuracy: 1.0000 - val_loss: 2.6112e-06 - val_accuracy: 1.0000
Epoch 748/800

114/114 [=====] - 0s 890us/sample - loss: 3.7110e-05 -
accuracy: 1.0000 - val_loss: 2.5601e-06 - val_accuracy: 1.0000
Epoch 749/800

114/114 [=====] - 0s 907us/sample - loss: 3.6561e-05 -
accuracy: 1.0000 - val_loss: 2.5942e-06 - val_accuracy: 1.0000
Epoch 750/800

114/114 [=====] - 0s 2ms/sample - loss: 3.6577e-05 -
accuracy: 1.0000 - val_loss: 2.6112e-06 - val_accuracy: 1.0000
Epoch 751/800

114/114 [=====] - 0s 874us/sample - loss: 3.6586e-05 -
accuracy: 1.0000 - val_loss: 2.5828e-06 - val_accuracy: 1.0000
Epoch 752/800

114/114 [=====] - 0s 901us/sample - loss: 3.7716e-05 -
accuracy: 1.0000 - val_loss: 2.4296e-06 - val_accuracy: 1.0000
Epoch 753/800

114/114 [=====] - 0s 864us/sample - loss: 3.6081e-05 -
accuracy: 1.0000 - val_loss: 2.4182e-06 - val_accuracy: 1.0000
Epoch 754/800

114/114 [=====] - 0s 957us/sample - loss: 3.6145e-05 -
accuracy: 1.0000 - val_loss: 2.4125e-06 - val_accuracy: 1.0000
Epoch 755/800

114/114 [=====] - 0s 906us/sample - loss: 3.5849e-05 -
accuracy: 1.0000 - val_loss: 2.4579e-06 - val_accuracy: 1.0000
Epoch 756/800

114/114 [=====] - 0s 884us/sample - loss: 3.5930e-05 -
accuracy: 1.0000 - val_loss: 2.4977e-06 - val_accuracy: 1.0000
Epoch 757/800

114/114 [=====] - 0s 2ms/sample - loss: 3.5665e-05 -
accuracy: 1.0000 - val_loss: 2.5034e-06 - val_accuracy: 1.0000
Epoch 758/800

114/114 [=====] - 0s 896us/sample - loss: 3.6377e-05 -
accuracy: 1.0000 - val_loss: 2.4239e-06 - val_accuracy: 1.0000
Epoch 759/800

114/114 [=====] - 0s 892us/sample - loss: 3.6222e-05 -
accuracy: 1.0000 - val_loss: 2.3955e-06 - val_accuracy: 1.0000
Epoch 760/800

114/114 [=====] - 0s 896us/sample - loss: 3.5251e-05 -
accuracy: 1.0000 - val_loss: 2.4523e-06 - val_accuracy: 1.0000
Epoch 761/800

114/114 [=====] - 0s 861us/sample - loss: 3.5248e-05 -
accuracy: 1.0000 - val_loss: 2.5090e-06 - val_accuracy: 1.0000
Epoch 762/800

114/114 [=====] - 0s 942us/sample - loss: 3.5410e-05 -
accuracy: 1.0000 - val_loss: 2.5261e-06 - val_accuracy: 1.0000
Epoch 763/800

114/114 [=====] - 0s 896us/sample - loss: 3.5446e-05 -
accuracy: 1.0000 - val_loss: 2.5090e-06 - val_accuracy: 1.0000
Epoch 764/800

114/114 [=====] - 0s 911us/sample - loss: 3.5376e-05 -
accuracy: 1.0000 - val_loss: 2.4069e-06 - val_accuracy: 1.0000
Epoch 765/800

114/114 [=====] - 0s 879us/sample - loss: 3.5568e-05 -
accuracy: 1.0000 - val_loss: 2.3331e-06 - val_accuracy: 1.0000
Epoch 766/800

114/114 [=====] - 0s 2ms/sample - loss: 3.5152e-05 -
accuracy: 1.0000 - val_loss: 2.3331e-06 - val_accuracy: 1.0000
Epoch 767/800

114/114 [=====] - 0s 904us/sample - loss: 3.5025e-05 -
accuracy: 1.0000 - val_loss: 2.3331e-06 - val_accuracy: 1.0000
Epoch 768/800

114/114 [=====] - 0s 899us/sample - loss: 3.5588e-05 -
accuracy: 1.0000 - val_loss: 2.4069e-06 - val_accuracy: 1.0000
Epoch 769/800

114/114 [=====] - 0s 2ms/sample - loss: 3.4793e-05 -
accuracy: 1.0000 - val_loss: 2.4296e-06 - val_accuracy: 1.0000
Epoch 770/800

114/114 [=====] - 0s 950us/sample - loss: 3.5066e-05 -
accuracy: 1.0000 - val_loss: 2.4466e-06 - val_accuracy: 1.0000
Epoch 771/800

114/114 [=====] - 0s 880us/sample - loss: 3.4419e-05 -
accuracy: 1.0000 - val_loss: 2.3671e-06 - val_accuracy: 1.0000
Epoch 772/800

114/114 [=====] - 0s 883us/sample - loss: 3.4681e-05 -
accuracy: 1.0000 - val_loss: 2.3444e-06 - val_accuracy: 1.0000
Epoch 773/800

114/114 [=====] - 0s 2ms/sample - loss: 3.4884e-05 -
accuracy: 1.0000 - val_loss: 2.2649e-06 - val_accuracy: 1.0000
Epoch 774/800

114/114 [=====] - 0s 898us/sample - loss: 3.4990e-05 -
accuracy: 1.0000 - val_loss: 2.2366e-06 - val_accuracy: 1.0000
Epoch 775/800
114/114 [=====] - 0s 942us/sample - loss: 3.4263e-05 -
accuracy: 1.0000 - val_loss: 2.2820e-06 - val_accuracy: 1.0000
Epoch 776/800
114/114 [=====] - 0s 887us/sample - loss: 3.4222e-05 -
accuracy: 1.0000 - val_loss: 2.3898e-06 - val_accuracy: 1.0000
Epoch 777/800
114/114 [=====] - 0s 2ms/sample - loss: 3.3828e-05 -
accuracy: 1.0000 - val_loss: 2.4182e-06 - val_accuracy: 1.0000
Epoch 778/800
114/114 [=====] - 0s 913us/sample - loss: 3.4346e-05 -
accuracy: 1.0000 - val_loss: 2.3955e-06 - val_accuracy: 1.0000
Epoch 779/800
114/114 [=====] - 0s 886us/sample - loss: 3.4314e-05 -
accuracy: 1.0000 - val_loss: 2.4409e-06 - val_accuracy: 1.0000
Epoch 780/800
114/114 [=====] - 0s 922us/sample - loss: 3.3855e-05 -
accuracy: 1.0000 - val_loss: 2.3841e-06 - val_accuracy: 1.0000
Epoch 781/800
114/114 [=====] - 0s 874us/sample - loss: 3.3845e-05 -
accuracy: 1.0000 - val_loss: 2.3217e-06 - val_accuracy: 1.0000
Epoch 782/800
114/114 [=====] - 0s 866us/sample - loss: 3.3709e-05 -
accuracy: 1.0000 - val_loss: 2.2990e-06 - val_accuracy: 1.0000
Epoch 783/800
114/114 [=====] - 0s 2ms/sample - loss: 3.4174e-05 -
accuracy: 1.0000 - val_loss: 2.2649e-06 - val_accuracy: 1.0000
Epoch 784/800
114/114 [=====] - 0s 896us/sample - loss: 3.3465e-05 -
accuracy: 1.0000 - val_loss: 2.2933e-06 - val_accuracy: 1.0000
Epoch 785/800
114/114 [=====] - 0s 922us/sample - loss: 3.3072e-05 -
accuracy: 1.0000 - val_loss: 2.3614e-06 - val_accuracy: 1.0000
Epoch 786/800
114/114 [=====] - 0s 890us/sample - loss: 3.3222e-05 -
accuracy: 1.0000 - val_loss: 2.3785e-06 - val_accuracy: 1.0000
Epoch 787/800
114/114 [=====] - 0s 877us/sample - loss: 3.3224e-05 -
accuracy: 1.0000 - val_loss: 2.4239e-06 - val_accuracy: 1.0000
Epoch 788/800
114/114 [=====] - 0s 916us/sample - loss: 3.3693e-05 -
accuracy: 1.0000 - val_loss: 2.3785e-06 - val_accuracy: 1.0000
Epoch 789/800
114/114 [=====] - 0s 940us/sample - loss: 3.3321e-05 -
accuracy: 1.0000 - val_loss: 2.3898e-06 - val_accuracy: 1.0000
Epoch 790/800

```

114/114 [=====] - 0s 897us/sample - loss: 3.2970e-05 -
accuracy: 1.0000 - val_loss: 2.2990e-06 - val_accuracy: 1.0000
Epoch 791/800
114/114 [=====] - 0s 862us/sample - loss: 3.2877e-05 -
accuracy: 1.0000 - val_loss: 2.2366e-06 - val_accuracy: 1.0000
Epoch 792/800
114/114 [=====] - 0s 2ms/sample - loss: 3.2747e-05 -
accuracy: 1.0000 - val_loss: 2.2195e-06 - val_accuracy: 1.0000
Epoch 793/800
114/114 [=====] - 0s 913us/sample - loss: 3.2799e-05 -
accuracy: 1.0000 - val_loss: 2.2139e-06 - val_accuracy: 1.0000
Epoch 794/800
114/114 [=====] - 0s 906us/sample - loss: 3.2956e-05 -
accuracy: 1.0000 - val_loss: 2.2649e-06 - val_accuracy: 1.0000
Epoch 795/800
114/114 [=====] - 0s 871us/sample - loss: 3.2429e-05 -
accuracy: 1.0000 - val_loss: 2.2593e-06 - val_accuracy: 1.0000
Epoch 796/800
114/114 [=====] - 0s 888us/sample - loss: 3.2633e-05 -
accuracy: 1.0000 - val_loss: 2.2877e-06 - val_accuracy: 1.0000
Epoch 797/800
114/114 [=====] - 0s 963us/sample - loss: 3.3120e-05 -
accuracy: 1.0000 - val_loss: 2.2195e-06 - val_accuracy: 1.0000
Epoch 798/800
114/114 [=====] - 0s 912us/sample - loss: 3.2394e-05 -
accuracy: 1.0000 - val_loss: 2.2422e-06 - val_accuracy: 1.0000
Epoch 799/800
114/114 [=====] - 0s 873us/sample - loss: 3.2388e-05 -
accuracy: 1.0000 - val_loss: 2.2252e-06 - val_accuracy: 1.0000
Epoch 800/800
114/114 [=====] - 0s 2ms/sample - loss: 3.2274e-05 -
accuracy: 1.0000 - val_loss: 2.2649e-06 - val_accuracy: 1.0000

```

Plot the learning curves We will now plot two graphs: * Epoch vs accuracy * Epoch vs loss

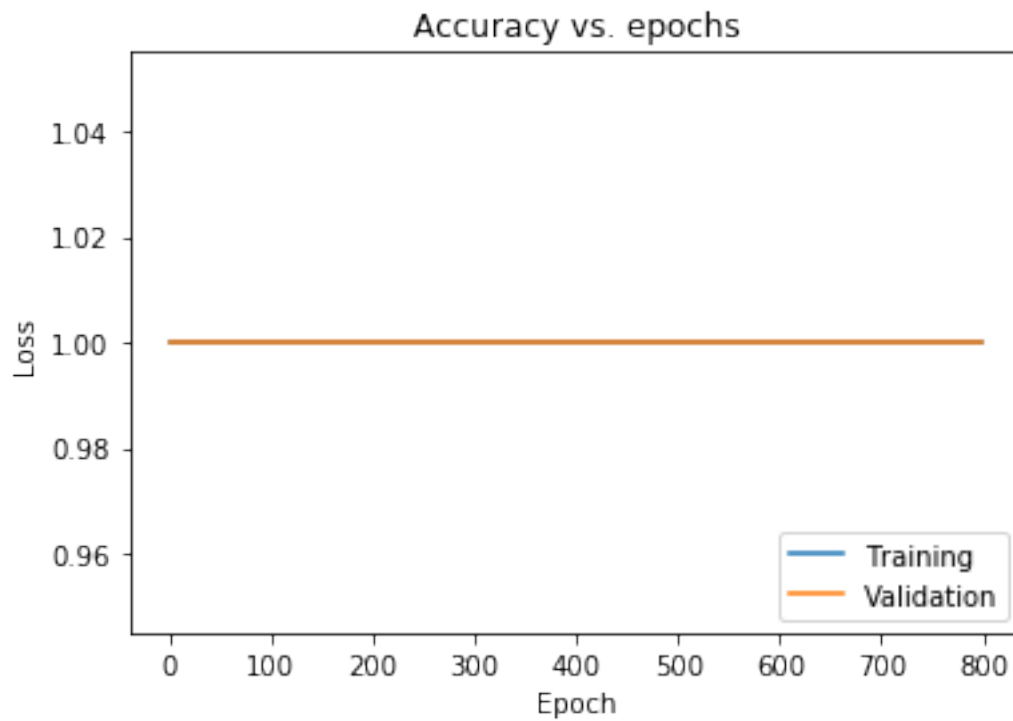
```

[31]: # Run this cell to plot the epoch vs accuracy graph

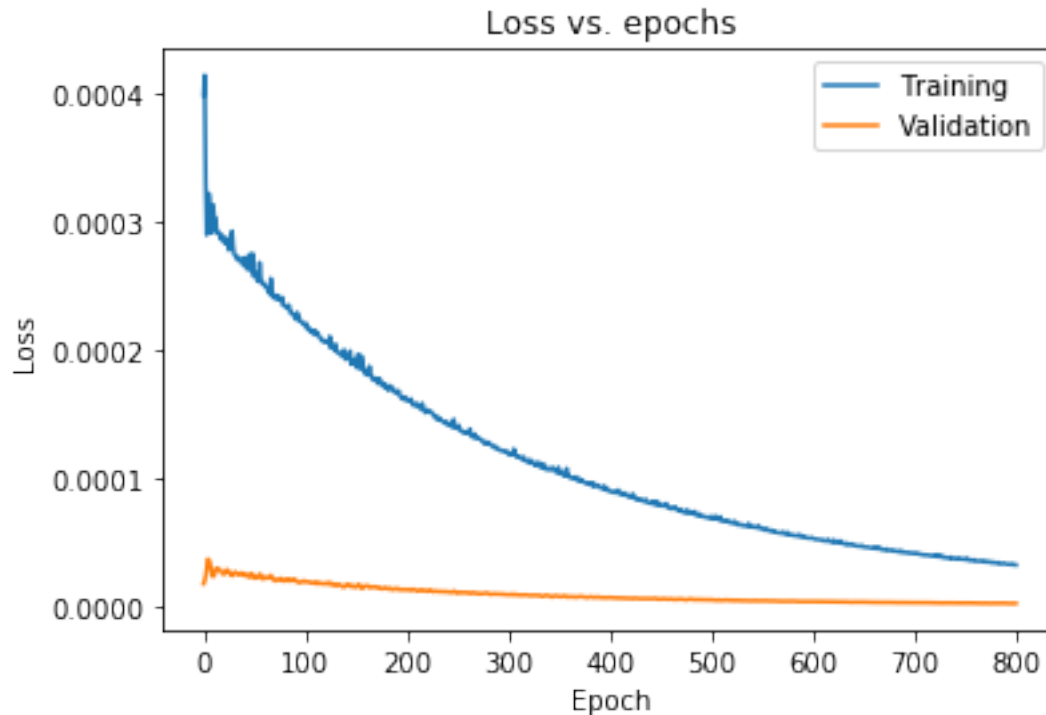
try:
    plt.plot(history.history['accuracy'])
    plt.plot(history.history['val_accuracy'])
except KeyError:
    plt.plot(history.history['acc'])
    plt.plot(history.history['val_acc'])
plt.title('Accuracy vs. epochs')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(['Training', 'Validation'], loc='lower right')

```

```
plt.show()
```



```
[32]: #Run this cell to plot the epoch vs loss graph
plt.plot(history.history['loss'])
plt.plot(history.history['val_loss'])
plt.title('Loss vs. epochs')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(['Training', 'Validation'], loc='upper right')
plt.show()
```



Oh no! We have overfit our dataset. You should now try to now try to mitigate this overfitting.

Reducing overfitting in the model You should now define a new regularised model. The specs for the regularised model are the same as our original model, with the addition of two dropout layers, weight decay, and a batch normalisation layer.

In particular:

- Add a dropout layer after the 3rd Dense layer
- Then there should be two more Dense layers with 128 units before a batch normalisation layer
- Following this, two more Dense layers with 64 units and then another Dropout layer
- Two more Dense layers with 64 units and then the final 3-way softmax layer
- Add weight decay (l2 kernel regularisation) in all Dense layers except the final softmax layer

```
[54]: ##### GRADED CELL #####

# Complete the following function.
# Make sure to not change the function name or arguments.

def get_regularised_model(input_shape, dropout_rate, weight_decay):
    """
    This function should build a regularised Sequential model according to the
    →above specification.
    The dropout_rate argument in the function should be used to set the Dropout
    →rate for all Dropout layers.
```

```

    L2 kernel regularisation (weight decay) should be added using the
    ↪weight_decay argument to
    set the weight decay coefficient in all Dense layers that use L2
    ↪regularisation.
    Ensure the weights are initialised by providing the input_shape argument in
    ↪the first layer, given by the
    function argument input_shape.
    Your function should return the model.
    """

```

Instantiate, compile and train the model

```

[55]: # Instantiate the model, using a dropout rate of 0.3 and weight decay
    ↪coefficient of 0.001

```

```

reg_model = get_regularised_model(train_data[0].shape, 0.3, 0.001)

```

```

[57]: # Compile the model

```

```

compile_model(reg_model)
reg_model.summary()

```

Model: "sequential_9"

Layer (type)	Output Shape	Param #
dense_90 (Dense)	(None, 64)	320
dense_91 (Dense)	(None, 128)	8320
dense_92 (Dense)	(None, 128)	16512
dropout_10 (Dropout)	(None, 128)	0
dense_93 (Dense)	(None, 128)	16512
dense_94 (Dense)	(None, 128)	16512
batch_normalization_5 (Batch Normalization)	(None, 128)	512
dense_95 (Dense)	(None, 64)	8256
dense_96 (Dense)	(None, 64)	4160
dropout_11 (Dropout)	(None, 64)	0
dense_97 (Dense)	(None, 64)	4160

```

-----
dense_98 (Dense)                (None, 64)                4160
-----
dense_99 (Dense)                (None, 3)                  195
=====
Total params: 79,619
Trainable params: 79,363
Non-trainable params: 256
-----

```

[58]: *# Train the model*

```
reg_history = train_model(reg_model, train_data, train_targets, epochs=800)
```

Train on 114 samples, validate on 21 samples

Epoch 1/800

114/114 [=====] - 3s 27ms/sample - loss: 1.9690 - accuracy: 0.3333 - val_loss: 1.9339 - val_accuracy: 0.4286

Epoch 2/800

114/114 [=====] - 0s 2ms/sample - loss: 1.9508 - accuracy: 0.3947 - val_loss: 1.9283 - val_accuracy: 0.4286

Epoch 3/800

114/114 [=====] - 0s 907us/sample - loss: 1.9597 - accuracy: 0.3772 - val_loss: 1.9212 - val_accuracy: 0.4286

Epoch 4/800

114/114 [=====] - 0s 2ms/sample - loss: 1.9502 - accuracy: 0.4035 - val_loss: 1.9134 - val_accuracy: 0.4286

Epoch 5/800

114/114 [=====] - 0s 1ms/sample - loss: 1.9576 - accuracy: 0.4035 - val_loss: 1.9044 - val_accuracy: 0.4286

Epoch 6/800

114/114 [=====] - 0s 2ms/sample - loss: 1.9528 - accuracy: 0.4211 - val_loss: 1.8971 - val_accuracy: 0.4286

Epoch 7/800

114/114 [=====] - 0s 955us/sample - loss: 1.9233 - accuracy: 0.5175 - val_loss: 1.8887 - val_accuracy: 0.4286

Epoch 8/800

114/114 [=====] - 0s 2ms/sample - loss: 1.9264 - accuracy: 0.4035 - val_loss: 1.8811 - val_accuracy: 0.4286

Epoch 9/800

114/114 [=====] - 0s 976us/sample - loss: 1.9441 - accuracy: 0.3947 - val_loss: 1.8731 - val_accuracy: 0.4286

Epoch 10/800

114/114 [=====] - 0s 2ms/sample - loss: 1.9255 - accuracy: 0.5088 - val_loss: 1.8648 - val_accuracy: 0.4286

Epoch 11/800

114/114 [=====] - 0s 1ms/sample - loss: 1.8814 - accuracy: 0.5088 - val_loss: 1.8562 - val_accuracy: 0.4286

Epoch 12/800
114/114 [=====] - 0s 2ms/sample - loss: 1.8842 -
accuracy: 0.4912 - val_loss: 1.8485 - val_accuracy: 0.4286
Epoch 13/800
114/114 [=====] - 0s 1ms/sample - loss: 1.8526 -
accuracy: 0.5877 - val_loss: 1.8403 - val_accuracy: 0.4286
Epoch 14/800
114/114 [=====] - 0s 2ms/sample - loss: 1.8640 -
accuracy: 0.5000 - val_loss: 1.8323 - val_accuracy: 0.4286
Epoch 15/800
114/114 [=====] - 0s 938us/sample - loss: 1.8233 -
accuracy: 0.5526 - val_loss: 1.8236 - val_accuracy: 0.4286
Epoch 16/800
114/114 [=====] - 0s 892us/sample - loss: 1.8017 -
accuracy: 0.6140 - val_loss: 1.8163 - val_accuracy: 0.4286
Epoch 17/800
114/114 [=====] - 0s 2ms/sample - loss: 1.8185 -
accuracy: 0.6053 - val_loss: 1.8086 - val_accuracy: 0.4286
Epoch 18/800
114/114 [=====] - 0s 929us/sample - loss: 1.7954 -
accuracy: 0.6053 - val_loss: 1.7989 - val_accuracy: 0.4762
Epoch 19/800
114/114 [=====] - 0s 2ms/sample - loss: 1.7782 -
accuracy: 0.6404 - val_loss: 1.7874 - val_accuracy: 0.5714
Epoch 20/800
114/114 [=====] - 0s 927us/sample - loss: 1.7746 -
accuracy: 0.6140 - val_loss: 1.7748 - val_accuracy: 0.7143
Epoch 21/800
114/114 [=====] - 0s 2ms/sample - loss: 1.7831 -
accuracy: 0.6404 - val_loss: 1.7610 - val_accuracy: 0.7143
Epoch 22/800
114/114 [=====] - 0s 931us/sample - loss: 1.7351 -
accuracy: 0.6579 - val_loss: 1.7459 - val_accuracy: 0.7143
Epoch 23/800
114/114 [=====] - 0s 2ms/sample - loss: 1.7118 -
accuracy: 0.6930 - val_loss: 1.7294 - val_accuracy: 0.7143
Epoch 24/800
114/114 [=====] - 0s 930us/sample - loss: 1.6870 -
accuracy: 0.7193 - val_loss: 1.7117 - val_accuracy: 0.7143
Epoch 25/800
114/114 [=====] - 0s 930us/sample - loss: 1.6714 -
accuracy: 0.6404 - val_loss: 1.6933 - val_accuracy: 0.7143
Epoch 26/800
114/114 [=====] - 0s 2ms/sample - loss: 1.6589 -
accuracy: 0.7193 - val_loss: 1.6737 - val_accuracy: 0.7143
Epoch 27/800
114/114 [=====] - 0s 912us/sample - loss: 1.6244 -
accuracy: 0.6842 - val_loss: 1.6531 - val_accuracy: 0.7143

Epoch 28/800
114/114 [=====] - 0s 2ms/sample - loss: 1.6497 -
accuracy: 0.6228 - val_loss: 1.6339 - val_accuracy: 0.7143
Epoch 29/800
114/114 [=====] - 0s 977us/sample - loss: 1.6353 -
accuracy: 0.6842 - val_loss: 1.6145 - val_accuracy: 0.7143
Epoch 30/800
114/114 [=====] - 0s 2ms/sample - loss: 1.5900 -
accuracy: 0.6842 - val_loss: 1.5941 - val_accuracy: 0.7143
Epoch 31/800
114/114 [=====] - 0s 984us/sample - loss: 1.6017 -
accuracy: 0.6842 - val_loss: 1.5732 - val_accuracy: 0.7619
Epoch 32/800
114/114 [=====] - 0s 2ms/sample - loss: 1.5416 -
accuracy: 0.7456 - val_loss: 1.5514 - val_accuracy: 0.7619
Epoch 33/800
114/114 [=====] - 0s 2ms/sample - loss: 1.5610 -
accuracy: 0.6754 - val_loss: 1.5290 - val_accuracy: 0.7619
Epoch 34/800
114/114 [=====] - 0s 999us/sample - loss: 1.5495 -
accuracy: 0.6579 - val_loss: 1.5061 - val_accuracy: 0.7619
Epoch 35/800
114/114 [=====] - 0s 2ms/sample - loss: 1.4619 -
accuracy: 0.7544 - val_loss: 1.4844 - val_accuracy: 0.7619
Epoch 36/800
114/114 [=====] - 0s 2ms/sample - loss: 1.5014 -
accuracy: 0.7281 - val_loss: 1.4635 - val_accuracy: 0.7619
Epoch 37/800
114/114 [=====] - 0s 1ms/sample - loss: 1.4558 -
accuracy: 0.7456 - val_loss: 1.4439 - val_accuracy: 0.7619
Epoch 38/800
114/114 [=====] - 0s 995us/sample - loss: 1.4260 -
accuracy: 0.7456 - val_loss: 1.4262 - val_accuracy: 0.7619
Epoch 39/800
114/114 [=====] - 0s 941us/sample - loss: 1.3996 -
accuracy: 0.7456 - val_loss: 1.4099 - val_accuracy: 0.7619
Epoch 40/800
114/114 [=====] - 0s 2ms/sample - loss: 1.4359 -
accuracy: 0.7193 - val_loss: 1.3942 - val_accuracy: 0.7619
Epoch 41/800
114/114 [=====] - 0s 2ms/sample - loss: 1.4524 -
accuracy: 0.7281 - val_loss: 1.3794 - val_accuracy: 0.7619
Epoch 42/800
114/114 [=====] - 0s 1ms/sample - loss: 1.4344 -
accuracy: 0.7368 - val_loss: 1.3654 - val_accuracy: 0.7619
Epoch 43/800
114/114 [=====] - 0s 2ms/sample - loss: 1.4183 -
accuracy: 0.7544 - val_loss: 1.3527 - val_accuracy: 0.7619

Epoch 44/800
114/114 [=====] - 0s 909us/sample - loss: 1.3259 -
accuracy: 0.8158 - val_loss: 1.3415 - val_accuracy: 0.7619
Epoch 45/800
114/114 [=====] - 0s 2ms/sample - loss: 1.3110 -
accuracy: 0.8246 - val_loss: 1.3301 - val_accuracy: 0.7619
Epoch 46/800
114/114 [=====] - 0s 937us/sample - loss: 1.3559 -
accuracy: 0.7895 - val_loss: 1.3183 - val_accuracy: 0.7619
Epoch 47/800
114/114 [=====] - 0s 897us/sample - loss: 1.3156 -
accuracy: 0.7719 - val_loss: 1.3074 - val_accuracy: 0.7619
Epoch 48/800
114/114 [=====] - 0s 1ms/sample - loss: 1.3115 -
accuracy: 0.8070 - val_loss: 1.2969 - val_accuracy: 0.7619
Epoch 49/800
114/114 [=====] - 0s 911us/sample - loss: 1.3295 -
accuracy: 0.8070 - val_loss: 1.2863 - val_accuracy: 0.7619
Epoch 50/800
114/114 [=====] - 0s 2ms/sample - loss: 1.3323 -
accuracy: 0.7982 - val_loss: 1.2766 - val_accuracy: 0.8095
Epoch 51/800
114/114 [=====] - 0s 920us/sample - loss: 1.2587 -
accuracy: 0.8333 - val_loss: 1.2668 - val_accuracy: 0.8095
Epoch 52/800
114/114 [=====] - 0s 2ms/sample - loss: 1.3093 -
accuracy: 0.8246 - val_loss: 1.2555 - val_accuracy: 0.8571
Epoch 53/800
114/114 [=====] - 0s 985us/sample - loss: 1.2763 -
accuracy: 0.8070 - val_loss: 1.2459 - val_accuracy: 0.8571
Epoch 54/800
114/114 [=====] - 0s 2ms/sample - loss: 1.2927 -
accuracy: 0.8158 - val_loss: 1.2371 - val_accuracy: 0.8095
Epoch 55/800
114/114 [=====] - 0s 939us/sample - loss: 1.2292 -
accuracy: 0.8246 - val_loss: 1.2286 - val_accuracy: 0.8571
Epoch 56/800
114/114 [=====] - 0s 2ms/sample - loss: 1.2310 -
accuracy: 0.8684 - val_loss: 1.2204 - val_accuracy: 0.8571
Epoch 57/800
114/114 [=====] - 0s 913us/sample - loss: 1.1515 -
accuracy: 0.9474 - val_loss: 1.2108 - val_accuracy: 0.8571
Epoch 58/800
114/114 [=====] - 0s 2ms/sample - loss: 1.2322 -
accuracy: 0.8070 - val_loss: 1.2005 - val_accuracy: 0.9048
Epoch 59/800
114/114 [=====] - 0s 974us/sample - loss: 1.1837 -
accuracy: 0.8684 - val_loss: 1.1905 - val_accuracy: 0.9048

Epoch 60/800
114/114 [=====] - 0s 2ms/sample - loss: 1.2120 -
accuracy: 0.7982 - val_loss: 1.1803 - val_accuracy: 0.9048

Epoch 61/800
114/114 [=====] - 0s 962us/sample - loss: 1.1858 -
accuracy: 0.8772 - val_loss: 1.1697 - val_accuracy: 0.9048

Epoch 62/800
114/114 [=====] - 0s 1ms/sample - loss: 1.2033 -
accuracy: 0.8421 - val_loss: 1.1611 - val_accuracy: 0.9048

Epoch 63/800
114/114 [=====] - 0s 918us/sample - loss: 1.1609 -
accuracy: 0.8596 - val_loss: 1.1526 - val_accuracy: 0.9048

Epoch 64/800
114/114 [=====] - 0s 2ms/sample - loss: 1.1690 -
accuracy: 0.8684 - val_loss: 1.1446 - val_accuracy: 0.9048

Epoch 65/800
114/114 [=====] - 0s 923us/sample - loss: 1.1254 -
accuracy: 0.8860 - val_loss: 1.1377 - val_accuracy: 1.0000

Epoch 66/800
114/114 [=====] - 0s 2ms/sample - loss: 1.1362 -
accuracy: 0.9035 - val_loss: 1.1294 - val_accuracy: 1.0000

Epoch 67/800
114/114 [=====] - 0s 973us/sample - loss: 1.0901 -
accuracy: 0.9298 - val_loss: 1.1212 - val_accuracy: 1.0000

Epoch 68/800
114/114 [=====] - 0s 902us/sample - loss: 1.1500 -
accuracy: 0.8596 - val_loss: 1.1100 - val_accuracy: 1.0000

Epoch 69/800
114/114 [=====] - 0s 1ms/sample - loss: 1.1189 -
accuracy: 0.8947 - val_loss: 1.0979 - val_accuracy: 1.0000

Epoch 70/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0753 -
accuracy: 0.9386 - val_loss: 1.0855 - val_accuracy: 1.0000

Epoch 71/800
114/114 [=====] - 0s 1ms/sample - loss: 1.0894 -
accuracy: 0.9123 - val_loss: 1.0751 - val_accuracy: 1.0000

Epoch 72/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0943 -
accuracy: 0.8860 - val_loss: 1.0664 - val_accuracy: 1.0000

Epoch 73/800
114/114 [=====] - 0s 951us/sample - loss: 1.0601 -
accuracy: 0.9386 - val_loss: 1.0585 - val_accuracy: 1.0000

Epoch 74/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0433 -
accuracy: 0.9298 - val_loss: 1.0520 - val_accuracy: 0.9524

Epoch 75/800
114/114 [=====] - 0s 967us/sample - loss: 1.0686 -
accuracy: 0.9035 - val_loss: 1.0448 - val_accuracy: 0.9524

Epoch 76/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0723 -
accuracy: 0.9298 - val_loss: 1.0361 - val_accuracy: 1.0000
Epoch 77/800
114/114 [=====] - 0s 929us/sample - loss: 1.0228 -
accuracy: 0.9737 - val_loss: 1.0278 - val_accuracy: 1.0000
Epoch 78/800
114/114 [=====] - 0s 2ms/sample - loss: 0.9971 -
accuracy: 0.9386 - val_loss: 1.0195 - val_accuracy: 1.0000
Epoch 79/800
114/114 [=====] - 0s 923us/sample - loss: 1.0431 -
accuracy: 0.9298 - val_loss: 1.0131 - val_accuracy: 1.0000
Epoch 80/800
114/114 [=====] - 0s 2ms/sample - loss: 0.9904 -
accuracy: 0.9561 - val_loss: 1.0058 - val_accuracy: 1.0000
Epoch 81/800
114/114 [=====] - 0s 989us/sample - loss: 1.0220 -
accuracy: 0.9386 - val_loss: 0.9964 - val_accuracy: 1.0000
Epoch 82/800
114/114 [=====] - 0s 900us/sample - loss: 1.0119 -
accuracy: 0.9298 - val_loss: 0.9885 - val_accuracy: 1.0000
Epoch 83/800
114/114 [=====] - 0s 996us/sample - loss: 0.9871 -
accuracy: 0.9298 - val_loss: 0.9827 - val_accuracy: 1.0000
Epoch 84/800
114/114 [=====] - 0s 933us/sample - loss: 0.9800 -
accuracy: 0.9474 - val_loss: 0.9759 - val_accuracy: 1.0000
Epoch 85/800
114/114 [=====] - 0s 900us/sample - loss: 0.9596 -
accuracy: 0.9386 - val_loss: 0.9692 - val_accuracy: 1.0000
Epoch 86/800
114/114 [=====] - 0s 2ms/sample - loss: 0.9437 -
accuracy: 0.9561 - val_loss: 0.9619 - val_accuracy: 1.0000
Epoch 87/800
114/114 [=====] - 0s 909us/sample - loss: 0.9604 -
accuracy: 0.9561 - val_loss: 0.9563 - val_accuracy: 1.0000
Epoch 88/800
114/114 [=====] - 0s 1ms/sample - loss: 0.9661 -
accuracy: 0.9561 - val_loss: 0.9520 - val_accuracy: 1.0000
Epoch 89/800
114/114 [=====] - 0s 2ms/sample - loss: 0.9275 -
accuracy: 0.9737 - val_loss: 0.9501 - val_accuracy: 1.0000
Epoch 90/800
114/114 [=====] - 0s 945us/sample - loss: 0.9476 -
accuracy: 0.9649 - val_loss: 0.9430 - val_accuracy: 1.0000
Epoch 91/800
114/114 [=====] - 0s 2ms/sample - loss: 0.9397 -
accuracy: 0.9474 - val_loss: 0.9327 - val_accuracy: 1.0000

Epoch 92/800
114/114 [=====] - 0s 964us/sample - loss: 0.9337 -
accuracy: 0.9386 - val_loss: 0.9217 - val_accuracy: 1.0000
Epoch 93/800
114/114 [=====] - 0s 2ms/sample - loss: 0.9639 -
accuracy: 0.9211 - val_loss: 0.9153 - val_accuracy: 1.0000
Epoch 94/800
114/114 [=====] - 0s 1ms/sample - loss: 0.9106 -
accuracy: 0.9561 - val_loss: 0.9118 - val_accuracy: 1.0000
Epoch 95/800
114/114 [=====] - 0s 2ms/sample - loss: 0.9061 -
accuracy: 0.9474 - val_loss: 0.9099 - val_accuracy: 1.0000
Epoch 96/800
114/114 [=====] - 0s 907us/sample - loss: 0.9032 -
accuracy: 0.9825 - val_loss: 0.9031 - val_accuracy: 1.0000
Epoch 97/800
114/114 [=====] - 0s 906us/sample - loss: 0.9097 -
accuracy: 0.9737 - val_loss: 0.8956 - val_accuracy: 1.0000
Epoch 98/800
114/114 [=====] - 0s 1ms/sample - loss: 0.9349 -
accuracy: 0.9386 - val_loss: 0.8883 - val_accuracy: 1.0000
Epoch 99/800
114/114 [=====] - 0s 2ms/sample - loss: 0.9428 -
accuracy: 0.9386 - val_loss: 0.8843 - val_accuracy: 1.0000
Epoch 100/800
114/114 [=====] - 0s 976us/sample - loss: 0.8970 -
accuracy: 0.9649 - val_loss: 0.8783 - val_accuracy: 1.0000
Epoch 101/800
114/114 [=====] - 0s 892us/sample - loss: 0.8867 -
accuracy: 0.9649 - val_loss: 0.8725 - val_accuracy: 1.0000
Epoch 102/800
114/114 [=====] - 0s 981us/sample - loss: 0.9138 -
accuracy: 0.9649 - val_loss: 0.8668 - val_accuracy: 1.0000
Epoch 103/800
114/114 [=====] - 0s 927us/sample - loss: 0.8793 -
accuracy: 0.9649 - val_loss: 0.8620 - val_accuracy: 1.0000
Epoch 104/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8998 -
accuracy: 0.9737 - val_loss: 0.8585 - val_accuracy: 1.0000
Epoch 105/800
114/114 [=====] - 0s 948us/sample - loss: 0.9060 -
accuracy: 0.9561 - val_loss: 0.8553 - val_accuracy: 1.0000
Epoch 106/800
114/114 [=====] - 0s 876us/sample - loss: 0.8653 -
accuracy: 0.9737 - val_loss: 0.8502 - val_accuracy: 1.0000
Epoch 107/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8856 -
accuracy: 0.9825 - val_loss: 0.8476 - val_accuracy: 1.0000

Epoch 108/800
114/114 [=====] - 0s 912us/sample - loss: 0.8698 -
accuracy: 0.9649 - val_loss: 0.8437 - val_accuracy: 1.0000

Epoch 109/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8725 -
accuracy: 0.9825 - val_loss: 0.8400 - val_accuracy: 1.0000

Epoch 110/800
114/114 [=====] - 0s 911us/sample - loss: 0.9311 -
accuracy: 0.9474 - val_loss: 0.8354 - val_accuracy: 1.0000

Epoch 111/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8631 -
accuracy: 0.9825 - val_loss: 0.8322 - val_accuracy: 1.0000

Epoch 112/800
114/114 [=====] - 0s 877us/sample - loss: 0.8518 -
accuracy: 0.9825 - val_loss: 0.8302 - val_accuracy: 1.0000

Epoch 113/800
114/114 [=====] - 0s 926us/sample - loss: 0.8516 -
accuracy: 0.9737 - val_loss: 0.8267 - val_accuracy: 1.0000

Epoch 114/800
114/114 [=====] - 0s 984us/sample - loss: 0.8977 -
accuracy: 0.9561 - val_loss: 0.8231 - val_accuracy: 1.0000

Epoch 115/800
114/114 [=====] - 0s 885us/sample - loss: 0.8464 -
accuracy: 0.9737 - val_loss: 0.8296 - val_accuracy: 1.0000

Epoch 116/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8619 -
accuracy: 0.9737 - val_loss: 0.8391 - val_accuracy: 1.0000

Epoch 117/800
114/114 [=====] - 0s 973us/sample - loss: 0.8421 -
accuracy: 0.9737 - val_loss: 0.8393 - val_accuracy: 1.0000

Epoch 118/800
114/114 [=====] - 0s 2ms/sample - loss: 0.9035 -
accuracy: 0.9474 - val_loss: 0.8242 - val_accuracy: 1.0000

Epoch 119/800
114/114 [=====] - 0s 1ms/sample - loss: 0.8459 -
accuracy: 0.9912 - val_loss: 0.8128 - val_accuracy: 1.0000

Epoch 120/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8201 -
accuracy: 0.9825 - val_loss: 0.8086 - val_accuracy: 1.0000

Epoch 121/800
114/114 [=====] - 0s 1ms/sample - loss: 0.8530 -
accuracy: 0.9737 - val_loss: 0.8063 - val_accuracy: 1.0000

Epoch 122/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8698 -
accuracy: 0.9737 - val_loss: 0.8049 - val_accuracy: 1.0000

Epoch 123/800
114/114 [=====] - 0s 903us/sample - loss: 0.8301 -
accuracy: 0.9825 - val_loss: 0.8039 - val_accuracy: 1.0000

Epoch 124/800
114/114 [=====] - 0s 967us/sample - loss: 0.8622 -
accuracy: 0.9825 - val_loss: 0.8065 - val_accuracy: 1.0000
Epoch 125/800
114/114 [=====] - 0s 995us/sample - loss: 0.8475 -
accuracy: 0.9737 - val_loss: 0.8055 - val_accuracy: 1.0000
Epoch 126/800
114/114 [=====] - 0s 896us/sample - loss: 0.8104 -
accuracy: 0.9912 - val_loss: 0.8022 - val_accuracy: 1.0000
Epoch 127/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8422 -
accuracy: 0.9737 - val_loss: 0.7972 - val_accuracy: 1.0000
Epoch 128/800
114/114 [=====] - 0s 950us/sample - loss: 0.8327 -
accuracy: 0.9825 - val_loss: 0.7934 - val_accuracy: 1.0000
Epoch 129/800
114/114 [=====] - 0s 889us/sample - loss: 0.8446 -
accuracy: 0.9649 - val_loss: 0.7907 - val_accuracy: 1.0000
Epoch 130/800
114/114 [=====] - 0s 994us/sample - loss: 0.8309 -
accuracy: 0.9737 - val_loss: 0.7893 - val_accuracy: 1.0000
Epoch 131/800
114/114 [=====] - 0s 926us/sample - loss: 0.8626 -
accuracy: 0.9737 - val_loss: 0.7897 - val_accuracy: 1.0000
Epoch 132/800
114/114 [=====] - 0s 944us/sample - loss: 0.8709 -
accuracy: 0.9649 - val_loss: 0.7873 - val_accuracy: 1.0000
Epoch 133/800
114/114 [=====] - 0s 982us/sample - loss: 0.8309 -
accuracy: 0.9825 - val_loss: 0.7844 - val_accuracy: 1.0000
Epoch 134/800
114/114 [=====] - 0s 874us/sample - loss: 0.8091 -
accuracy: 0.9737 - val_loss: 0.7825 - val_accuracy: 1.0000
Epoch 135/800
114/114 [=====] - 0s 1ms/sample - loss: 0.8206 -
accuracy: 0.9825 - val_loss: 0.7826 - val_accuracy: 1.0000
Epoch 136/800
114/114 [=====] - 0s 908us/sample - loss: 0.8321 -
accuracy: 0.9825 - val_loss: 0.7895 - val_accuracy: 1.0000
Epoch 137/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8112 -
accuracy: 0.9649 - val_loss: 0.8014 - val_accuracy: 1.0000
Epoch 138/800
114/114 [=====] - 0s 912us/sample - loss: 0.8126 -
accuracy: 0.9825 - val_loss: 0.7903 - val_accuracy: 1.0000
Epoch 139/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8167 -
accuracy: 0.9737 - val_loss: 0.7762 - val_accuracy: 1.0000

Epoch 140/800
114/114 [=====] - 0s 936us/sample - loss: 0.8012 -
accuracy: 0.9912 - val_loss: 0.7713 - val_accuracy: 1.0000

Epoch 141/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8244 -
accuracy: 0.9737 - val_loss: 0.7697 - val_accuracy: 1.0000

Epoch 142/800
114/114 [=====] - 0s 982us/sample - loss: 0.8417 -
accuracy: 0.9561 - val_loss: 0.7703 - val_accuracy: 1.0000

Epoch 143/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7961 -
accuracy: 0.9912 - val_loss: 0.7677 - val_accuracy: 1.0000

Epoch 144/800
114/114 [=====] - 0s 1ms/sample - loss: 0.8020 -
accuracy: 0.9825 - val_loss: 0.7647 - val_accuracy: 1.0000

Epoch 145/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7900 -
accuracy: 1.0000 - val_loss: 0.7630 - val_accuracy: 1.0000

Epoch 146/800
114/114 [=====] - 0s 906us/sample - loss: 0.8117 -
accuracy: 0.9649 - val_loss: 0.7604 - val_accuracy: 1.0000

Epoch 147/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7960 -
accuracy: 0.9825 - val_loss: 0.7582 - val_accuracy: 1.0000

Epoch 148/800
114/114 [=====] - 0s 976us/sample - loss: 0.8051 -
accuracy: 0.9737 - val_loss: 0.7573 - val_accuracy: 1.0000

Epoch 149/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7898 -
accuracy: 0.9825 - val_loss: 0.7601 - val_accuracy: 1.0000

Epoch 150/800
114/114 [=====] - 0s 975us/sample - loss: 0.8350 -
accuracy: 0.9649 - val_loss: 0.7690 - val_accuracy: 1.0000

Epoch 151/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7864 -
accuracy: 0.9912 - val_loss: 0.7726 - val_accuracy: 1.0000

Epoch 152/800
114/114 [=====] - 0s 954us/sample - loss: 0.8196 -
accuracy: 0.9649 - val_loss: 0.7643 - val_accuracy: 1.0000

Epoch 153/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8443 -
accuracy: 0.9561 - val_loss: 0.7677 - val_accuracy: 1.0000

Epoch 154/800
114/114 [=====] - 0s 948us/sample - loss: 0.7783 -
accuracy: 0.9912 - val_loss: 0.7720 - val_accuracy: 1.0000

Epoch 155/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8014 -
accuracy: 0.9912 - val_loss: 0.7747 - val_accuracy: 1.0000

Epoch 156/800
114/114 [=====] - 0s 996us/sample - loss: 0.8399 -
accuracy: 0.9474 - val_loss: 0.7694 - val_accuracy: 1.0000

Epoch 157/800
114/114 [=====] - 0s 906us/sample - loss: 0.7842 -
accuracy: 0.9912 - val_loss: 0.7605 - val_accuracy: 1.0000

Epoch 158/800
114/114 [=====] - 0s 1ms/sample - loss: 0.8059 -
accuracy: 0.9737 - val_loss: 0.7482 - val_accuracy: 1.0000

Epoch 159/800
114/114 [=====] - 0s 935us/sample - loss: 0.7765 -
accuracy: 0.9825 - val_loss: 0.7474 - val_accuracy: 1.0000

Epoch 160/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7951 -
accuracy: 0.9737 - val_loss: 0.7485 - val_accuracy: 1.0000

Epoch 161/800
114/114 [=====] - 0s 979us/sample - loss: 0.7749 -
accuracy: 0.9825 - val_loss: 0.7480 - val_accuracy: 1.0000

Epoch 162/800
114/114 [=====] - 0s 936us/sample - loss: 0.7958 -
accuracy: 0.9912 - val_loss: 0.7467 - val_accuracy: 1.0000

Epoch 163/800
114/114 [=====] - 0s 995us/sample - loss: 0.8182 -
accuracy: 0.9737 - val_loss: 0.7429 - val_accuracy: 1.0000

Epoch 164/800
114/114 [=====] - 0s 913us/sample - loss: 0.8375 -
accuracy: 0.9649 - val_loss: 0.7442 - val_accuracy: 1.0000

Epoch 165/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7547 -
accuracy: 1.0000 - val_loss: 0.7517 - val_accuracy: 1.0000

Epoch 166/800
114/114 [=====] - 0s 997us/sample - loss: 0.7788 -
accuracy: 0.9912 - val_loss: 0.7729 - val_accuracy: 0.9524

Epoch 167/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7904 -
accuracy: 0.9825 - val_loss: 0.7793 - val_accuracy: 0.9524

Epoch 168/800
114/114 [=====] - 0s 976us/sample - loss: 0.7910 -
accuracy: 0.9737 - val_loss: 0.7912 - val_accuracy: 0.9524

Epoch 169/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7936 -
accuracy: 0.9737 - val_loss: 0.7747 - val_accuracy: 0.9524

Epoch 170/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7881 -
accuracy: 0.9649 - val_loss: 0.7478 - val_accuracy: 1.0000

Epoch 171/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7585 -
accuracy: 0.9825 - val_loss: 0.7423 - val_accuracy: 1.0000

Epoch 172/800
114/114 [=====] - 0s 990us/sample - loss: 0.7751 -
accuracy: 0.9825 - val_loss: 0.7378 - val_accuracy: 1.0000

Epoch 173/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7409 -
accuracy: 1.0000 - val_loss: 0.7343 - val_accuracy: 1.0000

Epoch 174/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7944 -
accuracy: 0.9737 - val_loss: 0.7337 - val_accuracy: 1.0000

Epoch 175/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8024 -
accuracy: 0.9737 - val_loss: 0.7335 - val_accuracy: 1.0000

Epoch 176/800
114/114 [=====] - 0s 978us/sample - loss: 0.7973 -
accuracy: 0.9737 - val_loss: 0.7361 - val_accuracy: 1.0000

Epoch 177/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7801 -
accuracy: 0.9825 - val_loss: 0.7500 - val_accuracy: 1.0000

Epoch 178/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7714 -
accuracy: 0.9737 - val_loss: 0.7516 - val_accuracy: 1.0000

Epoch 179/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7745 -
accuracy: 0.9737 - val_loss: 0.7502 - val_accuracy: 1.0000

Epoch 180/800
114/114 [=====] - 0s 973us/sample - loss: 0.7790 -
accuracy: 0.9825 - val_loss: 0.7408 - val_accuracy: 1.0000

Epoch 181/800
114/114 [=====] - 0s 894us/sample - loss: 0.7888 -
accuracy: 0.9825 - val_loss: 0.7343 - val_accuracy: 1.0000

Epoch 182/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7488 -
accuracy: 0.9825 - val_loss: 0.7292 - val_accuracy: 1.0000

Epoch 183/800
114/114 [=====] - 0s 933us/sample - loss: 0.7809 -
accuracy: 0.9825 - val_loss: 0.7283 - val_accuracy: 1.0000

Epoch 184/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7763 -
accuracy: 0.9737 - val_loss: 0.7304 - val_accuracy: 1.0000

Epoch 185/800
114/114 [=====] - 0s 926us/sample - loss: 0.7650 -
accuracy: 0.9825 - val_loss: 0.7383 - val_accuracy: 1.0000

Epoch 186/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7544 -
accuracy: 0.9825 - val_loss: 0.7526 - val_accuracy: 1.0000

Epoch 187/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7428 -
accuracy: 0.9912 - val_loss: 0.7552 - val_accuracy: 0.9524

Epoch 188/800
114/114 [=====] - 0s 897us/sample - loss: 0.7642 -
accuracy: 0.9737 - val_loss: 0.7442 - val_accuracy: 1.0000
Epoch 189/800
114/114 [=====] - 0s 1ms/sample - loss: 0.8102 -
accuracy: 0.9649 - val_loss: 0.7355 - val_accuracy: 1.0000
Epoch 190/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7611 -
accuracy: 0.9737 - val_loss: 0.7242 - val_accuracy: 1.0000
Epoch 191/800
114/114 [=====] - 0s 925us/sample - loss: 0.7679 -
accuracy: 0.9649 - val_loss: 0.7206 - val_accuracy: 1.0000
Epoch 192/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7931 -
accuracy: 0.9737 - val_loss: 0.7183 - val_accuracy: 1.0000
Epoch 193/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7578 -
accuracy: 0.9825 - val_loss: 0.7167 - val_accuracy: 1.0000
Epoch 194/800
114/114 [=====] - 0s 993us/sample - loss: 0.7813 -
accuracy: 0.9561 - val_loss: 0.7159 - val_accuracy: 1.0000
Epoch 195/800
114/114 [=====] - 0s 924us/sample - loss: 0.7801 -
accuracy: 0.9649 - val_loss: 0.7147 - val_accuracy: 1.0000
Epoch 196/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8019 -
accuracy: 0.9649 - val_loss: 0.7134 - val_accuracy: 1.0000
Epoch 197/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7849 -
accuracy: 0.9825 - val_loss: 0.7129 - val_accuracy: 1.0000
Epoch 198/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7891 -
accuracy: 0.9649 - val_loss: 0.7163 - val_accuracy: 1.0000
Epoch 199/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7857 -
accuracy: 0.9737 - val_loss: 0.7304 - val_accuracy: 1.0000
Epoch 200/800
114/114 [=====] - 0s 972us/sample - loss: 0.7280 -
accuracy: 0.9912 - val_loss: 0.7399 - val_accuracy: 1.0000
Epoch 201/800
114/114 [=====] - 0s 891us/sample - loss: 0.7599 -
accuracy: 0.9825 - val_loss: 0.7355 - val_accuracy: 1.0000
Epoch 202/800
114/114 [=====] - 0s 971us/sample - loss: 0.7322 -
accuracy: 1.0000 - val_loss: 0.7242 - val_accuracy: 1.0000
Epoch 203/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7262 -
accuracy: 0.9912 - val_loss: 0.7177 - val_accuracy: 1.0000

Epoch 204/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7264 -
accuracy: 0.9912 - val_loss: 0.7139 - val_accuracy: 1.0000

Epoch 205/800
114/114 [=====] - 0s 905us/sample - loss: 0.7530 -
accuracy: 0.9825 - val_loss: 0.7217 - val_accuracy: 1.0000

Epoch 206/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7440 -
accuracy: 0.9912 - val_loss: 0.7312 - val_accuracy: 1.0000

Epoch 207/800
114/114 [=====] - 0s 942us/sample - loss: 0.7247 -
accuracy: 0.9912 - val_loss: 0.7287 - val_accuracy: 1.0000

Epoch 208/800
114/114 [=====] - 0s 1ms/sample - loss: 0.8998 -
accuracy: 0.9035 - val_loss: 0.7154 - val_accuracy: 1.0000

Epoch 209/800
114/114 [=====] - 0s 885us/sample - loss: 0.7386 -
accuracy: 0.9825 - val_loss: 0.7050 - val_accuracy: 1.0000

Epoch 210/800
114/114 [=====] - 0s 992us/sample - loss: 0.7504 -
accuracy: 0.9825 - val_loss: 0.7047 - val_accuracy: 1.0000

Epoch 211/800
114/114 [=====] - 0s 948us/sample - loss: 0.7607 -
accuracy: 0.9825 - val_loss: 0.7036 - val_accuracy: 1.0000

Epoch 212/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7427 -
accuracy: 0.9825 - val_loss: 0.7047 - val_accuracy: 1.0000

Epoch 213/800
114/114 [=====] - 0s 923us/sample - loss: 0.7490 -
accuracy: 0.9825 - val_loss: 0.7035 - val_accuracy: 1.0000

Epoch 214/800
114/114 [=====] - 0s 992us/sample - loss: 0.7383 -
accuracy: 0.9825 - val_loss: 0.7048 - val_accuracy: 1.0000

Epoch 215/800
114/114 [=====] - 0s 932us/sample - loss: 0.7391 -
accuracy: 0.9912 - val_loss: 0.7057 - val_accuracy: 1.0000

Epoch 216/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7506 -
accuracy: 0.9737 - val_loss: 0.7079 - val_accuracy: 1.0000

Epoch 217/800
114/114 [=====] - 0s 973us/sample - loss: 0.7360 -
accuracy: 0.9737 - val_loss: 0.7103 - val_accuracy: 1.0000

Epoch 218/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7500 -
accuracy: 0.9825 - val_loss: 0.7121 - val_accuracy: 1.0000

Epoch 219/800
114/114 [=====] - 0s 915us/sample - loss: 0.7279 -
accuracy: 0.9912 - val_loss: 0.7123 - val_accuracy: 1.0000

Epoch 220/800
114/114 [=====] - 0s 913us/sample - loss: 0.7700 -
accuracy: 0.9561 - val_loss: 0.7167 - val_accuracy: 1.0000

Epoch 221/800
114/114 [=====] - 0s 997us/sample - loss: 0.7331 -
accuracy: 0.9825 - val_loss: 0.7104 - val_accuracy: 1.0000

Epoch 222/800
114/114 [=====] - 0s 928us/sample - loss: 0.7133 -
accuracy: 0.9912 - val_loss: 0.7067 - val_accuracy: 1.0000

Epoch 223/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7191 -
accuracy: 0.9825 - val_loss: 0.7070 - val_accuracy: 1.0000

Epoch 224/800
114/114 [=====] - 0s 917us/sample - loss: 0.7294 -
accuracy: 0.9912 - val_loss: 0.7072 - val_accuracy: 1.0000

Epoch 225/800
114/114 [=====] - 0s 933us/sample - loss: 0.7472 -
accuracy: 0.9825 - val_loss: 0.7108 - val_accuracy: 1.0000

Epoch 226/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7491 -
accuracy: 0.9649 - val_loss: 0.7094 - val_accuracy: 1.0000

Epoch 227/800
114/114 [=====] - 0s 926us/sample - loss: 0.7286 -
accuracy: 0.9825 - val_loss: 0.7101 - val_accuracy: 1.0000

Epoch 228/800
114/114 [=====] - 0s 948us/sample - loss: 0.7494 -
accuracy: 0.9737 - val_loss: 0.7076 - val_accuracy: 1.0000

Epoch 229/800
114/114 [=====] - 0s 968us/sample - loss: 0.7349 -
accuracy: 0.9737 - val_loss: 0.7105 - val_accuracy: 1.0000

Epoch 230/800
114/114 [=====] - 0s 984us/sample - loss: 0.7528 -
accuracy: 0.9825 - val_loss: 0.7095 - val_accuracy: 1.0000

Epoch 231/800
114/114 [=====] - 0s 885us/sample - loss: 0.7238 -
accuracy: 0.9825 - val_loss: 0.7129 - val_accuracy: 1.0000

Epoch 232/800
114/114 [=====] - 0s 940us/sample - loss: 0.7136 -
accuracy: 0.9825 - val_loss: 0.7072 - val_accuracy: 1.0000

Epoch 233/800
114/114 [=====] - 0s 991us/sample - loss: 0.7102 -
accuracy: 0.9825 - val_loss: 0.7053 - val_accuracy: 1.0000

Epoch 234/800
114/114 [=====] - 0s 918us/sample - loss: 0.7317 -
accuracy: 0.9825 - val_loss: 0.7109 - val_accuracy: 1.0000

Epoch 235/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7144 -
accuracy: 0.9912 - val_loss: 0.7007 - val_accuracy: 1.0000

Epoch 236/800
114/114 [=====] - 0s 930us/sample - loss: 0.7169 - accuracy: 0.9912 - val_loss: 0.6941 - val_accuracy: 1.0000

Epoch 237/800
114/114 [=====] - 0s 916us/sample - loss: 0.7197 - accuracy: 0.9912 - val_loss: 0.6902 - val_accuracy: 1.0000

Epoch 238/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7225 - accuracy: 0.9825 - val_loss: 0.6886 - val_accuracy: 1.0000

Epoch 239/800
114/114 [=====] - 0s 884us/sample - loss: 0.7468 - accuracy: 0.9825 - val_loss: 0.6958 - val_accuracy: 1.0000

Epoch 240/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7077 - accuracy: 0.9825 - val_loss: 0.7079 - val_accuracy: 1.0000

Epoch 241/800
114/114 [=====] - 0s 955us/sample - loss: 0.7507 - accuracy: 0.9737 - val_loss: 0.6872 - val_accuracy: 1.0000

Epoch 242/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7102 - accuracy: 0.9825 - val_loss: 0.6854 - val_accuracy: 1.0000

Epoch 243/800
114/114 [=====] - 0s 984us/sample - loss: 0.7012 - accuracy: 0.9912 - val_loss: 0.6845 - val_accuracy: 1.0000

Epoch 244/800
114/114 [=====] - 0s 865us/sample - loss: 0.7371 - accuracy: 0.9737 - val_loss: 0.6844 - val_accuracy: 1.0000

Epoch 245/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7306 - accuracy: 0.9912 - val_loss: 0.6836 - val_accuracy: 1.0000

Epoch 246/800
114/114 [=====] - 0s 939us/sample - loss: 0.7179 - accuracy: 0.9825 - val_loss: 0.6838 - val_accuracy: 1.0000

Epoch 247/800
114/114 [=====] - 0s 880us/sample - loss: 0.7264 - accuracy: 0.9737 - val_loss: 0.6869 - val_accuracy: 1.0000

Epoch 248/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7161 - accuracy: 0.9825 - val_loss: 0.6856 - val_accuracy: 1.0000

Epoch 249/800
114/114 [=====] - 0s 871us/sample - loss: 0.6999 - accuracy: 1.0000 - val_loss: 0.6836 - val_accuracy: 1.0000

Epoch 250/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7124 - accuracy: 0.9737 - val_loss: 0.6804 - val_accuracy: 1.0000

Epoch 251/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7010 - accuracy: 0.9912 - val_loss: 0.6784 - val_accuracy: 1.0000

Epoch 252/800
114/114 [=====] - 0s 875us/sample - loss: 0.7213 -
accuracy: 0.9737 - val_loss: 0.6789 - val_accuracy: 1.0000

Epoch 253/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7166 -
accuracy: 0.9912 - val_loss: 0.6805 - val_accuracy: 1.0000

Epoch 254/800
114/114 [=====] - 0s 863us/sample - loss: 0.7020 -
accuracy: 0.9912 - val_loss: 0.6834 - val_accuracy: 1.0000

Epoch 255/800
114/114 [=====] - 0s 922us/sample - loss: 0.6891 -
accuracy: 0.9912 - val_loss: 0.6819 - val_accuracy: 1.0000

Epoch 256/800
114/114 [=====] - 0s 999us/sample - loss: 0.7081 -
accuracy: 0.9912 - val_loss: 0.6835 - val_accuracy: 1.0000

Epoch 257/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7109 -
accuracy: 0.9825 - val_loss: 0.6895 - val_accuracy: 1.0000

Epoch 258/800
114/114 [=====] - 0s 989us/sample - loss: 0.7505 -
accuracy: 0.9649 - val_loss: 0.6835 - val_accuracy: 1.0000

Epoch 259/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7387 -
accuracy: 0.9649 - val_loss: 0.6750 - val_accuracy: 1.0000

Epoch 260/800
114/114 [=====] - 0s 939us/sample - loss: 0.7417 -
accuracy: 0.9825 - val_loss: 0.6716 - val_accuracy: 1.0000

Epoch 261/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7109 -
accuracy: 0.9825 - val_loss: 0.6710 - val_accuracy: 1.0000

Epoch 262/800
114/114 [=====] - 0s 958us/sample - loss: 0.7023 -
accuracy: 0.9825 - val_loss: 0.6735 - val_accuracy: 1.0000

Epoch 263/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7201 -
accuracy: 0.9737 - val_loss: 0.6855 - val_accuracy: 1.0000

Epoch 264/800
114/114 [=====] - 0s 982us/sample - loss: 0.7118 -
accuracy: 0.9737 - val_loss: 0.7231 - val_accuracy: 0.9524

Epoch 265/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7123 -
accuracy: 0.9912 - val_loss: 0.7318 - val_accuracy: 0.9524

Epoch 266/800
114/114 [=====] - 0s 912us/sample - loss: 0.7052 -
accuracy: 0.9825 - val_loss: 0.7042 - val_accuracy: 0.9524

Epoch 267/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6897 -
accuracy: 0.9825 - val_loss: 0.6876 - val_accuracy: 1.0000

Epoch 268/800
114/114 [=====] - 0s 896us/sample - loss: 0.7457 -
accuracy: 0.9649 - val_loss: 0.6729 - val_accuracy: 1.0000

Epoch 269/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6908 -
accuracy: 0.9912 - val_loss: 0.6680 - val_accuracy: 1.0000

Epoch 270/800
114/114 [=====] - 0s 984us/sample - loss: 0.7035 -
accuracy: 0.9825 - val_loss: 0.6672 - val_accuracy: 1.0000

Epoch 271/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6897 -
accuracy: 0.9912 - val_loss: 0.6671 - val_accuracy: 1.0000

Epoch 272/800
114/114 [=====] - 0s 966us/sample - loss: 0.7025 -
accuracy: 0.9912 - val_loss: 0.6705 - val_accuracy: 1.0000

Epoch 273/800
114/114 [=====] - 0s 898us/sample - loss: 0.6866 -
accuracy: 0.9912 - val_loss: 0.6777 - val_accuracy: 1.0000

Epoch 274/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7050 -
accuracy: 0.9912 - val_loss: 0.6925 - val_accuracy: 1.0000

Epoch 275/800
114/114 [=====] - 0s 929us/sample - loss: 0.7270 -
accuracy: 0.9737 - val_loss: 0.7107 - val_accuracy: 0.9524

Epoch 276/800
114/114 [=====] - 0s 929us/sample - loss: 0.7245 -
accuracy: 0.9649 - val_loss: 0.6834 - val_accuracy: 1.0000

Epoch 277/800
114/114 [=====] - 0s 942us/sample - loss: 0.7027 -
accuracy: 0.9825 - val_loss: 0.6663 - val_accuracy: 1.0000

Epoch 278/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7057 -
accuracy: 0.9825 - val_loss: 0.6622 - val_accuracy: 1.0000

Epoch 279/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7157 -
accuracy: 0.9825 - val_loss: 0.6615 - val_accuracy: 1.0000

Epoch 280/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7555 -
accuracy: 0.9649 - val_loss: 0.6612 - val_accuracy: 1.0000

Epoch 281/800
114/114 [=====] - 0s 928us/sample - loss: 0.7085 -
accuracy: 0.9649 - val_loss: 0.6621 - val_accuracy: 1.0000

Epoch 282/800
114/114 [=====] - 0s 929us/sample - loss: 0.6933 -
accuracy: 0.9825 - val_loss: 0.6736 - val_accuracy: 1.0000

Epoch 283/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6834 -
accuracy: 0.9912 - val_loss: 0.7053 - val_accuracy: 0.9524

Epoch 284/800
114/114 [=====] - 0s 980us/sample - loss: 0.6750 - accuracy: 0.9912 - val_loss: 0.7918 - val_accuracy: 0.9524

Epoch 285/800
114/114 [=====] - 0s 852us/sample - loss: 0.7223 - accuracy: 0.9737 - val_loss: 0.7747 - val_accuracy: 0.9524

Epoch 286/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6877 - accuracy: 0.9912 - val_loss: 0.7280 - val_accuracy: 0.9524

Epoch 287/800
114/114 [=====] - 0s 942us/sample - loss: 0.7086 - accuracy: 0.9825 - val_loss: 0.6743 - val_accuracy: 1.0000

Epoch 288/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6824 - accuracy: 0.9912 - val_loss: 0.6609 - val_accuracy: 1.0000

Epoch 289/800
114/114 [=====] - 0s 900us/sample - loss: 0.6974 - accuracy: 0.9825 - val_loss: 0.6588 - val_accuracy: 1.0000

Epoch 290/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7340 - accuracy: 0.9737 - val_loss: 0.6605 - val_accuracy: 1.0000

Epoch 291/800
114/114 [=====] - 0s 914us/sample - loss: 0.7279 - accuracy: 0.9737 - val_loss: 0.6814 - val_accuracy: 1.0000

Epoch 292/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7108 - accuracy: 0.9825 - val_loss: 0.7088 - val_accuracy: 0.9524

Epoch 293/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6927 - accuracy: 0.9737 - val_loss: 0.7244 - val_accuracy: 0.9524

Epoch 294/800
114/114 [=====] - 0s 839us/sample - loss: 0.6934 - accuracy: 0.9737 - val_loss: 0.7205 - val_accuracy: 0.9524

Epoch 295/800
114/114 [=====] - 0s 992us/sample - loss: 0.6979 - accuracy: 0.9825 - val_loss: 0.6884 - val_accuracy: 0.9524

Epoch 296/800
114/114 [=====] - 0s 947us/sample - loss: 0.7231 - accuracy: 0.9737 - val_loss: 0.7028 - val_accuracy: 0.9524

Epoch 297/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7207 - accuracy: 0.9825 - val_loss: 0.6979 - val_accuracy: 0.9524

Epoch 298/800
114/114 [=====] - 0s 928us/sample - loss: 0.7073 - accuracy: 0.9649 - val_loss: 0.6768 - val_accuracy: 1.0000

Epoch 299/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6712 - accuracy: 0.9912 - val_loss: 0.6674 - val_accuracy: 1.0000

Epoch 300/800
114/114 [=====] - 0s 892us/sample - loss: 0.6796 -
accuracy: 0.9912 - val_loss: 0.6581 - val_accuracy: 1.0000

Epoch 301/800
114/114 [=====] - 0s 919us/sample - loss: 0.7040 -
accuracy: 0.9825 - val_loss: 0.6545 - val_accuracy: 1.0000

Epoch 302/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6618 -
accuracy: 1.0000 - val_loss: 0.6526 - val_accuracy: 1.0000

Epoch 303/800
114/114 [=====] - 0s 968us/sample - loss: 0.6727 -
accuracy: 0.9912 - val_loss: 0.6513 - val_accuracy: 1.0000

Epoch 304/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6635 -
accuracy: 1.0000 - val_loss: 0.6516 - val_accuracy: 1.0000

Epoch 305/800
114/114 [=====] - 0s 884us/sample - loss: 0.7020 -
accuracy: 0.9825 - val_loss: 0.6545 - val_accuracy: 1.0000

Epoch 306/800
114/114 [=====] - 0s 942us/sample - loss: 0.6692 -
accuracy: 0.9912 - val_loss: 0.6530 - val_accuracy: 1.0000

Epoch 307/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6916 -
accuracy: 0.9825 - val_loss: 0.6491 - val_accuracy: 1.0000

Epoch 308/800
114/114 [=====] - 0s 897us/sample - loss: 0.6837 -
accuracy: 0.9825 - val_loss: 0.6499 - val_accuracy: 1.0000

Epoch 309/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8066 -
accuracy: 0.9649 - val_loss: 0.6460 - val_accuracy: 1.0000

Epoch 310/800
114/114 [=====] - 0s 958us/sample - loss: 0.7209 -
accuracy: 0.9737 - val_loss: 0.6460 - val_accuracy: 1.0000

Epoch 311/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6633 -
accuracy: 0.9912 - val_loss: 0.6454 - val_accuracy: 1.0000

Epoch 312/800
114/114 [=====] - 0s 975us/sample - loss: 0.6737 -
accuracy: 0.9912 - val_loss: 0.6461 - val_accuracy: 1.0000

Epoch 313/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6931 -
accuracy: 0.9825 - val_loss: 0.6477 - val_accuracy: 1.0000

Epoch 314/800
114/114 [=====] - 0s 940us/sample - loss: 0.6953 -
accuracy: 0.9737 - val_loss: 0.6465 - val_accuracy: 1.0000

Epoch 315/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6943 -
accuracy: 0.9825 - val_loss: 0.6467 - val_accuracy: 1.0000

Epoch 316/800
114/114 [=====] - 0s 928us/sample - loss: 0.6639 -
accuracy: 0.9912 - val_loss: 0.6564 - val_accuracy: 1.0000

Epoch 317/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6698 -
accuracy: 0.9825 - val_loss: 0.6739 - val_accuracy: 0.9524

Epoch 318/800
114/114 [=====] - 0s 924us/sample - loss: 0.6589 -
accuracy: 0.9912 - val_loss: 0.7039 - val_accuracy: 0.9524

Epoch 319/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6782 -
accuracy: 0.9825 - val_loss: 0.7521 - val_accuracy: 0.9524

Epoch 320/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6893 -
accuracy: 0.9825 - val_loss: 0.7661 - val_accuracy: 0.9524

Epoch 321/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6781 -
accuracy: 0.9737 - val_loss: 0.7223 - val_accuracy: 0.9524

Epoch 322/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6800 -
accuracy: 0.9737 - val_loss: 0.6791 - val_accuracy: 0.9524

Epoch 323/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6942 -
accuracy: 0.9825 - val_loss: 0.6798 - val_accuracy: 0.9524

Epoch 324/800
114/114 [=====] - 0s 927us/sample - loss: 0.7052 -
accuracy: 0.9825 - val_loss: 0.6956 - val_accuracy: 0.9524

Epoch 325/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6653 -
accuracy: 0.9912 - val_loss: 0.7221 - val_accuracy: 0.9524

Epoch 326/800
114/114 [=====] - 0s 853us/sample - loss: 0.6949 -
accuracy: 0.9825 - val_loss: 0.7068 - val_accuracy: 0.9524

Epoch 327/800
114/114 [=====] - 0s 953us/sample - loss: 0.6770 -
accuracy: 0.9737 - val_loss: 0.6542 - val_accuracy: 1.0000

Epoch 328/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6918 -
accuracy: 0.9649 - val_loss: 0.6406 - val_accuracy: 1.0000

Epoch 329/800
114/114 [=====] - 0s 922us/sample - loss: 0.6628 -
accuracy: 0.9825 - val_loss: 0.6378 - val_accuracy: 1.0000

Epoch 330/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6750 -
accuracy: 0.9825 - val_loss: 0.6376 - val_accuracy: 1.0000

Epoch 331/800
114/114 [=====] - 0s 948us/sample - loss: 0.6513 -
accuracy: 0.9912 - val_loss: 0.6383 - val_accuracy: 1.0000

Epoch 332/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7248 -
accuracy: 0.9649 - val_loss: 0.6399 - val_accuracy: 1.0000

Epoch 333/800
114/114 [=====] - 0s 974us/sample - loss: 0.6946 -
accuracy: 0.9825 - val_loss: 0.6385 - val_accuracy: 1.0000

Epoch 334/800
114/114 [=====] - 0s 875us/sample - loss: 0.6709 -
accuracy: 0.9912 - val_loss: 0.6396 - val_accuracy: 1.0000

Epoch 335/800
114/114 [=====] - 0s 978us/sample - loss: 0.7030 -
accuracy: 0.9737 - val_loss: 0.6435 - val_accuracy: 1.0000

Epoch 336/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6826 -
accuracy: 0.9737 - val_loss: 0.6528 - val_accuracy: 1.0000

Epoch 337/800
114/114 [=====] - 0s 953us/sample - loss: 0.6562 -
accuracy: 0.9912 - val_loss: 0.6506 - val_accuracy: 1.0000

Epoch 338/800
114/114 [=====] - 0s 951us/sample - loss: 0.6428 -
accuracy: 1.0000 - val_loss: 0.6560 - val_accuracy: 1.0000

Epoch 339/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6734 -
accuracy: 0.9825 - val_loss: 0.6596 - val_accuracy: 1.0000

Epoch 340/800
114/114 [=====] - 0s 905us/sample - loss: 0.7391 -
accuracy: 0.9649 - val_loss: 0.6511 - val_accuracy: 1.0000

Epoch 341/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6771 -
accuracy: 0.9649 - val_loss: 0.6438 - val_accuracy: 1.0000

Epoch 342/800
114/114 [=====] - 0s 910us/sample - loss: 0.6548 -
accuracy: 0.9912 - val_loss: 0.6417 - val_accuracy: 1.0000

Epoch 343/800
114/114 [=====] - 0s 908us/sample - loss: 0.6607 -
accuracy: 0.9737 - val_loss: 0.6444 - val_accuracy: 1.0000

Epoch 344/800
114/114 [=====] - 0s 987us/sample - loss: 0.6888 -
accuracy: 0.9649 - val_loss: 0.6492 - val_accuracy: 1.0000

Epoch 345/800
114/114 [=====] - 0s 939us/sample - loss: 0.6554 -
accuracy: 0.9825 - val_loss: 0.6559 - val_accuracy: 1.0000

Epoch 346/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6602 -
accuracy: 0.9912 - val_loss: 0.6845 - val_accuracy: 0.9524

Epoch 347/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6678 -
accuracy: 0.9825 - val_loss: 0.6928 - val_accuracy: 0.9524

Epoch 348/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6414 -
accuracy: 0.9912 - val_loss: 0.6635 - val_accuracy: 0.9524

Epoch 349/800
114/114 [=====] - 0s 1ms/sample - loss: 0.7012 -
accuracy: 0.9561 - val_loss: 0.6431 - val_accuracy: 1.0000

Epoch 350/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6864 -
accuracy: 0.9561 - val_loss: 0.6428 - val_accuracy: 1.0000

Epoch 351/800
114/114 [=====] - 0s 930us/sample - loss: 0.6393 -
accuracy: 1.0000 - val_loss: 0.6373 - val_accuracy: 1.0000

Epoch 352/800
114/114 [=====] - 0s 906us/sample - loss: 0.6493 -
accuracy: 0.9912 - val_loss: 0.6447 - val_accuracy: 1.0000

Epoch 353/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6797 -
accuracy: 0.9737 - val_loss: 0.6478 - val_accuracy: 1.0000

Epoch 354/800
114/114 [=====] - 0s 926us/sample - loss: 0.6392 -
accuracy: 0.9912 - val_loss: 0.6462 - val_accuracy: 1.0000

Epoch 355/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6635 -
accuracy: 0.9825 - val_loss: 0.6586 - val_accuracy: 0.9524

Epoch 356/800
114/114 [=====] - 0s 925us/sample - loss: 0.6333 -
accuracy: 1.0000 - val_loss: 0.7057 - val_accuracy: 0.9524

Epoch 357/800
114/114 [=====] - 0s 927us/sample - loss: 0.6512 -
accuracy: 0.9912 - val_loss: 0.7242 - val_accuracy: 0.9524

Epoch 358/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6338 -
accuracy: 1.0000 - val_loss: 0.7243 - val_accuracy: 0.9524

Epoch 359/800
114/114 [=====] - 0s 922us/sample - loss: 0.6990 -
accuracy: 0.9649 - val_loss: 0.6819 - val_accuracy: 0.9524

Epoch 360/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6739 -
accuracy: 0.9825 - val_loss: 0.6329 - val_accuracy: 1.0000

Epoch 361/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6453 -
accuracy: 0.9825 - val_loss: 0.6249 - val_accuracy: 1.0000

Epoch 362/800
114/114 [=====] - 0s 907us/sample - loss: 0.6530 -
accuracy: 0.9912 - val_loss: 0.6256 - val_accuracy: 1.0000

Epoch 363/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6472 -
accuracy: 0.9912 - val_loss: 0.6283 - val_accuracy: 1.0000

Epoch 364/800
114/114 [=====] - 0s 888us/sample - loss: 0.6453 -
accuracy: 0.9825 - val_loss: 0.6373 - val_accuracy: 1.0000

Epoch 365/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6731 -
accuracy: 0.9825 - val_loss: 0.6545 - val_accuracy: 0.9524

Epoch 366/800
114/114 [=====] - 0s 974us/sample - loss: 0.6476 -
accuracy: 0.9912 - val_loss: 0.6513 - val_accuracy: 0.9524

Epoch 367/800
114/114 [=====] - 0s 927us/sample - loss: 0.6996 -
accuracy: 0.9737 - val_loss: 0.6516 - val_accuracy: 0.9524

Epoch 368/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6452 -
accuracy: 0.9912 - val_loss: 0.6680 - val_accuracy: 0.9524

Epoch 369/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6628 -
accuracy: 0.9737 - val_loss: 0.6599 - val_accuracy: 0.9524

Epoch 370/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6581 -
accuracy: 0.9737 - val_loss: 0.6459 - val_accuracy: 1.0000

Epoch 371/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6703 -
accuracy: 0.9825 - val_loss: 0.6281 - val_accuracy: 1.0000

Epoch 372/800
114/114 [=====] - 0s 991us/sample - loss: 0.6365 -
accuracy: 0.9912 - val_loss: 0.6196 - val_accuracy: 1.0000

Epoch 373/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6293 -
accuracy: 0.9912 - val_loss: 0.6171 - val_accuracy: 1.0000

Epoch 374/800
114/114 [=====] - 0s 985us/sample - loss: 0.6347 -
accuracy: 0.9825 - val_loss: 0.6167 - val_accuracy: 1.0000

Epoch 375/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6258 -
accuracy: 1.0000 - val_loss: 0.6177 - val_accuracy: 1.0000

Epoch 376/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6693 -
accuracy: 0.9825 - val_loss: 0.6209 - val_accuracy: 1.0000

Epoch 377/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6345 -
accuracy: 0.9912 - val_loss: 0.6330 - val_accuracy: 1.0000

Epoch 378/800
114/114 [=====] - 0s 922us/sample - loss: 0.6419 -
accuracy: 0.9825 - val_loss: 0.6426 - val_accuracy: 1.0000

Epoch 379/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6306 -
accuracy: 0.9912 - val_loss: 0.6418 - val_accuracy: 1.0000

Epoch 380/800
114/114 [=====] - 0s 904us/sample - loss: 0.6680 -
accuracy: 0.9737 - val_loss: 0.6438 - val_accuracy: 1.0000

Epoch 381/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6767 -
accuracy: 0.9737 - val_loss: 0.6193 - val_accuracy: 1.0000

Epoch 382/800
114/114 [=====] - 0s 945us/sample - loss: 0.6671 -
accuracy: 0.9737 - val_loss: 0.6172 - val_accuracy: 1.0000

Epoch 383/800
114/114 [=====] - 0s 933us/sample - loss: 0.6620 -
accuracy: 0.9737 - val_loss: 0.6207 - val_accuracy: 1.0000

Epoch 384/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6252 -
accuracy: 1.0000 - val_loss: 0.6295 - val_accuracy: 1.0000

Epoch 385/800
114/114 [=====] - 0s 932us/sample - loss: 0.6677 -
accuracy: 0.9649 - val_loss: 0.6396 - val_accuracy: 1.0000

Epoch 386/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6296 -
accuracy: 0.9912 - val_loss: 0.7019 - val_accuracy: 0.9524

Epoch 387/800
114/114 [=====] - 0s 945us/sample - loss: 0.6575 -
accuracy: 0.9737 - val_loss: 0.6514 - val_accuracy: 0.9524

Epoch 388/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6575 -
accuracy: 0.9737 - val_loss: 0.6182 - val_accuracy: 1.0000

Epoch 389/800
114/114 [=====] - 0s 917us/sample - loss: 0.6279 -
accuracy: 0.9912 - val_loss: 0.6120 - val_accuracy: 1.0000

Epoch 390/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6631 -
accuracy: 0.9825 - val_loss: 0.6100 - val_accuracy: 1.0000

Epoch 391/800
114/114 [=====] - 0s 908us/sample - loss: 0.6654 -
accuracy: 0.9737 - val_loss: 0.6104 - val_accuracy: 1.0000

Epoch 392/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6608 -
accuracy: 0.9825 - val_loss: 0.6113 - val_accuracy: 1.0000

Epoch 393/800
114/114 [=====] - 0s 944us/sample - loss: 0.6202 -
accuracy: 0.9912 - val_loss: 0.6125 - val_accuracy: 1.0000

Epoch 394/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6160 -
accuracy: 1.0000 - val_loss: 0.6138 - val_accuracy: 1.0000

Epoch 395/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6286 -
accuracy: 0.9825 - val_loss: 0.6169 - val_accuracy: 1.0000

Epoch 396/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6338 - accuracy: 0.9825 - val_loss: 0.6200 - val_accuracy: 1.0000

Epoch 397/800
114/114 [=====] - 0s 948us/sample - loss: 0.6603 - accuracy: 0.9825 - val_loss: 0.6225 - val_accuracy: 1.0000

Epoch 398/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6466 - accuracy: 0.9825 - val_loss: 0.6436 - val_accuracy: 0.9524

Epoch 399/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6199 - accuracy: 1.0000 - val_loss: 0.6696 - val_accuracy: 0.9524

Epoch 400/800
114/114 [=====] - 0s 853us/sample - loss: 0.6222 - accuracy: 0.9912 - val_loss: 0.6589 - val_accuracy: 0.9524

Epoch 401/800
114/114 [=====] - 0s 982us/sample - loss: 0.6401 - accuracy: 0.9737 - val_loss: 0.6431 - val_accuracy: 0.9524

Epoch 402/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6249 - accuracy: 0.9912 - val_loss: 0.6125 - val_accuracy: 1.0000

Epoch 403/800
114/114 [=====] - 0s 976us/sample - loss: 0.6730 - accuracy: 0.9825 - val_loss: 0.6052 - val_accuracy: 1.0000

Epoch 404/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6393 - accuracy: 0.9825 - val_loss: 0.6058 - val_accuracy: 1.0000

Epoch 405/800
114/114 [=====] - 0s 983us/sample - loss: 0.6243 - accuracy: 0.9825 - val_loss: 0.6112 - val_accuracy: 1.0000

Epoch 406/800
114/114 [=====] - 0s 943us/sample - loss: 0.6124 - accuracy: 1.0000 - val_loss: 0.6170 - val_accuracy: 1.0000

Epoch 407/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6348 - accuracy: 0.9912 - val_loss: 0.6277 - val_accuracy: 1.0000

Epoch 408/800
114/114 [=====] - 0s 914us/sample - loss: 0.6268 - accuracy: 0.9912 - val_loss: 0.6397 - val_accuracy: 0.9524

Epoch 409/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6380 - accuracy: 0.9912 - val_loss: 0.6219 - val_accuracy: 1.0000

Epoch 410/800
114/114 [=====] - 0s 933us/sample - loss: 0.6343 - accuracy: 0.9825 - val_loss: 0.6216 - val_accuracy: 1.0000

Epoch 411/800
114/114 [=====] - 0s 928us/sample - loss: 0.6265 - accuracy: 0.9912 - val_loss: 0.6302 - val_accuracy: 1.0000

Epoch 412/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6287 -
accuracy: 0.9912 - val_loss: 0.6446 - val_accuracy: 0.9524

Epoch 413/800
114/114 [=====] - 0s 920us/sample - loss: 0.6256 -
accuracy: 0.9825 - val_loss: 0.6199 - val_accuracy: 1.0000

Epoch 414/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6155 -
accuracy: 0.9912 - val_loss: 0.6077 - val_accuracy: 1.0000

Epoch 415/800
114/114 [=====] - 0s 906us/sample - loss: 0.6182 -
accuracy: 0.9912 - val_loss: 0.6040 - val_accuracy: 1.0000

Epoch 416/800
114/114 [=====] - 0s 912us/sample - loss: 0.6348 -
accuracy: 0.9825 - val_loss: 0.6016 - val_accuracy: 1.0000

Epoch 417/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6100 -
accuracy: 1.0000 - val_loss: 0.6016 - val_accuracy: 1.0000

Epoch 418/800
114/114 [=====] - 0s 899us/sample - loss: 0.6245 -
accuracy: 0.9825 - val_loss: 0.6049 - val_accuracy: 1.0000

Epoch 419/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6056 -
accuracy: 1.0000 - val_loss: 0.6114 - val_accuracy: 1.0000

Epoch 420/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6392 -
accuracy: 0.9825 - val_loss: 0.6226 - val_accuracy: 1.0000

Epoch 421/800
114/114 [=====] - 0s 887us/sample - loss: 0.6220 -
accuracy: 0.9737 - val_loss: 0.6257 - val_accuracy: 1.0000

Epoch 422/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6373 -
accuracy: 0.9825 - val_loss: 0.6230 - val_accuracy: 1.0000

Epoch 423/800
114/114 [=====] - 0s 882us/sample - loss: 0.6270 -
accuracy: 0.9825 - val_loss: 0.6044 - val_accuracy: 1.0000

Epoch 424/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6366 -
accuracy: 0.9912 - val_loss: 0.5987 - val_accuracy: 1.0000

Epoch 425/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6000 -
accuracy: 1.0000 - val_loss: 0.5963 - val_accuracy: 1.0000

Epoch 426/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6131 -
accuracy: 0.9912 - val_loss: 0.5959 - val_accuracy: 1.0000

Epoch 427/800
114/114 [=====] - 0s 983us/sample - loss: 0.6414 -
accuracy: 0.9825 - val_loss: 0.5971 - val_accuracy: 1.0000

Epoch 428/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6041 -
accuracy: 1.0000 - val_loss: 0.5990 - val_accuracy: 1.0000

Epoch 429/800
114/114 [=====] - 0s 934us/sample - loss: 0.6270 -
accuracy: 0.9737 - val_loss: 0.5956 - val_accuracy: 1.0000

Epoch 430/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6273 -
accuracy: 0.9825 - val_loss: 0.5958 - val_accuracy: 1.0000

Epoch 431/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6106 -
accuracy: 0.9912 - val_loss: 0.6006 - val_accuracy: 1.0000

Epoch 432/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6270 -
accuracy: 0.9912 - val_loss: 0.6086 - val_accuracy: 1.0000

Epoch 433/800
114/114 [=====] - 0s 940us/sample - loss: 0.6002 -
accuracy: 1.0000 - val_loss: 0.6136 - val_accuracy: 1.0000

Epoch 434/800
114/114 [=====] - 0s 902us/sample - loss: 0.6507 -
accuracy: 0.9825 - val_loss: 0.5951 - val_accuracy: 1.0000

Epoch 435/800
114/114 [=====] - 0s 999us/sample - loss: 0.6217 -
accuracy: 0.9912 - val_loss: 0.5922 - val_accuracy: 1.0000

Epoch 436/800
114/114 [=====] - 0s 936us/sample - loss: 0.6166 -
accuracy: 0.9825 - val_loss: 0.5914 - val_accuracy: 1.0000

Epoch 437/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6145 -
accuracy: 0.9912 - val_loss: 0.5919 - val_accuracy: 1.0000

Epoch 438/800
114/114 [=====] - 0s 947us/sample - loss: 0.6038 -
accuracy: 0.9912 - val_loss: 0.5955 - val_accuracy: 1.0000

Epoch 439/800
114/114 [=====] - 0s 928us/sample - loss: 0.6238 -
accuracy: 0.9912 - val_loss: 0.6057 - val_accuracy: 1.0000

Epoch 440/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6478 -
accuracy: 0.9561 - val_loss: 0.6021 - val_accuracy: 1.0000

Epoch 441/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6477 -
accuracy: 0.9737 - val_loss: 0.5954 - val_accuracy: 1.0000

Epoch 442/800
114/114 [=====] - 0s 985us/sample - loss: 0.6162 -
accuracy: 0.9912 - val_loss: 0.5893 - val_accuracy: 1.0000

Epoch 443/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6258 -
accuracy: 0.9825 - val_loss: 0.5884 - val_accuracy: 1.0000

Epoch 444/800
114/114 [=====] - 0s 957us/sample - loss: 0.6222 - accuracy: 0.9912 - val_loss: 0.5920 - val_accuracy: 1.0000

Epoch 445/800
114/114 [=====] - 0s 904us/sample - loss: 0.6410 - accuracy: 0.9737 - val_loss: 0.5939 - val_accuracy: 1.0000

Epoch 446/800
114/114 [=====] - 0s 996us/sample - loss: 0.6019 - accuracy: 1.0000 - val_loss: 0.5878 - val_accuracy: 1.0000

Epoch 447/800
114/114 [=====] - 0s 868us/sample - loss: 0.5999 - accuracy: 0.9912 - val_loss: 0.5851 - val_accuracy: 1.0000

Epoch 448/800
114/114 [=====] - 0s 921us/sample - loss: 0.6021 - accuracy: 0.9912 - val_loss: 0.5844 - val_accuracy: 1.0000

Epoch 449/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6147 - accuracy: 0.9912 - val_loss: 0.5849 - val_accuracy: 1.0000

Epoch 450/800
114/114 [=====] - 0s 884us/sample - loss: 0.6113 - accuracy: 0.9912 - val_loss: 0.5879 - val_accuracy: 1.0000

Epoch 451/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6021 - accuracy: 1.0000 - val_loss: 0.5880 - val_accuracy: 1.0000

Epoch 452/800
114/114 [=====] - 0s 897us/sample - loss: 0.6332 - accuracy: 0.9825 - val_loss: 0.5840 - val_accuracy: 1.0000

Epoch 453/800
114/114 [=====] - 0s 957us/sample - loss: 0.6150 - accuracy: 0.9825 - val_loss: 0.5837 - val_accuracy: 1.0000

Epoch 454/800
114/114 [=====] - 0s 945us/sample - loss: 0.6259 - accuracy: 0.9912 - val_loss: 0.5900 - val_accuracy: 1.0000

Epoch 455/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5981 - accuracy: 1.0000 - val_loss: 0.5978 - val_accuracy: 1.0000

Epoch 456/800
114/114 [=====] - 0s 964us/sample - loss: 0.5961 - accuracy: 0.9912 - val_loss: 0.6005 - val_accuracy: 1.0000

Epoch 457/800
114/114 [=====] - 0s 904us/sample - loss: 0.5873 - accuracy: 1.0000 - val_loss: 0.6037 - val_accuracy: 1.0000

Epoch 458/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6024 - accuracy: 0.9912 - val_loss: 0.6108 - val_accuracy: 1.0000

Epoch 459/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5939 - accuracy: 1.0000 - val_loss: 0.6022 - val_accuracy: 1.0000

Epoch 460/800
114/114 [=====] - 0s 915us/sample - loss: 0.6170 -
accuracy: 0.9737 - val_loss: 0.5873 - val_accuracy: 1.0000

Epoch 461/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5902 -
accuracy: 1.0000 - val_loss: 0.5840 - val_accuracy: 1.0000

Epoch 462/800
114/114 [=====] - 0s 888us/sample - loss: 0.6069 -
accuracy: 0.9912 - val_loss: 0.5847 - val_accuracy: 1.0000

Epoch 463/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5871 -
accuracy: 1.0000 - val_loss: 0.5867 - val_accuracy: 1.0000

Epoch 464/800
114/114 [=====] - 0s 873us/sample - loss: 0.6200 -
accuracy: 0.9825 - val_loss: 0.5887 - val_accuracy: 1.0000

Epoch 465/800
114/114 [=====] - 0s 920us/sample - loss: 0.6065 -
accuracy: 0.9912 - val_loss: 0.5976 - val_accuracy: 1.0000

Epoch 466/800
114/114 [=====] - 0s 985us/sample - loss: 0.5922 -
accuracy: 0.9912 - val_loss: 0.6172 - val_accuracy: 0.9524

Epoch 467/800
114/114 [=====] - 0s 894us/sample - loss: 0.6234 -
accuracy: 0.9737 - val_loss: 0.6246 - val_accuracy: 0.9524

Epoch 468/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6437 -
accuracy: 0.9825 - val_loss: 0.6221 - val_accuracy: 0.9524

Epoch 469/800
114/114 [=====] - 0s 943us/sample - loss: 0.6034 -
accuracy: 0.9912 - val_loss: 0.5941 - val_accuracy: 1.0000

Epoch 470/800
114/114 [=====] - 0s 887us/sample - loss: 0.6016 -
accuracy: 0.9912 - val_loss: 0.5847 - val_accuracy: 1.0000

Epoch 471/800
114/114 [=====] - 0s 985us/sample - loss: 0.6182 -
accuracy: 0.9825 - val_loss: 0.5819 - val_accuracy: 1.0000

Epoch 472/800
114/114 [=====] - 0s 900us/sample - loss: 0.5877 -
accuracy: 1.0000 - val_loss: 0.5820 - val_accuracy: 1.0000

Epoch 473/800
114/114 [=====] - 0s 899us/sample - loss: 0.5972 -
accuracy: 0.9912 - val_loss: 0.5853 - val_accuracy: 1.0000

Epoch 474/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6027 -
accuracy: 0.9912 - val_loss: 0.5892 - val_accuracy: 1.0000

Epoch 475/800
114/114 [=====] - 0s 905us/sample - loss: 0.5877 -
accuracy: 1.0000 - val_loss: 0.5913 - val_accuracy: 1.0000

Epoch 476/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5864 -
accuracy: 1.0000 - val_loss: 0.5913 - val_accuracy: 1.0000
Epoch 477/800
114/114 [=====] - 0s 923us/sample - loss: 0.6106 -
accuracy: 0.9825 - val_loss: 0.5806 - val_accuracy: 1.0000
Epoch 478/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5751 -
accuracy: 1.0000 - val_loss: 0.5732 - val_accuracy: 1.0000
Epoch 479/800
114/114 [=====] - 0s 908us/sample - loss: 0.6377 -
accuracy: 0.9825 - val_loss: 0.5722 - val_accuracy: 1.0000
Epoch 480/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5930 -
accuracy: 0.9912 - val_loss: 0.5744 - val_accuracy: 1.0000
Epoch 481/800
114/114 [=====] - 0s 919us/sample - loss: 0.6019 -
accuracy: 0.9912 - val_loss: 0.5801 - val_accuracy: 1.0000
Epoch 482/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6003 -
accuracy: 0.9912 - val_loss: 0.6089 - val_accuracy: 0.9524
Epoch 483/800
114/114 [=====] - 0s 911us/sample - loss: 0.6284 -
accuracy: 0.9737 - val_loss: 0.6882 - val_accuracy: 0.9524
Epoch 484/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6019 -
accuracy: 0.9912 - val_loss: 0.6583 - val_accuracy: 0.9524
Epoch 485/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5971 -
accuracy: 0.9912 - val_loss: 0.5910 - val_accuracy: 1.0000
Epoch 486/800
114/114 [=====] - 0s 923us/sample - loss: 0.5899 -
accuracy: 0.9912 - val_loss: 0.5740 - val_accuracy: 1.0000
Epoch 487/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6039 -
accuracy: 0.9912 - val_loss: 0.5712 - val_accuracy: 1.0000
Epoch 488/800
114/114 [=====] - 0s 968us/sample - loss: 0.5873 -
accuracy: 0.9912 - val_loss: 0.5712 - val_accuracy: 1.0000
Epoch 489/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5813 -
accuracy: 1.0000 - val_loss: 0.5716 - val_accuracy: 1.0000
Epoch 490/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6082 -
accuracy: 0.9825 - val_loss: 0.5768 - val_accuracy: 1.0000
Epoch 491/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5854 -
accuracy: 0.9912 - val_loss: 0.5787 - val_accuracy: 1.0000

Epoch 492/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5987 -
accuracy: 0.9825 - val_loss: 0.5883 - val_accuracy: 1.0000

Epoch 493/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6021 -
accuracy: 0.9912 - val_loss: 0.5985 - val_accuracy: 1.0000

Epoch 494/800
114/114 [=====] - 0s 879us/sample - loss: 0.6253 -
accuracy: 0.9825 - val_loss: 0.5725 - val_accuracy: 1.0000

Epoch 495/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6126 -
accuracy: 0.9825 - val_loss: 0.5880 - val_accuracy: 1.0000

Epoch 496/800
114/114 [=====] - 0s 902us/sample - loss: 0.5914 -
accuracy: 0.9912 - val_loss: 0.6520 - val_accuracy: 0.9524

Epoch 497/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5978 -
accuracy: 0.9825 - val_loss: 0.6513 - val_accuracy: 0.9524

Epoch 498/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5765 -
accuracy: 1.0000 - val_loss: 0.6287 - val_accuracy: 0.9524

Epoch 499/800
114/114 [=====] - 0s 962us/sample - loss: 0.5804 -
accuracy: 0.9912 - val_loss: 0.5983 - val_accuracy: 0.9524

Epoch 500/800
114/114 [=====] - 0s 945us/sample - loss: 0.6347 -
accuracy: 0.9825 - val_loss: 0.5874 - val_accuracy: 1.0000

Epoch 501/800
114/114 [=====] - 0s 997us/sample - loss: 0.6319 -
accuracy: 0.9737 - val_loss: 0.5697 - val_accuracy: 1.0000

Epoch 502/800
114/114 [=====] - 0s 912us/sample - loss: 0.6114 -
accuracy: 0.9912 - val_loss: 0.5677 - val_accuracy: 1.0000

Epoch 503/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5837 -
accuracy: 0.9912 - val_loss: 0.5668 - val_accuracy: 1.0000

Epoch 504/800
114/114 [=====] - 0s 971us/sample - loss: 0.5912 -
accuracy: 0.9912 - val_loss: 0.5708 - val_accuracy: 1.0000

Epoch 505/800
114/114 [=====] - 0s 915us/sample - loss: 0.5876 -
accuracy: 0.9825 - val_loss: 0.6017 - val_accuracy: 0.9524

Epoch 506/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5721 -
accuracy: 0.9912 - val_loss: 0.6505 - val_accuracy: 0.9524

Epoch 507/800
114/114 [=====] - 0s 909us/sample - loss: 0.5827 -
accuracy: 0.9912 - val_loss: 0.6009 - val_accuracy: 0.9524

Epoch 508/800
114/114 [=====] - 0s 899us/sample - loss: 0.5690 -
accuracy: 1.0000 - val_loss: 0.5762 - val_accuracy: 1.0000

Epoch 509/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5912 -
accuracy: 0.9912 - val_loss: 0.5695 - val_accuracy: 1.0000

Epoch 510/800
114/114 [=====] - 0s 900us/sample - loss: 0.5679 -
accuracy: 1.0000 - val_loss: 0.5758 - val_accuracy: 1.0000

Epoch 511/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5737 -
accuracy: 1.0000 - val_loss: 0.5757 - val_accuracy: 1.0000

Epoch 512/800
114/114 [=====] - 0s 991us/sample - loss: 0.5689 -
accuracy: 0.9912 - val_loss: 0.5808 - val_accuracy: 1.0000

Epoch 513/800
114/114 [=====] - 0s 885us/sample - loss: 0.5640 -
accuracy: 1.0000 - val_loss: 0.5868 - val_accuracy: 1.0000

Epoch 514/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5979 -
accuracy: 0.9825 - val_loss: 0.5705 - val_accuracy: 1.0000

Epoch 515/800
114/114 [=====] - 0s 920us/sample - loss: 0.6237 -
accuracy: 0.9561 - val_loss: 0.5624 - val_accuracy: 1.0000

Epoch 516/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5733 -
accuracy: 1.0000 - val_loss: 0.5594 - val_accuracy: 1.0000

Epoch 517/800
114/114 [=====] - 0s 917us/sample - loss: 0.5680 -
accuracy: 1.0000 - val_loss: 0.5593 - val_accuracy: 1.0000

Epoch 518/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6069 -
accuracy: 0.9825 - val_loss: 0.5635 - val_accuracy: 1.0000

Epoch 519/800
114/114 [=====] - 0s 934us/sample - loss: 0.5662 -
accuracy: 1.0000 - val_loss: 0.5815 - val_accuracy: 1.0000

Epoch 520/800
114/114 [=====] - 0s 864us/sample - loss: 0.5656 -
accuracy: 1.0000 - val_loss: 0.5946 - val_accuracy: 0.9524

Epoch 521/800
114/114 [=====] - 0s 989us/sample - loss: 0.5694 -
accuracy: 0.9912 - val_loss: 0.5894 - val_accuracy: 0.9524

Epoch 522/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5618 -
accuracy: 1.0000 - val_loss: 0.5831 - val_accuracy: 1.0000

Epoch 523/800
114/114 [=====] - 0s 985us/sample - loss: 0.6246 -
accuracy: 0.9737 - val_loss: 0.5566 - val_accuracy: 1.0000

Epoch 524/800
114/114 [=====] - 0s 911us/sample - loss: 0.5663 -
accuracy: 0.9912 - val_loss: 0.5553 - val_accuracy: 1.0000

Epoch 525/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5834 -
accuracy: 0.9825 - val_loss: 0.5549 - val_accuracy: 1.0000

Epoch 526/800
114/114 [=====] - 0s 925us/sample - loss: 0.5695 -
accuracy: 0.9912 - val_loss: 0.5548 - val_accuracy: 1.0000

Epoch 527/800
114/114 [=====] - 0s 902us/sample - loss: 0.5821 -
accuracy: 0.9912 - val_loss: 0.5552 - val_accuracy: 1.0000

Epoch 528/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5740 -
accuracy: 0.9912 - val_loss: 0.5606 - val_accuracy: 1.0000

Epoch 529/800
114/114 [=====] - 0s 901us/sample - loss: 0.5797 -
accuracy: 0.9825 - val_loss: 0.5820 - val_accuracy: 1.0000

Epoch 530/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5697 -
accuracy: 1.0000 - val_loss: 0.5743 - val_accuracy: 1.0000

Epoch 531/800
114/114 [=====] - 0s 924us/sample - loss: 0.6030 -
accuracy: 0.9737 - val_loss: 0.5569 - val_accuracy: 1.0000

Epoch 532/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5799 -
accuracy: 0.9825 - val_loss: 0.5532 - val_accuracy: 1.0000

Epoch 533/800
114/114 [=====] - 0s 983us/sample - loss: 0.6076 -
accuracy: 0.9825 - val_loss: 0.5527 - val_accuracy: 1.0000

Epoch 534/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5845 -
accuracy: 0.9912 - val_loss: 0.5537 - val_accuracy: 1.0000

Epoch 535/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5596 -
accuracy: 1.0000 - val_loss: 0.5564 - val_accuracy: 1.0000

Epoch 536/800
114/114 [=====] - 0s 898us/sample - loss: 0.5997 -
accuracy: 0.9912 - val_loss: 0.5648 - val_accuracy: 1.0000

Epoch 537/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5761 -
accuracy: 0.9825 - val_loss: 0.5573 - val_accuracy: 1.0000

Epoch 538/800
114/114 [=====] - 0s 894us/sample - loss: 0.5991 -
accuracy: 0.9825 - val_loss: 0.5552 - val_accuracy: 1.0000

Epoch 539/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5595 -
accuracy: 1.0000 - val_loss: 0.5524 - val_accuracy: 1.0000

Epoch 540/800
114/114 [=====] - 0s 897us/sample - loss: 0.5738 -
accuracy: 0.9912 - val_loss: 0.5517 - val_accuracy: 1.0000

Epoch 541/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5798 -
accuracy: 0.9825 - val_loss: 0.5602 - val_accuracy: 1.0000

Epoch 542/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5702 -
accuracy: 0.9912 - val_loss: 0.5626 - val_accuracy: 1.0000

Epoch 543/800
114/114 [=====] - 0s 939us/sample - loss: 0.5606 -
accuracy: 1.0000 - val_loss: 0.5538 - val_accuracy: 1.0000

Epoch 544/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5686 -
accuracy: 0.9912 - val_loss: 0.5524 - val_accuracy: 1.0000

Epoch 545/800
114/114 [=====] - 0s 948us/sample - loss: 0.5716 -
accuracy: 0.9825 - val_loss: 0.5522 - val_accuracy: 1.0000

Epoch 546/800
114/114 [=====] - 0s 891us/sample - loss: 0.6095 -
accuracy: 0.9825 - val_loss: 0.5503 - val_accuracy: 1.0000

Epoch 547/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5853 -
accuracy: 0.9825 - val_loss: 0.5516 - val_accuracy: 1.0000

Epoch 548/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5763 -
accuracy: 0.9912 - val_loss: 0.5499 - val_accuracy: 1.0000

Epoch 549/800
114/114 [=====] - 0s 951us/sample - loss: 0.5663 -
accuracy: 0.9912 - val_loss: 0.5508 - val_accuracy: 1.0000

Epoch 550/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5677 -
accuracy: 0.9912 - val_loss: 0.5516 - val_accuracy: 1.0000

Epoch 551/800
114/114 [=====] - 0s 960us/sample - loss: 0.5758 -
accuracy: 0.9912 - val_loss: 0.5548 - val_accuracy: 1.0000

Epoch 552/800
114/114 [=====] - 0s 939us/sample - loss: 0.5568 -
accuracy: 1.0000 - val_loss: 0.5883 - val_accuracy: 0.9524

Epoch 553/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5590 -
accuracy: 1.0000 - val_loss: 0.6657 - val_accuracy: 0.9524

Epoch 554/800
114/114 [=====] - 0s 922us/sample - loss: 0.5879 -
accuracy: 0.9912 - val_loss: 0.6682 - val_accuracy: 0.9524

Epoch 555/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5567 -
accuracy: 1.0000 - val_loss: 0.5941 - val_accuracy: 0.9524

Epoch 556/800
114/114 [=====] - 0s 972us/sample - loss: 0.5618 -
accuracy: 0.9912 - val_loss: 0.5564 - val_accuracy: 1.0000
Epoch 557/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5703 -
accuracy: 0.9825 - val_loss: 0.5459 - val_accuracy: 1.0000
Epoch 558/800
114/114 [=====] - 0s 915us/sample - loss: 0.5487 -
accuracy: 1.0000 - val_loss: 0.5445 - val_accuracy: 1.0000
Epoch 559/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5713 -
accuracy: 0.9825 - val_loss: 0.5441 - val_accuracy: 1.0000
Epoch 560/800
114/114 [=====] - 0s 921us/sample - loss: 0.5576 -
accuracy: 1.0000 - val_loss: 0.5441 - val_accuracy: 1.0000
Epoch 561/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5548 -
accuracy: 1.0000 - val_loss: 0.5446 - val_accuracy: 1.0000
Epoch 562/800
114/114 [=====] - 0s 933us/sample - loss: 0.5662 -
accuracy: 0.9825 - val_loss: 0.5459 - val_accuracy: 1.0000
Epoch 563/800
114/114 [=====] - 0s 896us/sample - loss: 0.5841 -
accuracy: 0.9912 - val_loss: 0.5477 - val_accuracy: 1.0000
Epoch 564/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5538 -
accuracy: 0.9912 - val_loss: 0.5585 - val_accuracy: 1.0000
Epoch 565/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5709 -
accuracy: 0.9825 - val_loss: 0.5671 - val_accuracy: 1.0000
Epoch 566/800
114/114 [=====] - 0s 993us/sample - loss: 0.5537 -
accuracy: 1.0000 - val_loss: 0.5760 - val_accuracy: 0.9524
Epoch 567/800
114/114 [=====] - 0s 915us/sample - loss: 0.5796 -
accuracy: 0.9912 - val_loss: 0.5703 - val_accuracy: 1.0000
Epoch 568/800
114/114 [=====] - 0s 896us/sample - loss: 0.5475 -
accuracy: 1.0000 - val_loss: 0.5502 - val_accuracy: 1.0000
Epoch 569/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6245 -
accuracy: 0.9737 - val_loss: 0.5466 - val_accuracy: 1.0000
Epoch 570/800
114/114 [=====] - 0s 950us/sample - loss: 0.5592 -
accuracy: 0.9912 - val_loss: 0.5511 - val_accuracy: 1.0000
Epoch 571/800
114/114 [=====] - 0s 875us/sample - loss: 0.5607 -
accuracy: 0.9825 - val_loss: 0.5658 - val_accuracy: 1.0000

Epoch 572/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5583 -
accuracy: 0.9912 - val_loss: 0.5654 - val_accuracy: 1.0000

Epoch 573/800
114/114 [=====] - 0s 915us/sample - loss: 0.6064 -
accuracy: 0.9825 - val_loss: 0.5451 - val_accuracy: 1.0000

Epoch 574/800
114/114 [=====] - 0s 869us/sample - loss: 0.5619 -
accuracy: 0.9912 - val_loss: 0.5415 - val_accuracy: 1.0000

Epoch 575/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5620 -
accuracy: 0.9912 - val_loss: 0.5412 - val_accuracy: 1.0000

Epoch 576/800
114/114 [=====] - 0s 928us/sample - loss: 0.5692 -
accuracy: 0.9825 - val_loss: 0.5431 - val_accuracy: 1.0000

Epoch 577/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5676 -
accuracy: 0.9912 - val_loss: 0.5476 - val_accuracy: 1.0000

Epoch 578/800
114/114 [=====] - 0s 933us/sample - loss: 0.5858 -
accuracy: 0.9825 - val_loss: 0.5520 - val_accuracy: 1.0000

Epoch 579/800
114/114 [=====] - 0s 913us/sample - loss: 0.5592 -
accuracy: 0.9912 - val_loss: 0.5441 - val_accuracy: 1.0000

Epoch 580/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5437 -
accuracy: 1.0000 - val_loss: 0.5464 - val_accuracy: 1.0000

Epoch 581/800
114/114 [=====] - 0s 943us/sample - loss: 0.5697 -
accuracy: 0.9825 - val_loss: 0.5458 - val_accuracy: 1.0000

Epoch 582/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5416 -
accuracy: 1.0000 - val_loss: 0.5442 - val_accuracy: 1.0000

Epoch 583/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5619 -
accuracy: 0.9825 - val_loss: 0.5480 - val_accuracy: 1.0000

Epoch 584/800
114/114 [=====] - 0s 936us/sample - loss: 0.5641 -
accuracy: 0.9737 - val_loss: 0.5835 - val_accuracy: 0.9524

Epoch 585/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5737 -
accuracy: 0.9912 - val_loss: 0.5571 - val_accuracy: 1.0000

Epoch 586/800
114/114 [=====] - 0s 920us/sample - loss: 0.5487 -
accuracy: 1.0000 - val_loss: 0.5426 - val_accuracy: 1.0000

Epoch 587/800
114/114 [=====] - 0s 926us/sample - loss: 0.5794 -
accuracy: 0.9825 - val_loss: 0.5407 - val_accuracy: 1.0000

Epoch 588/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5791 -
accuracy: 0.9825 - val_loss: 0.5503 - val_accuracy: 1.0000

Epoch 589/800
114/114 [=====] - 0s 922us/sample - loss: 0.5689 -
accuracy: 0.9912 - val_loss: 0.5837 - val_accuracy: 0.9524

Epoch 590/800
114/114 [=====] - 0s 902us/sample - loss: 0.5593 -
accuracy: 0.9825 - val_loss: 0.6004 - val_accuracy: 0.9524

Epoch 591/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5402 -
accuracy: 1.0000 - val_loss: 0.5893 - val_accuracy: 0.9524

Epoch 592/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5448 -
accuracy: 1.0000 - val_loss: 0.5538 - val_accuracy: 1.0000

Epoch 593/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5494 -
accuracy: 1.0000 - val_loss: 0.5470 - val_accuracy: 1.0000

Epoch 594/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5471 -
accuracy: 0.9912 - val_loss: 0.5423 - val_accuracy: 1.0000

Epoch 595/800
114/114 [=====] - 0s 948us/sample - loss: 0.5427 -
accuracy: 1.0000 - val_loss: 0.5384 - val_accuracy: 1.0000

Epoch 596/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5746 -
accuracy: 0.9912 - val_loss: 0.5400 - val_accuracy: 1.0000

Epoch 597/800
114/114 [=====] - 0s 972us/sample - loss: 0.5809 -
accuracy: 0.9737 - val_loss: 0.5418 - val_accuracy: 1.0000

Epoch 598/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5760 -
accuracy: 0.9825 - val_loss: 0.5498 - val_accuracy: 1.0000

Epoch 599/800
114/114 [=====] - 0s 881us/sample - loss: 0.5335 -
accuracy: 1.0000 - val_loss: 0.5441 - val_accuracy: 1.0000

Epoch 600/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5452 -
accuracy: 0.9912 - val_loss: 0.5432 - val_accuracy: 1.0000

Epoch 601/800
114/114 [=====] - 0s 928us/sample - loss: 0.5570 -
accuracy: 0.9825 - val_loss: 0.5386 - val_accuracy: 1.0000

Epoch 602/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5469 -
accuracy: 0.9912 - val_loss: 0.5375 - val_accuracy: 1.0000

Epoch 603/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5548 -
accuracy: 0.9912 - val_loss: 0.5363 - val_accuracy: 1.0000

Epoch 604/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5508 -
accuracy: 0.9912 - val_loss: 0.5397 - val_accuracy: 1.0000

Epoch 605/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6050 -
accuracy: 0.9825 - val_loss: 0.5616 - val_accuracy: 1.0000

Epoch 606/800
114/114 [=====] - 0s 873us/sample - loss: 0.5395 -
accuracy: 1.0000 - val_loss: 0.6191 - val_accuracy: 0.9524

Epoch 607/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5489 -
accuracy: 0.9912 - val_loss: 0.6817 - val_accuracy: 0.9524

Epoch 608/800
114/114 [=====] - 0s 954us/sample - loss: 0.5617 -
accuracy: 0.9912 - val_loss: 0.6725 - val_accuracy: 0.9524

Epoch 609/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5923 -
accuracy: 0.9825 - val_loss: 0.5664 - val_accuracy: 0.9524

Epoch 610/800
114/114 [=====] - 0s 971us/sample - loss: 0.5756 -
accuracy: 0.9825 - val_loss: 0.5374 - val_accuracy: 1.0000

Epoch 611/800
114/114 [=====] - 0s 897us/sample - loss: 0.5501 -
accuracy: 0.9912 - val_loss: 0.5357 - val_accuracy: 1.0000

Epoch 612/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5521 -
accuracy: 0.9912 - val_loss: 0.5359 - val_accuracy: 1.0000

Epoch 613/800
114/114 [=====] - 0s 946us/sample - loss: 0.5694 -
accuracy: 0.9825 - val_loss: 0.5312 - val_accuracy: 1.0000

Epoch 614/800
114/114 [=====] - 0s 889us/sample - loss: 0.5350 -
accuracy: 1.0000 - val_loss: 0.5296 - val_accuracy: 1.0000

Epoch 615/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5470 -
accuracy: 0.9912 - val_loss: 0.5304 - val_accuracy: 1.0000

Epoch 616/800
114/114 [=====] - 0s 912us/sample - loss: 0.5471 -
accuracy: 0.9912 - val_loss: 0.5321 - val_accuracy: 1.0000

Epoch 617/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5517 -
accuracy: 0.9825 - val_loss: 0.5392 - val_accuracy: 1.0000

Epoch 618/800
114/114 [=====] - 0s 917us/sample - loss: 0.5466 -
accuracy: 0.9912 - val_loss: 0.6130 - val_accuracy: 0.9524

Epoch 619/800
114/114 [=====] - 0s 941us/sample - loss: 0.5478 -
accuracy: 0.9912 - val_loss: 0.6175 - val_accuracy: 0.9524

Epoch 620/800
114/114 [=====] - 0s 898us/sample - loss: 0.5319 -
accuracy: 1.0000 - val_loss: 0.5621 - val_accuracy: 0.9524
Epoch 621/800
114/114 [=====] - 0s 990us/sample - loss: 0.5429 -
accuracy: 1.0000 - val_loss: 0.5383 - val_accuracy: 1.0000
Epoch 622/800
114/114 [=====] - 0s 923us/sample - loss: 0.5463 -
accuracy: 0.9825 - val_loss: 0.5305 - val_accuracy: 1.0000
Epoch 623/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5648 -
accuracy: 0.9825 - val_loss: 0.5260 - val_accuracy: 1.0000
Epoch 624/800
114/114 [=====] - 0s 935us/sample - loss: 0.5345 -
accuracy: 0.9912 - val_loss: 0.5258 - val_accuracy: 1.0000
Epoch 625/800
114/114 [=====] - 0s 890us/sample - loss: 0.5562 -
accuracy: 0.9912 - val_loss: 0.5278 - val_accuracy: 1.0000
Epoch 626/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5433 -
accuracy: 0.9825 - val_loss: 0.5399 - val_accuracy: 1.0000
Epoch 627/800
114/114 [=====] - 0s 920us/sample - loss: 0.5486 -
accuracy: 0.9825 - val_loss: 0.6276 - val_accuracy: 0.9524
Epoch 628/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5675 -
accuracy: 0.9912 - val_loss: 0.6041 - val_accuracy: 0.9524
Epoch 629/800
114/114 [=====] - 0s 964us/sample - loss: 0.5609 -
accuracy: 0.9737 - val_loss: 0.5300 - val_accuracy: 1.0000
Epoch 630/800
114/114 [=====] - 0s 896us/sample - loss: 0.5273 -
accuracy: 1.0000 - val_loss: 0.5223 - val_accuracy: 1.0000
Epoch 631/800
114/114 [=====] - 0s 977us/sample - loss: 0.5486 -
accuracy: 0.9912 - val_loss: 0.5213 - val_accuracy: 1.0000
Epoch 632/800
114/114 [=====] - 0s 954us/sample - loss: 0.5458 -
accuracy: 0.9825 - val_loss: 0.5229 - val_accuracy: 1.0000
Epoch 633/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5310 -
accuracy: 1.0000 - val_loss: 0.5270 - val_accuracy: 1.0000
Epoch 634/800
114/114 [=====] - 0s 967us/sample - loss: 0.5272 -
accuracy: 1.0000 - val_loss: 0.5277 - val_accuracy: 1.0000
Epoch 635/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5507 -
accuracy: 0.9912 - val_loss: 0.5250 - val_accuracy: 1.0000

Epoch 636/800
114/114 [=====] - 0s 916us/sample - loss: 0.5404 -
accuracy: 0.9912 - val_loss: 0.5211 - val_accuracy: 1.0000

Epoch 637/800
114/114 [=====] - 0s 952us/sample - loss: 0.5411 -
accuracy: 0.9912 - val_loss: 0.5196 - val_accuracy: 1.0000

Epoch 638/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5436 -
accuracy: 0.9912 - val_loss: 0.5214 - val_accuracy: 1.0000

Epoch 639/800
114/114 [=====] - 0s 855us/sample - loss: 0.5325 -
accuracy: 0.9912 - val_loss: 0.5304 - val_accuracy: 1.0000

Epoch 640/800
114/114 [=====] - 0s 949us/sample - loss: 0.5406 -
accuracy: 0.9912 - val_loss: 0.5656 - val_accuracy: 0.9524

Epoch 641/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5369 -
accuracy: 0.9825 - val_loss: 0.5724 - val_accuracy: 0.9524

Epoch 642/800
114/114 [=====] - 0s 936us/sample - loss: 0.5388 -
accuracy: 0.9912 - val_loss: 0.5336 - val_accuracy: 1.0000

Epoch 643/800
114/114 [=====] - 0s 899us/sample - loss: 0.5234 -
accuracy: 1.0000 - val_loss: 0.5217 - val_accuracy: 1.0000

Epoch 644/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5423 -
accuracy: 0.9825 - val_loss: 0.5207 - val_accuracy: 1.0000

Epoch 645/800
114/114 [=====] - 0s 943us/sample - loss: 0.5386 -
accuracy: 0.9912 - val_loss: 0.5206 - val_accuracy: 1.0000

Epoch 646/800
114/114 [=====] - 0s 984us/sample - loss: 0.5519 -
accuracy: 0.9737 - val_loss: 0.5227 - val_accuracy: 1.0000

Epoch 647/800
114/114 [=====] - 0s 925us/sample - loss: 0.5753 -
accuracy: 0.9737 - val_loss: 0.5236 - val_accuracy: 1.0000

Epoch 648/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5341 -
accuracy: 0.9912 - val_loss: 0.5290 - val_accuracy: 1.0000

Epoch 649/800
114/114 [=====] - 0s 959us/sample - loss: 0.5533 -
accuracy: 0.9825 - val_loss: 0.5393 - val_accuracy: 1.0000

Epoch 650/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5435 -
accuracy: 0.9825 - val_loss: 0.5237 - val_accuracy: 1.0000

Epoch 651/800
114/114 [=====] - 0s 932us/sample - loss: 0.5438 -
accuracy: 0.9825 - val_loss: 0.5158 - val_accuracy: 1.0000

Epoch 652/800
114/114 [=====] - 0s 892us/sample - loss: 0.5260 - accuracy: 1.0000 - val_loss: 0.5148 - val_accuracy: 1.0000

Epoch 653/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5451 - accuracy: 0.9912 - val_loss: 0.5144 - val_accuracy: 1.0000

Epoch 654/800
114/114 [=====] - 0s 930us/sample - loss: 0.5343 - accuracy: 0.9912 - val_loss: 0.5140 - val_accuracy: 1.0000

Epoch 655/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5696 - accuracy: 0.9912 - val_loss: 0.5139 - val_accuracy: 1.0000

Epoch 656/800
114/114 [=====] - 0s 981us/sample - loss: 0.5533 - accuracy: 0.9825 - val_loss: 0.5168 - val_accuracy: 1.0000

Epoch 657/800
114/114 [=====] - 0s 875us/sample - loss: 0.5308 - accuracy: 0.9912 - val_loss: 0.5299 - val_accuracy: 1.0000

Epoch 658/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5543 - accuracy: 0.9825 - val_loss: 0.5758 - val_accuracy: 0.9524

Epoch 659/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5461 - accuracy: 0.9912 - val_loss: 0.5740 - val_accuracy: 0.9524

Epoch 660/800
114/114 [=====] - 0s 955us/sample - loss: 0.5665 - accuracy: 0.9825 - val_loss: 0.5164 - val_accuracy: 1.0000

Epoch 661/800
114/114 [=====] - 0s 978us/sample - loss: 0.5178 - accuracy: 1.0000 - val_loss: 0.5131 - val_accuracy: 1.0000

Epoch 662/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5501 - accuracy: 0.9912 - val_loss: 0.5123 - val_accuracy: 1.0000

Epoch 663/800
114/114 [=====] - 0s 919us/sample - loss: 0.5727 - accuracy: 0.9825 - val_loss: 0.5146 - val_accuracy: 1.0000

Epoch 664/800
114/114 [=====] - 0s 908us/sample - loss: 0.5446 - accuracy: 0.9825 - val_loss: 0.5196 - val_accuracy: 1.0000

Epoch 665/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5345 - accuracy: 0.9912 - val_loss: 0.5318 - val_accuracy: 1.0000

Epoch 666/800
114/114 [=====] - 0s 966us/sample - loss: 0.5300 - accuracy: 0.9912 - val_loss: 0.5526 - val_accuracy: 0.9524

Epoch 667/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5315 - accuracy: 0.9912 - val_loss: 0.5468 - val_accuracy: 0.9524

Epoch 668/800
114/114 [=====] - 0s 916us/sample - loss: 0.5357 -
accuracy: 0.9912 - val_loss: 0.5173 - val_accuracy: 1.0000
Epoch 669/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5856 -
accuracy: 0.9474 - val_loss: 0.5115 - val_accuracy: 1.0000
Epoch 670/800
114/114 [=====] - 0s 996us/sample - loss: 0.5136 -
accuracy: 1.0000 - val_loss: 0.5117 - val_accuracy: 1.0000
Epoch 671/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5158 -
accuracy: 1.0000 - val_loss: 0.5135 - val_accuracy: 1.0000
Epoch 672/800
114/114 [=====] - 0s 964us/sample - loss: 0.5424 -
accuracy: 0.9825 - val_loss: 0.5122 - val_accuracy: 1.0000
Epoch 673/800
114/114 [=====] - 0s 897us/sample - loss: 0.5287 -
accuracy: 0.9912 - val_loss: 0.5141 - val_accuracy: 1.0000
Epoch 674/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5281 -
accuracy: 0.9912 - val_loss: 0.5203 - val_accuracy: 1.0000
Epoch 675/800
114/114 [=====] - 0s 919us/sample - loss: 0.5427 -
accuracy: 0.9912 - val_loss: 0.5190 - val_accuracy: 1.0000
Epoch 676/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5853 -
accuracy: 0.9649 - val_loss: 0.5156 - val_accuracy: 1.0000
Epoch 677/800
114/114 [=====] - 0s 908us/sample - loss: 0.5342 -
accuracy: 0.9912 - val_loss: 0.5108 - val_accuracy: 1.0000
Epoch 678/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5363 -
accuracy: 0.9825 - val_loss: 0.5103 - val_accuracy: 1.0000
Epoch 679/800
114/114 [=====] - 0s 985us/sample - loss: 0.5262 -
accuracy: 0.9912 - val_loss: 0.5185 - val_accuracy: 1.0000
Epoch 680/800
114/114 [=====] - 0s 882us/sample - loss: 0.5247 -
accuracy: 1.0000 - val_loss: 0.5244 - val_accuracy: 1.0000
Epoch 681/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5411 -
accuracy: 0.9825 - val_loss: 0.5200 - val_accuracy: 1.0000
Epoch 682/800
114/114 [=====] - 0s 918us/sample - loss: 0.5350 -
accuracy: 0.9825 - val_loss: 0.5246 - val_accuracy: 1.0000
Epoch 683/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5753 -
accuracy: 0.9737 - val_loss: 0.5120 - val_accuracy: 1.0000

Epoch 684/800
114/114 [=====] - 0s 910us/sample - loss: 0.5269 -
accuracy: 0.9912 - val_loss: 0.5098 - val_accuracy: 1.0000

Epoch 685/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5706 -
accuracy: 0.9737 - val_loss: 0.5073 - val_accuracy: 1.0000

Epoch 686/800
114/114 [=====] - 0s 969us/sample - loss: 0.5509 -
accuracy: 0.9825 - val_loss: 0.5062 - val_accuracy: 1.0000

Epoch 687/800
114/114 [=====] - 0s 899us/sample - loss: 0.5191 -
accuracy: 0.9912 - val_loss: 0.5063 - val_accuracy: 1.0000

Epoch 688/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5186 -
accuracy: 1.0000 - val_loss: 0.5077 - val_accuracy: 1.0000

Epoch 689/800
114/114 [=====] - 0s 904us/sample - loss: 0.5504 -
accuracy: 0.9912 - val_loss: 0.5139 - val_accuracy: 1.0000

Epoch 690/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5364 -
accuracy: 0.9912 - val_loss: 0.5316 - val_accuracy: 1.0000

Epoch 691/800
114/114 [=====] - 0s 997us/sample - loss: 0.5397 -
accuracy: 0.9825 - val_loss: 0.5584 - val_accuracy: 0.9524

Epoch 692/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5815 -
accuracy: 0.9737 - val_loss: 0.5416 - val_accuracy: 0.9524

Epoch 693/800
114/114 [=====] - 0s 929us/sample - loss: 0.5461 -
accuracy: 0.9737 - val_loss: 0.5118 - val_accuracy: 1.0000

Epoch 694/800
114/114 [=====] - 0s 899us/sample - loss: 0.5191 -
accuracy: 0.9912 - val_loss: 0.5055 - val_accuracy: 1.0000

Epoch 695/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5287 -
accuracy: 0.9825 - val_loss: 0.5055 - val_accuracy: 1.0000

Epoch 696/800
114/114 [=====] - 0s 945us/sample - loss: 0.5215 -
accuracy: 0.9912 - val_loss: 0.5056 - val_accuracy: 1.0000

Epoch 697/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5228 -
accuracy: 0.9912 - val_loss: 0.5069 - val_accuracy: 1.0000

Epoch 698/800
114/114 [=====] - 0s 953us/sample - loss: 0.5296 -
accuracy: 0.9912 - val_loss: 0.5115 - val_accuracy: 1.0000

Epoch 699/800
114/114 [=====] - 0s 925us/sample - loss: 0.5199 -
accuracy: 1.0000 - val_loss: 0.5108 - val_accuracy: 1.0000

Epoch 700/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5100 -
accuracy: 1.0000 - val_loss: 0.5102 - val_accuracy: 1.0000
Epoch 701/800
114/114 [=====] - 0s 928us/sample - loss: 0.5264 -
accuracy: 0.9912 - val_loss: 0.5076 - val_accuracy: 1.0000
Epoch 702/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5056 -
accuracy: 1.0000 - val_loss: 0.5061 - val_accuracy: 1.0000
Epoch 703/800
114/114 [=====] - 0s 951us/sample - loss: 0.5174 -
accuracy: 0.9912 - val_loss: 0.5081 - val_accuracy: 1.0000
Epoch 704/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5262 -
accuracy: 0.9912 - val_loss: 0.5202 - val_accuracy: 1.0000
Epoch 705/800
114/114 [=====] - 0s 951us/sample - loss: 0.5303 -
accuracy: 0.9825 - val_loss: 0.5180 - val_accuracy: 1.0000
Epoch 706/800
114/114 [=====] - 0s 902us/sample - loss: 0.5210 -
accuracy: 0.9912 - val_loss: 0.5085 - val_accuracy: 1.0000
Epoch 707/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5118 -
accuracy: 0.9912 - val_loss: 0.5049 - val_accuracy: 1.0000
Epoch 708/800
114/114 [=====] - 0s 926us/sample - loss: 0.5118 -
accuracy: 1.0000 - val_loss: 0.5046 - val_accuracy: 1.0000
Epoch 709/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5162 -
accuracy: 0.9825 - val_loss: 0.5121 - val_accuracy: 1.0000
Epoch 710/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5139 -
accuracy: 0.9912 - val_loss: 0.5260 - val_accuracy: 1.0000
Epoch 711/800
114/114 [=====] - 0s 876us/sample - loss: 0.5330 -
accuracy: 0.9912 - val_loss: 0.5245 - val_accuracy: 1.0000
Epoch 712/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5405 -
accuracy: 0.9825 - val_loss: 0.5073 - val_accuracy: 1.0000
Epoch 713/800
114/114 [=====] - 0s 949us/sample - loss: 0.5277 -
accuracy: 0.9912 - val_loss: 0.5050 - val_accuracy: 1.0000
Epoch 714/800
114/114 [=====] - 0s 922us/sample - loss: 0.5287 -
accuracy: 0.9825 - val_loss: 0.5075 - val_accuracy: 1.0000
Epoch 715/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5208 -
accuracy: 0.9912 - val_loss: 0.5144 - val_accuracy: 1.0000

Epoch 716/800
114/114 [=====] - 0s 915us/sample - loss: 0.5195 -
accuracy: 0.9912 - val_loss: 0.5072 - val_accuracy: 1.0000

Epoch 717/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5243 -
accuracy: 0.9912 - val_loss: 0.5032 - val_accuracy: 1.0000

Epoch 718/800
114/114 [=====] - 0s 916us/sample - loss: 0.5144 -
accuracy: 0.9912 - val_loss: 0.5044 - val_accuracy: 1.0000

Epoch 719/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5282 -
accuracy: 0.9912 - val_loss: 0.5286 - val_accuracy: 1.0000

Epoch 720/800
114/114 [=====] - 0s 928us/sample - loss: 0.5466 -
accuracy: 0.9825 - val_loss: 0.6050 - val_accuracy: 0.9524

Epoch 721/800
114/114 [=====] - 0s 954us/sample - loss: 0.5230 -
accuracy: 0.9912 - val_loss: 0.5911 - val_accuracy: 0.9524

Epoch 722/800
114/114 [=====] - 0s 948us/sample - loss: 0.5361 -
accuracy: 0.9825 - val_loss: 0.5026 - val_accuracy: 1.0000

Epoch 723/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4996 -
accuracy: 1.0000 - val_loss: 0.4965 - val_accuracy: 1.0000

Epoch 724/800
114/114 [=====] - 0s 962us/sample - loss: 0.5344 -
accuracy: 0.9912 - val_loss: 0.4953 - val_accuracy: 1.0000

Epoch 725/800
114/114 [=====] - 0s 905us/sample - loss: 0.5100 -
accuracy: 0.9912 - val_loss: 0.4950 - val_accuracy: 1.0000

Epoch 726/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5306 -
accuracy: 0.9825 - val_loss: 0.4955 - val_accuracy: 1.0000

Epoch 727/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5114 -
accuracy: 0.9912 - val_loss: 0.4966 - val_accuracy: 1.0000

Epoch 728/800
114/114 [=====] - 0s 999us/sample - loss: 0.5087 -
accuracy: 0.9912 - val_loss: 0.5027 - val_accuracy: 1.0000

Epoch 729/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5293 -
accuracy: 0.9912 - val_loss: 0.5114 - val_accuracy: 1.0000

Epoch 730/800
114/114 [=====] - 0s 983us/sample - loss: 0.5316 -
accuracy: 0.9737 - val_loss: 0.5053 - val_accuracy: 1.0000

Epoch 731/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4990 -
accuracy: 1.0000 - val_loss: 0.4995 - val_accuracy: 1.0000

Epoch 732/800
114/114 [=====] - 0s 915us/sample - loss: 0.5156 -
accuracy: 0.9912 - val_loss: 0.4967 - val_accuracy: 1.0000

Epoch 733/800
114/114 [=====] - 0s 910us/sample - loss: 0.5269 -
accuracy: 0.9737 - val_loss: 0.4961 - val_accuracy: 1.0000

Epoch 734/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5009 -
accuracy: 1.0000 - val_loss: 0.4970 - val_accuracy: 1.0000

Epoch 735/800
114/114 [=====] - 0s 887us/sample - loss: 0.5018 -
accuracy: 1.0000 - val_loss: 0.4994 - val_accuracy: 1.0000

Epoch 736/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4995 -
accuracy: 1.0000 - val_loss: 0.5034 - val_accuracy: 1.0000

Epoch 737/800
114/114 [=====] - 0s 926us/sample - loss: 0.5211 -
accuracy: 0.9825 - val_loss: 0.4998 - val_accuracy: 1.0000

Epoch 738/800
114/114 [=====] - 0s 930us/sample - loss: 0.5055 -
accuracy: 0.9912 - val_loss: 0.4978 - val_accuracy: 1.0000

Epoch 739/800
114/114 [=====] - 0s 998us/sample - loss: 0.4943 -
accuracy: 1.0000 - val_loss: 0.4966 - val_accuracy: 1.0000

Epoch 740/800
114/114 [=====] - 0s 921us/sample - loss: 0.5031 -
accuracy: 0.9912 - val_loss: 0.4997 - val_accuracy: 1.0000

Epoch 741/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5192 -
accuracy: 0.9912 - val_loss: 0.5028 - val_accuracy: 1.0000

Epoch 742/800
114/114 [=====] - 0s 908us/sample - loss: 0.5103 -
accuracy: 0.9912 - val_loss: 0.4933 - val_accuracy: 1.0000

Epoch 743/800
114/114 [=====] - 0s 899us/sample - loss: 0.4989 -
accuracy: 1.0000 - val_loss: 0.4914 - val_accuracy: 1.0000

Epoch 744/800
114/114 [=====] - 0s 991us/sample - loss: 0.4934 -
accuracy: 1.0000 - val_loss: 0.4908 - val_accuracy: 1.0000

Epoch 745/800
114/114 [=====] - 0s 915us/sample - loss: 0.5139 -
accuracy: 0.9912 - val_loss: 0.4914 - val_accuracy: 1.0000

Epoch 746/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4962 -
accuracy: 1.0000 - val_loss: 0.4921 - val_accuracy: 1.0000

Epoch 747/800
114/114 [=====] - 0s 919us/sample - loss: 0.5064 -
accuracy: 0.9912 - val_loss: 0.4936 - val_accuracy: 1.0000

Epoch 748/800
114/114 [=====] - 0s 877us/sample - loss: 0.5176 - accuracy: 0.9912 - val_loss: 0.5019 - val_accuracy: 1.0000

Epoch 749/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5116 - accuracy: 0.9825 - val_loss: 0.5006 - val_accuracy: 1.0000

Epoch 750/800
114/114 [=====] - 0s 920us/sample - loss: 0.5288 - accuracy: 0.9737 - val_loss: 0.5188 - val_accuracy: 1.0000

Epoch 751/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5295 - accuracy: 0.9737 - val_loss: 0.4968 - val_accuracy: 1.0000

Epoch 752/800
114/114 [=====] - 0s 952us/sample - loss: 0.4989 - accuracy: 0.9912 - val_loss: 0.4900 - val_accuracy: 1.0000

Epoch 753/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5093 - accuracy: 0.9912 - val_loss: 0.4883 - val_accuracy: 1.0000

Epoch 754/800
114/114 [=====] - 0s 921us/sample - loss: 0.5067 - accuracy: 0.9912 - val_loss: 0.4900 - val_accuracy: 1.0000

Epoch 755/800
114/114 [=====] - 0s 947us/sample - loss: 0.4980 - accuracy: 0.9912 - val_loss: 0.4976 - val_accuracy: 1.0000

Epoch 756/800
114/114 [=====] - 0s 976us/sample - loss: 0.4939 - accuracy: 1.0000 - val_loss: 0.5098 - val_accuracy: 1.0000

Epoch 757/800
114/114 [=====] - 0s 927us/sample - loss: 0.4949 - accuracy: 1.0000 - val_loss: 0.5207 - val_accuracy: 0.9524

Epoch 758/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4966 - accuracy: 1.0000 - val_loss: 0.5215 - val_accuracy: 0.9524

Epoch 759/800
114/114 [=====] - 0s 922us/sample - loss: 0.4962 - accuracy: 0.9912 - val_loss: 0.5034 - val_accuracy: 1.0000

Epoch 760/800
114/114 [=====] - 0s 925us/sample - loss: 0.4892 - accuracy: 1.0000 - val_loss: 0.4906 - val_accuracy: 1.0000

Epoch 761/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5038 - accuracy: 0.9912 - val_loss: 0.4871 - val_accuracy: 1.0000

Epoch 762/800
114/114 [=====] - 0s 904us/sample - loss: 0.4960 - accuracy: 1.0000 - val_loss: 0.4864 - val_accuracy: 1.0000

Epoch 763/800
114/114 [=====] - 0s 906us/sample - loss: 0.5101 - accuracy: 0.9912 - val_loss: 0.4862 - val_accuracy: 1.0000

Epoch 764/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5140 -
accuracy: 0.9912 - val_loss: 0.4921 - val_accuracy: 1.0000

Epoch 765/800
114/114 [=====] - 0s 951us/sample - loss: 0.5003 -
accuracy: 0.9912 - val_loss: 0.5108 - val_accuracy: 1.0000

Epoch 766/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4870 -
accuracy: 1.0000 - val_loss: 0.5073 - val_accuracy: 1.0000

Epoch 767/800
114/114 [=====] - 0s 934us/sample - loss: 0.4987 -
accuracy: 0.9912 - val_loss: 0.4955 - val_accuracy: 1.0000

Epoch 768/800
114/114 [=====] - 0s 898us/sample - loss: 0.4952 -
accuracy: 1.0000 - val_loss: 0.4880 - val_accuracy: 1.0000

Epoch 769/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5146 -
accuracy: 0.9825 - val_loss: 0.4862 - val_accuracy: 1.0000

Epoch 770/800
114/114 [=====] - 0s 945us/sample - loss: 0.4864 -
accuracy: 1.0000 - val_loss: 0.4834 - val_accuracy: 1.0000

Epoch 771/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4870 -
accuracy: 1.0000 - val_loss: 0.4828 - val_accuracy: 1.0000

Epoch 772/800
114/114 [=====] - 0s 943us/sample - loss: 0.5361 -
accuracy: 0.9825 - val_loss: 0.4829 - val_accuracy: 1.0000

Epoch 773/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5160 -
accuracy: 0.9912 - val_loss: 0.4847 - val_accuracy: 1.0000

Epoch 774/800
114/114 [=====] - 0s 981us/sample - loss: 0.4840 -
accuracy: 1.0000 - val_loss: 0.4885 - val_accuracy: 1.0000

Epoch 775/800
114/114 [=====] - 0s 939us/sample - loss: 0.4845 -
accuracy: 1.0000 - val_loss: 0.4925 - val_accuracy: 1.0000

Epoch 776/800
114/114 [=====] - 0s 993us/sample - loss: 0.5370 -
accuracy: 0.9825 - val_loss: 0.5062 - val_accuracy: 1.0000

Epoch 777/800
114/114 [=====] - 0s 937us/sample - loss: 0.4964 -
accuracy: 1.0000 - val_loss: 0.5349 - val_accuracy: 0.9524

Epoch 778/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5025 -
accuracy: 0.9825 - val_loss: 0.5205 - val_accuracy: 0.9524

Epoch 779/800
114/114 [=====] - 0s 860us/sample - loss: 0.4881 -
accuracy: 1.0000 - val_loss: 0.4922 - val_accuracy: 1.0000

Epoch 780/800
114/114 [=====] - 0s 926us/sample - loss: 0.4994 -
accuracy: 0.9912 - val_loss: 0.4899 - val_accuracy: 1.0000
Epoch 781/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5037 -
accuracy: 1.0000 - val_loss: 0.4870 - val_accuracy: 1.0000
Epoch 782/800
114/114 [=====] - 0s 963us/sample - loss: 0.4969 -
accuracy: 0.9912 - val_loss: 0.4834 - val_accuracy: 1.0000
Epoch 783/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4937 -
accuracy: 0.9912 - val_loss: 0.4849 - val_accuracy: 1.0000
Epoch 784/800
114/114 [=====] - 0s 937us/sample - loss: 0.4917 -
accuracy: 0.9912 - val_loss: 0.4889 - val_accuracy: 1.0000
Epoch 785/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5087 -
accuracy: 0.9912 - val_loss: 0.4925 - val_accuracy: 1.0000
Epoch 786/800
114/114 [=====] - 0s 980us/sample - loss: 0.4852 -
accuracy: 1.0000 - val_loss: 0.4933 - val_accuracy: 1.0000
Epoch 787/800
114/114 [=====] - 0s 895us/sample - loss: 0.4841 -
accuracy: 1.0000 - val_loss: 0.4834 - val_accuracy: 1.0000
Epoch 788/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4833 -
accuracy: 1.0000 - val_loss: 0.4802 - val_accuracy: 1.0000
Epoch 789/800
114/114 [=====] - 0s 967us/sample - loss: 0.4786 -
accuracy: 1.0000 - val_loss: 0.4784 - val_accuracy: 1.0000
Epoch 790/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4988 -
accuracy: 0.9912 - val_loss: 0.4787 - val_accuracy: 1.0000
Epoch 791/800
114/114 [=====] - 0s 931us/sample - loss: 0.4851 -
accuracy: 1.0000 - val_loss: 0.4799 - val_accuracy: 1.0000
Epoch 792/800
114/114 [=====] - 0s 904us/sample - loss: 0.4929 -
accuracy: 0.9912 - val_loss: 0.4856 - val_accuracy: 1.0000
Epoch 793/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4898 -
accuracy: 0.9912 - val_loss: 0.4845 - val_accuracy: 1.0000
Epoch 794/800
114/114 [=====] - 0s 903us/sample - loss: 0.4894 -
accuracy: 1.0000 - val_loss: 0.4787 - val_accuracy: 1.0000
Epoch 795/800
114/114 [=====] - 0s 990us/sample - loss: 0.4961 -
accuracy: 0.9912 - val_loss: 0.4767 - val_accuracy: 1.0000

```

Epoch 796/800
114/114 [=====] - 0s 907us/sample - loss: 0.4842 -
accuracy: 1.0000 - val_loss: 0.4765 - val_accuracy: 1.0000
Epoch 797/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5023 -
accuracy: 0.9912 - val_loss: 0.4794 - val_accuracy: 1.0000
Epoch 798/800
114/114 [=====] - 0s 961us/sample - loss: 0.4892 -
accuracy: 0.9912 - val_loss: 0.4920 - val_accuracy: 1.0000
Epoch 799/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4776 -
accuracy: 1.0000 - val_loss: 0.5250 - val_accuracy: 0.9524
Epoch 800/800
114/114 [=====] - 0s 919us/sample - loss: 0.4863 -
accuracy: 1.0000 - val_loss: 0.5547 - val_accuracy: 0.9524

```

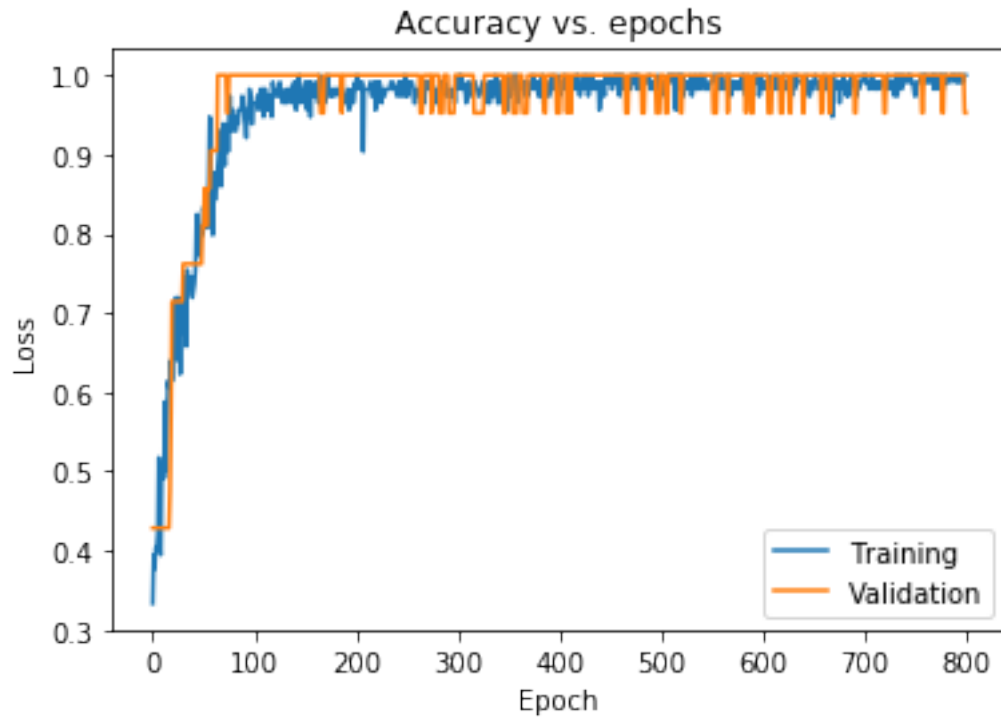
Plot the learning curves Let's now plot the loss and accuracy for the training and validation sets.

```

[59]: #Run this cell to plot the new accuracy vs epoch graph

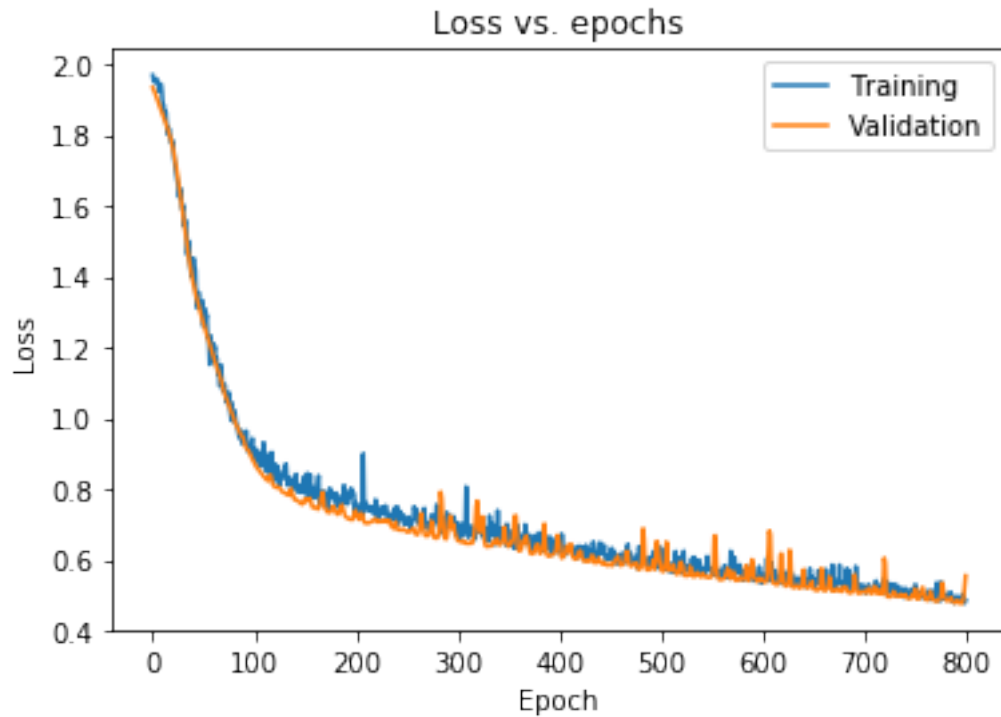
try:
    plt.plot(reg_history.history['accuracy'])
    plt.plot(reg_history.history['val_accuracy'])
except KeyError:
    plt.plot(reg_history.history['acc'])
    plt.plot(reg_history.history['val_acc'])
plt.title('Accuracy vs. epochs')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(['Training', 'Validation'], loc='lower right')
plt.show()

```

[60]: *#Run this cell to plot the new loss vs epoch graph*

```
plt.plot(reg_history.history['loss'])
plt.plot(reg_history.history['val_loss'])
plt.title('Loss vs. epochs')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(['Training', 'Validation'], loc='upper right')
plt.show()
```



We can see that the regularisation has helped to reduce the overfitting of the network. You will now incorporate callbacks into a new training run that implements early stopping and learning rate reduction on plateaux.

Fill in the function below so that:

- It creates an `EarlyStopping` callback object and a `ReduceLROnPlateau` callback object
- The early stopping callback is used and monitors validation loss with the mode set to "min" and patience of 30.
- The learning rate reduction on plateaux is used with a learning rate factor of 0.2 and a patience of 20.

[47]: `#### GRADED CELL ####`

```
# Complete the following function.
# Make sure to not change the function name or arguments.

def get_callbacks():
    """
    This function should create and return a tuple (early_stopping,
    ↪ learning_rate_reduction) callbacks.
    The callbacks should be instantiated according to the above requirements.
    """
```

Run the cell below to instantiate and train the regularised model with the callbacks.

```
[49]: call_model = get_regularised_model(train_data[0].shape, 0.3, 0.0001)
      compile_model(call_model)
      early_stopping, learning_rate_reduction = get_callbacks()
      call_history = call_model.fit(train_data, train_targets, epochs=800,
      ↪validation_split=0.15,
      ↪callbacks=[early_stopping, learning_rate_reduction],
      ↪verbose=0)
```

Train on 114 samples, validate on 21 samples

Epoch 1/800

114/114 [=====] - 3s 27ms/sample - loss: 1.1686 -
accuracy: 0.4035 - val_loss: 1.1339 - val_accuracy: 0.4286

Epoch 2/800

114/114 [=====] - 0s 2ms/sample - loss: 1.1794 -
accuracy: 0.3596 - val_loss: 1.1345 - val_accuracy: 0.4286

Epoch 3/800

114/114 [=====] - 0s 996us/sample - loss: 1.1669 -
accuracy: 0.4035 - val_loss: 1.1327 - val_accuracy: 0.4762

Epoch 4/800

114/114 [=====] - 0s 2ms/sample - loss: 1.1371 -
accuracy: 0.4211 - val_loss: 1.1289 - val_accuracy: 0.6190

Epoch 5/800

114/114 [=====] - 0s 2ms/sample - loss: 1.1417 -
accuracy: 0.4211 - val_loss: 1.1265 - val_accuracy: 0.6667

Epoch 6/800

114/114 [=====] - 0s 944us/sample - loss: 1.1052 -
accuracy: 0.5439 - val_loss: 1.1230 - val_accuracy: 0.6667

Epoch 7/800

114/114 [=====] - 0s 1ms/sample - loss: 1.1382 -
accuracy: 0.4737 - val_loss: 1.1185 - val_accuracy: 0.6667

Epoch 8/800

114/114 [=====] - 0s 2ms/sample - loss: 1.1135 -
accuracy: 0.4912 - val_loss: 1.1130 - val_accuracy: 0.6667

Epoch 9/800

114/114 [=====] - 0s 2ms/sample - loss: 1.1289 -
accuracy: 0.4825 - val_loss: 1.1052 - val_accuracy: 0.6667

Epoch 10/800

114/114 [=====] - 0s 2ms/sample - loss: 1.0975 -
accuracy: 0.5175 - val_loss: 1.0960 - val_accuracy: 0.6667

Epoch 11/800

114/114 [=====] - 0s 2ms/sample - loss: 1.0967 -
accuracy: 0.5263 - val_loss: 1.0848 - val_accuracy: 0.6667

Epoch 12/800

114/114 [=====] - 0s 1ms/sample - loss: 1.0745 -
accuracy: 0.5439 - val_loss: 1.0734 - val_accuracy: 0.6667

Epoch 13/800

114/114 [=====] - 0s 2ms/sample - loss: 1.0346 -
 accuracy: 0.6491 - val_loss: 1.0645 - val_accuracy: 0.6667
 Epoch 14/800
 114/114 [=====] - 0s 1ms/sample - loss: 1.0328 -
 accuracy: 0.5965 - val_loss: 1.0543 - val_accuracy: 0.6667
 Epoch 15/800
 114/114 [=====] - 0s 1ms/sample - loss: 1.0361 -
 accuracy: 0.5702 - val_loss: 1.0443 - val_accuracy: 0.6667
 Epoch 16/800
 114/114 [=====] - 0s 1ms/sample - loss: 1.0263 -
 accuracy: 0.6053 - val_loss: 1.0331 - val_accuracy: 0.6667
 Epoch 17/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.9993 -
 accuracy: 0.6228 - val_loss: 1.0196 - val_accuracy: 0.6667
 Epoch 18/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.9693 -
 accuracy: 0.6404 - val_loss: 1.0055 - val_accuracy: 0.6667
 Epoch 19/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.9749 -
 accuracy: 0.6316 - val_loss: 0.9921 - val_accuracy: 0.6667
 Epoch 20/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.9357 -
 accuracy: 0.6228 - val_loss: 0.9780 - val_accuracy: 0.6667
 Epoch 21/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.9219 -
 accuracy: 0.6754 - val_loss: 0.9630 - val_accuracy: 0.6667
 Epoch 22/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.8962 -
 accuracy: 0.6754 - val_loss: 0.9470 - val_accuracy: 0.6667
 Epoch 23/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.8529 -
 accuracy: 0.6754 - val_loss: 0.9320 - val_accuracy: 0.6667
 Epoch 24/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.8542 -
 accuracy: 0.6842 - val_loss: 0.9172 - val_accuracy: 0.6667
 Epoch 25/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.8379 -
 accuracy: 0.6930 - val_loss: 0.8981 - val_accuracy: 0.6667
 Epoch 26/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.8252 -
 accuracy: 0.6491 - val_loss: 0.8772 - val_accuracy: 0.6667
 Epoch 27/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.7886 -
 accuracy: 0.6754 - val_loss: 0.8543 - val_accuracy: 0.6667
 Epoch 28/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.7681 -
 accuracy: 0.6930 - val_loss: 0.8301 - val_accuracy: 0.6667
 Epoch 29/800

114/114 [=====] - 0s 2ms/sample - loss: 0.7754 -
 accuracy: 0.6491 - val_loss: 0.8072 - val_accuracy: 0.6667
 Epoch 30/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.7346 -
 accuracy: 0.6754 - val_loss: 0.7823 - val_accuracy: 0.6667
 Epoch 31/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.7470 -
 accuracy: 0.6754 - val_loss: 0.7616 - val_accuracy: 0.6667
 Epoch 32/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.7356 -
 accuracy: 0.6667 - val_loss: 0.7448 - val_accuracy: 0.6667
 Epoch 33/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.7141 -
 accuracy: 0.7018 - val_loss: 0.7266 - val_accuracy: 0.6667
 Epoch 34/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.6749 -
 accuracy: 0.7018 - val_loss: 0.7101 - val_accuracy: 0.6667
 Epoch 35/800
 114/114 [=====] - 0s 950us/sample - loss: 0.6846 -
 accuracy: 0.7018 - val_loss: 0.6959 - val_accuracy: 0.6667
 Epoch 36/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.6674 -
 accuracy: 0.6930 - val_loss: 0.6835 - val_accuracy: 0.6667
 Epoch 37/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.6754 -
 accuracy: 0.6754 - val_loss: 0.6723 - val_accuracy: 0.6667
 Epoch 38/800
 114/114 [=====] - 0s 907us/sample - loss: 0.6273 -
 accuracy: 0.7281 - val_loss: 0.6605 - val_accuracy: 0.6667
 Epoch 39/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.6236 -
 accuracy: 0.7456 - val_loss: 0.6474 - val_accuracy: 0.6667
 Epoch 40/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.6167 -
 accuracy: 0.7018 - val_loss: 0.6368 - val_accuracy: 0.6667
 Epoch 41/800
 114/114 [=====] - 0s 981us/sample - loss: 0.6037 -
 accuracy: 0.7193 - val_loss: 0.6281 - val_accuracy: 0.6667
 Epoch 42/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.6302 -
 accuracy: 0.7456 - val_loss: 0.6201 - val_accuracy: 0.6667
 Epoch 43/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.5904 -
 accuracy: 0.7105 - val_loss: 0.6119 - val_accuracy: 0.6667
 Epoch 44/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.5733 -
 accuracy: 0.7544 - val_loss: 0.6036 - val_accuracy: 0.6667
 Epoch 45/800

114/114 [=====] - 0s 1ms/sample - loss: 0.6030 -
 accuracy: 0.7632 - val_loss: 0.5968 - val_accuracy: 0.7143
 Epoch 46/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.5817 -
 accuracy: 0.7281 - val_loss: 0.5904 - val_accuracy: 0.7143
 Epoch 47/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.5738 -
 accuracy: 0.7368 - val_loss: 0.5834 - val_accuracy: 0.7143
 Epoch 48/800
 114/114 [=====] - 0s 942us/sample - loss: 0.5561 -
 accuracy: 0.7544 - val_loss: 0.5769 - val_accuracy: 0.7143
 Epoch 49/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.5489 -
 accuracy: 0.7456 - val_loss: 0.5698 - val_accuracy: 0.7143
 Epoch 50/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.5454 -
 accuracy: 0.7193 - val_loss: 0.5626 - val_accuracy: 0.7143
 Epoch 51/800
 114/114 [=====] - 0s 931us/sample - loss: 0.5166 -
 accuracy: 0.7895 - val_loss: 0.5555 - val_accuracy: 0.7143
 Epoch 52/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.5254 -
 accuracy: 0.7807 - val_loss: 0.5484 - val_accuracy: 0.7143
 Epoch 53/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.5195 -
 accuracy: 0.7719 - val_loss: 0.5412 - val_accuracy: 0.7143
 Epoch 54/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.5100 -
 accuracy: 0.7807 - val_loss: 0.5336 - val_accuracy: 0.7143
 Epoch 55/800
 114/114 [=====] - 0s 953us/sample - loss: 0.5025 -
 accuracy: 0.7895 - val_loss: 0.5254 - val_accuracy: 0.7619
 Epoch 56/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.4814 -
 accuracy: 0.8509 - val_loss: 0.5162 - val_accuracy: 0.8095
 Epoch 57/800
 114/114 [=====] - 0s 959us/sample - loss: 0.4935 -
 accuracy: 0.8509 - val_loss: 0.5063 - val_accuracy: 0.8095
 Epoch 58/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.5011 -
 accuracy: 0.8158 - val_loss: 0.4977 - val_accuracy: 0.8095
 Epoch 59/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.4908 -
 accuracy: 0.7982 - val_loss: 0.4897 - val_accuracy: 0.9048
 Epoch 60/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.4627 -
 accuracy: 0.8070 - val_loss: 0.4826 - val_accuracy: 0.9048
 Epoch 61/800

114/114 [=====] - 0s 974us/sample - loss: 0.5062 -
 accuracy: 0.7895 - val_loss: 0.4769 - val_accuracy: 0.9048
 Epoch 62/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.4648 -
 accuracy: 0.8772 - val_loss: 0.4688 - val_accuracy: 0.9524
 Epoch 63/800
 114/114 [=====] - 0s 963us/sample - loss: 0.4479 -
 accuracy: 0.8070 - val_loss: 0.4600 - val_accuracy: 0.9524
 Epoch 64/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.4556 -
 accuracy: 0.8860 - val_loss: 0.4488 - val_accuracy: 0.9524
 Epoch 65/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.4605 -
 accuracy: 0.8158 - val_loss: 0.4398 - val_accuracy: 0.9524
 Epoch 66/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.4194 -
 accuracy: 0.8860 - val_loss: 0.4316 - val_accuracy: 0.9524
 Epoch 67/800
 114/114 [=====] - 0s 984us/sample - loss: 0.4583 -
 accuracy: 0.8246 - val_loss: 0.4242 - val_accuracy: 0.9524
 Epoch 68/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.4467 -
 accuracy: 0.8070 - val_loss: 0.4172 - val_accuracy: 0.9524
 Epoch 69/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.4202 -
 accuracy: 0.8596 - val_loss: 0.4083 - val_accuracy: 1.0000
 Epoch 70/800
 114/114 [=====] - 0s 930us/sample - loss: 0.4233 -
 accuracy: 0.8860 - val_loss: 0.3959 - val_accuracy: 1.0000
 Epoch 71/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.3736 -
 accuracy: 0.8947 - val_loss: 0.3807 - val_accuracy: 1.0000
 Epoch 72/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.3962 -
 accuracy: 0.8860 - val_loss: 0.3697 - val_accuracy: 1.0000
 Epoch 73/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.3514 -
 accuracy: 0.9298 - val_loss: 0.3560 - val_accuracy: 1.0000
 Epoch 74/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.4004 -
 accuracy: 0.8684 - val_loss: 0.3462 - val_accuracy: 1.0000
 Epoch 75/800
 114/114 [=====] - 0s 984us/sample - loss: 0.3217 -
 accuracy: 0.9474 - val_loss: 0.3385 - val_accuracy: 1.0000
 Epoch 76/800
 114/114 [=====] - 0s 998us/sample - loss: 0.3571 -
 accuracy: 0.8947 - val_loss: 0.3330 - val_accuracy: 1.0000
 Epoch 77/800

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114/114 [=====] - 0s 2ms/sample - loss: 0.3557 -
accuracy: 0.8947 - val_loss: 0.3282 - val_accuracy: 0.9524
Epoch 78/800
114/114 [=====] - 0s 2ms/sample - loss: 0.3540 -
accuracy: 0.9123 - val_loss: 0.3182 - val_accuracy: 0.9524
Epoch 79/800
114/114 [=====] - 0s 2ms/sample - loss: 0.3443 -
accuracy: 0.9035 - val_loss: 0.2988 - val_accuracy: 0.9524
Epoch 80/800
114/114 [=====] - 0s 1ms/sample - loss: 0.3347 -
accuracy: 0.9035 - val_loss: 0.2867 - val_accuracy: 0.9524
Epoch 81/800
114/114 [=====] - 0s 2ms/sample - loss: 0.3270 -
accuracy: 0.9211 - val_loss: 0.2802 - val_accuracy: 0.9524
Epoch 82/800
114/114 [=====] - 0s 2ms/sample - loss: 0.3450 -
accuracy: 0.9035 - val_loss: 0.2858 - val_accuracy: 0.9524
Epoch 83/800
114/114 [=====] - 0s 996us/sample - loss: 0.3337 -
accuracy: 0.9211 - val_loss: 0.3006 - val_accuracy: 0.9048
Epoch 84/800
114/114 [=====] - 0s 1ms/sample - loss: 0.2259 -
accuracy: 0.9649 - val_loss: 0.2903 - val_accuracy: 0.9524
Epoch 85/800
114/114 [=====] - 0s 2ms/sample - loss: 0.2596 -
accuracy: 0.9474 - val_loss: 0.2727 - val_accuracy: 0.9524
Epoch 86/800
114/114 [=====] - 0s 2ms/sample - loss: 0.2592 -
accuracy: 0.9386 - val_loss: 0.2711 - val_accuracy: 0.9524
Epoch 87/800
114/114 [=====] - 0s 1ms/sample - loss: 0.2762 -
accuracy: 0.9386 - val_loss: 0.2413 - val_accuracy: 0.9524
Epoch 88/800
114/114 [=====] - 0s 2ms/sample - loss: 0.2652 -
accuracy: 0.9474 - val_loss: 0.2065 - val_accuracy: 0.9524
Epoch 89/800
114/114 [=====] - 0s 2ms/sample - loss: 0.2048 -
accuracy: 0.9649 - val_loss: 0.1870 - val_accuracy: 1.0000
Epoch 90/800
114/114 [=====] - 0s 933us/sample - loss: 0.2337 -
accuracy: 0.9561 - val_loss: 0.1768 - val_accuracy: 1.0000
Epoch 91/800
114/114 [=====] - 0s 1ms/sample - loss: 0.2453 -
accuracy: 0.9474 - val_loss: 0.1702 - val_accuracy: 1.0000
Epoch 92/800
114/114 [=====] - 0s 1ms/sample - loss: 0.2100 -
accuracy: 0.9561 - val_loss: 0.1856 - val_accuracy: 0.9524
Epoch 93/800

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114/114 [=====] - 0s 2ms/sample - loss: 0.2144 -
 accuracy: 0.9561 - val_loss: 0.2799 - val_accuracy: 0.9048
 Epoch 94/800
 114/114 [=====] - 0s 960us/sample - loss: 0.2027 -
 accuracy: 0.9474 - val_loss: 0.3202 - val_accuracy: 0.8571
 Epoch 95/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.2253 -
 accuracy: 0.9561 - val_loss: 0.2679 - val_accuracy: 0.9048
 Epoch 96/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.2356 -
 accuracy: 0.9474 - val_loss: 0.1980 - val_accuracy: 0.9524
 Epoch 97/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1973 -
 accuracy: 0.9386 - val_loss: 0.1854 - val_accuracy: 0.9524
 Epoch 98/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.2149 -
 accuracy: 0.9298 - val_loss: 0.2202 - val_accuracy: 0.9524
 Epoch 99/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.2008 -
 accuracy: 0.9561 - val_loss: 0.2265 - val_accuracy: 0.9524
 Epoch 100/800
 114/114 [=====] - 0s 992us/sample - loss: 0.1887 -
 accuracy: 0.9649 - val_loss: 0.2146 - val_accuracy: 0.9524
 Epoch 101/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1883 -
 accuracy: 0.9561 - val_loss: 0.1707 - val_accuracy: 0.9524
 Epoch 102/800
 114/114 [=====] - 0s 951us/sample - loss: 0.1353 -
 accuracy: 0.9912 - val_loss: 0.1406 - val_accuracy: 1.0000
 Epoch 103/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.2270 -
 accuracy: 0.9649 - val_loss: 0.1349 - val_accuracy: 1.0000
 Epoch 104/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1390 -
 accuracy: 0.9737 - val_loss: 0.1304 - val_accuracy: 1.0000
 Epoch 105/800
 114/114 [=====] - 0s 962us/sample - loss: 0.1504 -
 accuracy: 0.9737 - val_loss: 0.1376 - val_accuracy: 0.9524
 Epoch 106/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1442 -
 accuracy: 0.9912 - val_loss: 0.1580 - val_accuracy: 0.9524
 Epoch 107/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1479 -
 accuracy: 0.9825 - val_loss: 0.1925 - val_accuracy: 0.9524
 Epoch 108/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1303 -
 accuracy: 0.9912 - val_loss: 0.2096 - val_accuracy: 0.9524
 Epoch 109/800

114/114 [=====] - 0s 993us/sample - loss: 0.1528 -
 accuracy: 0.9737 - val_loss: 0.1592 - val_accuracy: 0.9524
 Epoch 110/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1768 -
 accuracy: 0.9474 - val_loss: 0.1272 - val_accuracy: 0.9524
 Epoch 111/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1388 -
 accuracy: 0.9825 - val_loss: 0.1176 - val_accuracy: 1.0000
 Epoch 112/800
 114/114 [=====] - 0s 938us/sample - loss: 0.1887 -
 accuracy: 0.9561 - val_loss: 0.1109 - val_accuracy: 1.0000
 Epoch 113/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1485 -
 accuracy: 0.9737 - val_loss: 0.1125 - val_accuracy: 1.0000
 Epoch 114/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1603 -
 accuracy: 0.9649 - val_loss: 0.1202 - val_accuracy: 0.9524
 Epoch 115/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1633 -
 accuracy: 0.9561 - val_loss: 0.1318 - val_accuracy: 0.9524
 Epoch 116/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1295 -
 accuracy: 0.9912 - val_loss: 0.1717 - val_accuracy: 0.9524
 Epoch 117/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1444 -
 accuracy: 0.9737 - val_loss: 0.1950 - val_accuracy: 0.9524
 Epoch 118/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1163 -
 accuracy: 0.9825 - val_loss: 0.1849 - val_accuracy: 0.9524
 Epoch 119/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1369 -
 accuracy: 0.9825 - val_loss: 0.1361 - val_accuracy: 0.9524
 Epoch 120/800
 114/114 [=====] - 0s 978us/sample - loss: 0.1679 -
 accuracy: 0.9474 - val_loss: 0.1107 - val_accuracy: 1.0000
 Epoch 121/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1541 -
 accuracy: 0.9649 - val_loss: 0.1266 - val_accuracy: 0.9524
 Epoch 122/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1690 -
 accuracy: 0.9649 - val_loss: 0.1417 - val_accuracy: 0.9524
 Epoch 123/800
 114/114 [=====] - 0s 949us/sample - loss: 0.1694 -
 accuracy: 0.9561 - val_loss: 0.1969 - val_accuracy: 0.9524
 Epoch 124/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1405 -
 accuracy: 0.9737 - val_loss: 0.2107 - val_accuracy: 0.9524
 Epoch 125/800

114/114 [=====] - 0s 2ms/sample - loss: 0.1221 -
 accuracy: 0.9825 - val_loss: 0.1653 - val_accuracy: 0.9524
 Epoch 126/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1180 -
 accuracy: 0.9912 - val_loss: 0.1382 - val_accuracy: 0.9524
 Epoch 127/800
 114/114 [=====] - 0s 964us/sample - loss: 0.1334 -
 accuracy: 0.9737 - val_loss: 0.1392 - val_accuracy: 0.9524
 Epoch 128/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1496 -
 accuracy: 0.9649 - val_loss: 0.1104 - val_accuracy: 1.0000
 Epoch 129/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1272 -
 accuracy: 0.9737 - val_loss: 0.0983 - val_accuracy: 1.0000
 Epoch 130/800
 114/114 [=====] - 0s 935us/sample - loss: 0.1391 -
 accuracy: 0.9737 - val_loss: 0.1000 - val_accuracy: 1.0000
 Epoch 131/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.2045 -
 accuracy: 0.9474 - val_loss: 0.1009 - val_accuracy: 1.0000
 Epoch 132/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1047 -
 accuracy: 0.9825 - val_loss: 0.0973 - val_accuracy: 1.0000
 Epoch 133/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1680 -
 accuracy: 0.9649 - val_loss: 0.0998 - val_accuracy: 1.0000
 Epoch 134/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1152 -
 accuracy: 0.9825 - val_loss: 0.1198 - val_accuracy: 0.9524
 Epoch 135/800
 114/114 [=====] - 0s 948us/sample - loss: 0.1259 -
 accuracy: 0.9737 - val_loss: 0.1435 - val_accuracy: 0.9524
 Epoch 136/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1349 -
 accuracy: 0.9649 - val_loss: 0.1967 - val_accuracy: 0.9524
 Epoch 137/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1643 -
 accuracy: 0.9561 - val_loss: 0.1163 - val_accuracy: 0.9524
 Epoch 138/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1141 -
 accuracy: 0.9737 - val_loss: 0.1058 - val_accuracy: 1.0000
 Epoch 139/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1598 -
 accuracy: 0.9474 - val_loss: 0.1104 - val_accuracy: 1.0000
 Epoch 140/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1265 -
 accuracy: 0.9825 - val_loss: 0.1222 - val_accuracy: 0.9524
 Epoch 141/800

114/114 [=====] - 0s 1ms/sample - loss: 0.1418 -
 accuracy: 0.9649 - val_loss: 0.1652 - val_accuracy: 0.9524
 Epoch 142/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1523 -
 accuracy: 0.9561 - val_loss: 0.1571 - val_accuracy: 0.9524
 Epoch 143/800
 114/114 [=====] - 0s 915us/sample - loss: 0.1219 -
 accuracy: 0.9825 - val_loss: 0.1462 - val_accuracy: 0.9524
 Epoch 144/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1477 -
 accuracy: 0.9737 - val_loss: 0.1214 - val_accuracy: 0.9524
 Epoch 145/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1288 -
 accuracy: 0.9737 - val_loss: 0.1144 - val_accuracy: 0.9524
 Epoch 146/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1200 -
 accuracy: 0.9825 - val_loss: 0.0966 - val_accuracy: 1.0000
 Epoch 147/800
 114/114 [=====] - 0s 962us/sample - loss: 0.0975 -
 accuracy: 0.9912 - val_loss: 0.1109 - val_accuracy: 0.9524
 Epoch 148/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.0920 -
 accuracy: 0.9825 - val_loss: 0.1201 - val_accuracy: 0.9524
 Epoch 149/800
 114/114 [=====] - 0s 891us/sample - loss: 0.1394 -
 accuracy: 0.9737 - val_loss: 0.1424 - val_accuracy: 0.9524
 Epoch 150/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.0927 -
 accuracy: 0.9912 - val_loss: 0.1760 - val_accuracy: 0.9524
 Epoch 151/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.0944 -
 accuracy: 1.0000 - val_loss: 0.1457 - val_accuracy: 0.9524
 Epoch 152/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.0983 -
 accuracy: 1.0000 - val_loss: 0.0968 - val_accuracy: 1.0000
 Epoch 153/800
 114/114 [=====] - 0s 998us/sample - loss: 0.1765 -
 accuracy: 0.9561 - val_loss: 0.0786 - val_accuracy: 1.0000
 Epoch 154/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1170 -
 accuracy: 0.9649 - val_loss: 0.0720 - val_accuracy: 1.0000
 Epoch 155/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1385 -
 accuracy: 0.9825 - val_loss: 0.0724 - val_accuracy: 1.0000
 Epoch 156/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1274 -
 accuracy: 0.9912 - val_loss: 0.0775 - val_accuracy: 1.0000
 Epoch 157/800

114/114 [=====] - 0s 935us/sample - loss: 0.1077 -
 accuracy: 0.9912 - val_loss: 0.0908 - val_accuracy: 1.0000
 Epoch 158/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1536 -
 accuracy: 0.9737 - val_loss: 0.1120 - val_accuracy: 0.9524
 Epoch 159/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.0891 -
 accuracy: 0.9912 - val_loss: 0.1169 - val_accuracy: 0.9524
 Epoch 160/800
 114/114 [=====] - 0s 955us/sample - loss: 0.1110 -
 accuracy: 0.9825 - val_loss: 0.1189 - val_accuracy: 0.9524
 Epoch 161/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1082 -
 accuracy: 0.9825 - val_loss: 0.0947 - val_accuracy: 1.0000
 Epoch 162/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1663 -
 accuracy: 0.9737 - val_loss: 0.1115 - val_accuracy: 0.9524
 Epoch 163/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1855 -
 accuracy: 0.9649 - val_loss: 0.1041 - val_accuracy: 0.9524
 Epoch 164/800
 114/114 [=====] - 0s 983us/sample - loss: 0.0847 -
 accuracy: 0.9912 - val_loss: 0.0814 - val_accuracy: 1.0000
 Epoch 165/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1077 -
 accuracy: 0.9737 - val_loss: 0.0931 - val_accuracy: 1.0000
 Epoch 166/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1106 -
 accuracy: 0.9649 - val_loss: 0.1260 - val_accuracy: 0.9524
 Epoch 167/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1023 -
 accuracy: 0.9825 - val_loss: 0.0979 - val_accuracy: 1.0000
 Epoch 168/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1630 -
 accuracy: 0.9474 - val_loss: 0.0753 - val_accuracy: 1.0000
 Epoch 169/800
 114/114 [=====] - 0s 962us/sample - loss: 0.1553 -
 accuracy: 0.9825 - val_loss: 0.0759 - val_accuracy: 1.0000
 Epoch 170/800
 114/114 [=====] - 0s 1ms/sample - loss: 0.1031 -
 accuracy: 0.9825 - val_loss: 0.0854 - val_accuracy: 1.0000
 Epoch 171/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1164 -
 accuracy: 0.9737 - val_loss: 0.1019 - val_accuracy: 0.9524
 Epoch 172/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.1334 -
 accuracy: 0.9737 - val_loss: 0.1001 - val_accuracy: 0.9524
 Epoch 173/800

```

114/114 [=====] - 0s 983us/sample - loss: 0.1373 -
accuracy: 0.9649 - val_loss: 0.0782 - val_accuracy: 1.0000
Epoch 174/800
114/114 [=====] - 0s 1ms/sample - loss: 0.1340 -
accuracy: 0.9737 - val_loss: 0.0955 - val_accuracy: 1.0000
Epoch 175/800
114/114 [=====] - 0s 2ms/sample - loss: 0.1337 -
accuracy: 0.9825 - val_loss: 0.1034 - val_accuracy: 0.9524
Epoch 176/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0954 -
accuracy: 0.9912 - val_loss: 0.1140 - val_accuracy: 0.9524
Epoch 177/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0932 -
accuracy: 0.9825 - val_loss: 0.1156 - val_accuracy: 0.9524
Epoch 178/800
114/114 [=====] - 0s 994us/sample - loss: 0.1138 -
accuracy: 0.9825 - val_loss: 0.1155 - val_accuracy: 0.9524
Epoch 179/800
114/114 [=====] - 0s 1ms/sample - loss: 0.1259 -
accuracy: 0.9737 - val_loss: 0.1023 - val_accuracy: 0.9524
Epoch 180/800
114/114 [=====] - 0s 1ms/sample - loss: 0.1306 -
accuracy: 0.9737 - val_loss: 0.0946 - val_accuracy: 1.0000
Epoch 181/800
114/114 [=====] - 0s 2ms/sample - loss: 0.1223 -
accuracy: 0.9737 - val_loss: 0.0875 - val_accuracy: 1.0000
Epoch 182/800
114/114 [=====] - 0s 2ms/sample - loss: 0.1750 -
accuracy: 0.9474 - val_loss: 0.0831 - val_accuracy: 1.0000
Epoch 183/800
114/114 [=====] - 0s 959us/sample - loss: 0.1303 -
accuracy: 0.9737 - val_loss: 0.0818 - val_accuracy: 1.0000
Epoch 184/800
114/114 [=====] - 0s 979us/sample - loss: 0.0861 -
accuracy: 0.9912 - val_loss: 0.0820 - val_accuracy: 1.0000

```

```
[50]: learning_rate_reduction.patience
```

```
[50]: 20
```

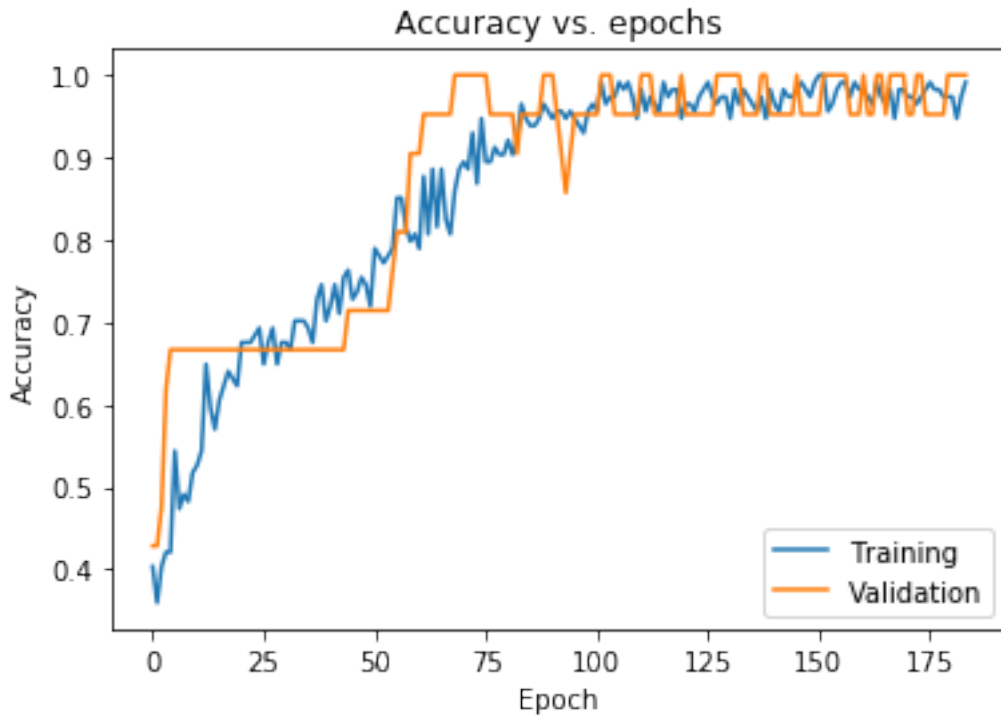
Finally, let's replot the accuracy and loss graphs for our new model.

```

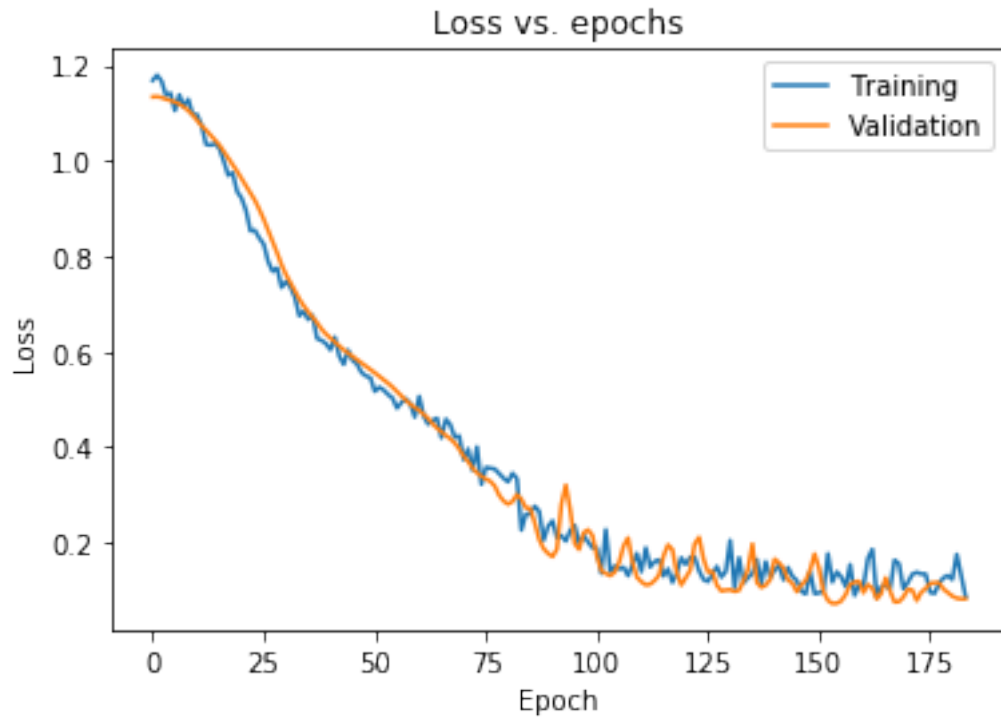
[51]: try:
    plt.plot(call_history.history['accuracy'])
    plt.plot(call_history.history['val_accuracy'])
except KeyError:
    plt.plot(call_history.history['acc'])
    plt.plot(call_history.history['val_acc'])

```

```
plt.title('Accuracy vs. epochs')
plt.ylabel('Accuracy')
plt.xlabel('Epoch')
plt.legend(['Training', 'Validation'], loc='lower right')
plt.show()
```



```
[52]: plt.plot(call_history.history['loss'])
plt.plot(call_history.history['val_loss'])
plt.title('Loss vs. epochs')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(['Training', 'Validation'], loc='upper right')
plt.show()
```



```
[53]: # Evaluate the model on the test set

test_loss, test_acc = call_model.evaluate(test_data, test_targets, verbose=0)
print("Test loss: {:.3f}\nTest accuracy: {:.2f}%".format(test_loss, 100 * ↵
↵test_acc))
```

Test loss: 0.431

Test accuracy: 86.67%

Congratulations for completing this programming assignment! In the next week of the course we will learn how to save and load pre-trained models.