

Week 3 Programming Assignment

November 15, 2020

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.

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

```
# Run this cell first to import all required packages. Do not make any imports elsewhere
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.models import Sequential
from tensorflow.keras.layers import Dense, Dropout
from tensorflow.keras import regularizers
from tensorflow.keras.callbacks import Callback
```

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.

In [4]: ##### GRADED CELL #####

```
# Complete the following function.
# Make sure to not change the function name or arguments.
from sklearn.model_selection import train_test_split

def read_in_and_split_data(iris_data):
    """
    This function takes the Iris dataset as loaded by sklearn.datasets.load_iris(), and
    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.
    """
    #define x and y
    data = iris_data['data']
    targets = iris_data['target']

    #splits data
    train_data, test_data, train_targets, test_targets = train_test_split(data, targets,
    return train_data, test_data, train_targets, test_targets
```

```
In [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)
```

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

```
In [9]: # 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.

```
In [21]: ##### 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.
    weights are initialised by providing the input_shape argument in the first layer,
    function argument.
    Your function should return the model.
    """
    model = Sequential([
        Dense(units = 64, activation = 'relu', input_shape = input_shape,
              kernel_initializer = tf.keras.initializers.he_uniform(seed = None),
              bias_initializer = tf.keras.initializers.Ones()),
        Dense(units = 128, activation = 'relu'),
        Dense(units = 128, activation = 'relu'),
        Dense(units = 128, activation = 'relu'),
        Dense(units = 128, activation = 'relu'),
        Dense(units = 64, activation = 'relu'),
```

```

        Dense(units = 64, activation = 'relu'),
        Dense(units = 64, activation = 'relu'),
        Dense(units = 64, activation = 'relu'),
        Dense(units = 3, activation = 'softmax')
    ])
    return model

```

In [22]: *# Run your function to get the model*

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

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.

In [25]: *#### 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
    the model with the Adam optimizer, 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.
    """
    model.compile(optimizer = tf.keras.optimizers.Adam(lr = 1e-4),
                  loss = 'categorical_crossentropy',
                  metrics = ['accuracy'])

```

In [26]: *# 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.

In [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.
    """
    history = model.fit(train_data, train_targets, epochs = epochs,
                        batch_size = 40, validation_split = 0.15)
    return history
```

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

In [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 [=====] - 2s 17ms/sample - loss: 1.0847 - accuracy: 0.3596 - v

Epoch 2/800

114/114 [=====] - 0s 1ms/sample - loss: 1.0599 - accuracy: 0.6228 - v

Epoch 3/800

114/114 [=====] - 0s 918us/sample - loss: 1.0445 - accuracy: 0.6842 -

Epoch 4/800

114/114 [=====] - 0s 847us/sample - loss: 1.0309 - accuracy: 0.7544 -

Epoch 5/800

114/114 [=====] - 0s 902us/sample - loss: 1.0181 - accuracy: 0.8596 -

Epoch 6/800

114/114 [=====] - 0s 870us/sample - loss: 1.0056 - accuracy: 0.9035 -

Epoch 7/800

114/114 [=====] - 0s 905us/sample - loss: 0.9923 - accuracy: 0.9561 -

Epoch 8/800

114/114 [=====] - 0s 863us/sample - loss: 0.9772 - accuracy: 0.9649 -

Epoch 9/800

114/114 [=====] - 0s 965us/sample - loss: 0.9628 - accuracy: 0.9474 -

Epoch 10/800

114/114 [=====] - 0s 946us/sample - loss: 0.9464 - accuracy: 0.9825 -

Epoch 11/800

114/114 [=====] - 0s 876us/sample - loss: 0.9307 - accuracy: 0.9211 -

Epoch 12/800

114/114 [=====] - 0s 882us/sample - loss: 0.9137 - accuracy: 0.8421 -

Epoch 13/800

114/114 [=====] - 0s 881us/sample - loss: 0.8943 - accuracy: 0.8772 -

Epoch 14/800

114/114 [=====] - 0s 2ms/sample - loss: 0.8746 - accuracy: 0.8596 - v

Epoch 15/800

114/114 [=====] - 0s 901us/sample - loss: 0.8537 - accuracy: 0.7982 -

Epoch 16/800

```

114/114 [=====] - 0s 933us/sample - loss: 0.8322 - accuracy: 0.8772 - v
Epoch 17/800
114/114 [=====] - 0s 905us/sample - loss: 0.8082 - accuracy: 0.8772 - v
Epoch 18/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7834 - accuracy: 0.8333 - v
Epoch 19/800
114/114 [=====] - 0s 899us/sample - loss: 0.7590 - accuracy: 0.8333 - v
Epoch 20/800
114/114 [=====] - 0s 907us/sample - loss: 0.7343 - accuracy: 0.8333 - v
Epoch 21/800
114/114 [=====] - 0s 890us/sample - loss: 0.7078 - accuracy: 0.8684 - v
Epoch 22/800
114/114 [=====] - 0s 885us/sample - loss: 0.6813 - accuracy: 0.8947 - v
Epoch 23/800
114/114 [=====] - 0s 853us/sample - loss: 0.6553 - accuracy: 0.8684 - v
Epoch 24/800
114/114 [=====] - 0s 1ms/sample - loss: 0.6294 - accuracy: 0.8509 - v
Epoch 25/800
114/114 [=====] - 0s 910us/sample - loss: 0.6050 - accuracy: 0.8421 - v
Epoch 26/800
114/114 [=====] - 0s 863us/sample - loss: 0.5810 - accuracy: 0.9211 - v
Epoch 27/800
114/114 [=====] - 0s 901us/sample - loss: 0.5587 - accuracy: 0.9474 - v
Epoch 28/800
114/114 [=====] - 0s 1ms/sample - loss: 0.5376 - accuracy: 0.9386 - v
Epoch 29/800
114/114 [=====] - 0s 868us/sample - loss: 0.5182 - accuracy: 0.9211 - v
Epoch 30/800
114/114 [=====] - 0s 918us/sample - loss: 0.4990 - accuracy: 0.9737 - v
Epoch 31/800
114/114 [=====] - 0s 885us/sample - loss: 0.4810 - accuracy: 0.9825 - v
Epoch 32/800
114/114 [=====] - 0s 2ms/sample - loss: 0.4653 - accuracy: 0.9912 - v
Epoch 33/800
114/114 [=====] - 0s 937us/sample - loss: 0.4496 - accuracy: 0.9912 - v
Epoch 34/800
114/114 [=====] - 0s 876us/sample - loss: 0.4378 - accuracy: 0.9474 - v
Epoch 35/800
114/114 [=====] - 0s 913us/sample - loss: 0.4227 - accuracy: 0.9737 - v
Epoch 36/800
114/114 [=====] - 0s 867us/sample - loss: 0.4103 - accuracy: 0.9912 - v
Epoch 37/800
114/114 [=====] - 0s 869us/sample - loss: 0.3984 - accuracy: 0.9825 - v
Epoch 38/800
114/114 [=====] - 0s 893us/sample - loss: 0.3900 - accuracy: 0.9737 - v
Epoch 39/800
114/114 [=====] - 0s 2ms/sample - loss: 0.3809 - accuracy: 0.9737 - v
Epoch 40/800

```

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114/114 [=====] - 0s 921us/sample - loss: 0.3646 - accuracy: 0.9737 -
Epoch 41/800
114/114 [=====] - 0s 856us/sample - loss: 0.3569 - accuracy: 0.9561 -
Epoch 42/800
114/114 [=====] - 0s 920us/sample - loss: 0.3419 - accuracy: 0.9825 -
Epoch 43/800
114/114 [=====] - 0s 869us/sample - loss: 0.3377 - accuracy: 0.9561 -
Epoch 44/800
114/114 [=====] - 0s 861us/sample - loss: 0.3191 - accuracy: 0.9737 -
Epoch 45/800
114/114 [=====] - 0s 889us/sample - loss: 0.3067 - accuracy: 0.9825 -
Epoch 46/800
114/114 [=====] - 0s 185us/sample - loss: 0.2948 - accuracy: 0.9825 -
Epoch 47/800
114/114 [=====] - 0s 185us/sample - loss: 0.2835 - accuracy: 0.9912 -
Epoch 48/800
114/114 [=====] - 0s 180us/sample - loss: 0.2722 - accuracy: 0.9912 -
Epoch 49/800
114/114 [=====] - 0s 981us/sample - loss: 0.2637 - accuracy: 0.9737 -
Epoch 50/800
114/114 [=====] - 0s 900us/sample - loss: 0.2558 - accuracy: 0.9737 -
Epoch 51/800
114/114 [=====] - 0s 836us/sample - loss: 0.2399 - accuracy: 0.9825 -
Epoch 52/800
114/114 [=====] - 0s 902us/sample - loss: 0.2270 - accuracy: 0.9825 -
Epoch 53/800
114/114 [=====] - 0s 913us/sample - loss: 0.2165 - accuracy: 0.9825 -
Epoch 54/800
114/114 [=====] - 0s 870us/sample - loss: 0.2063 - accuracy: 0.9825 -
Epoch 55/800
114/114 [=====] - 0s 866us/sample - loss: 0.1981 - accuracy: 0.9825 -
Epoch 56/800
114/114 [=====] - 0s 2ms/sample - loss: 0.1886 - accuracy: 0.9825 - va
Epoch 57/800
114/114 [=====] - 0s 831us/sample - loss: 0.1796 - accuracy: 0.9912 -
Epoch 58/800
114/114 [=====] - 0s 996us/sample - loss: 0.1692 - accuracy: 0.9825 -
Epoch 59/800
114/114 [=====] - 0s 850us/sample - loss: 0.1613 - accuracy: 0.9825 -
Epoch 60/800
114/114 [=====] - 0s 866us/sample - loss: 0.1511 - accuracy: 0.9825 -
Epoch 61/800
114/114 [=====] - 0s 907us/sample - loss: 0.1436 - accuracy: 0.9825 -
Epoch 62/800
114/114 [=====] - 0s 874us/sample - loss: 0.1370 - accuracy: 0.9825 -
Epoch 63/800
114/114 [=====] - 0s 893us/sample - loss: 0.1272 - accuracy: 0.9825 -
Epoch 64/800

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114/114 [=====] - 0s 926us/sample - loss: 0.1219 - accuracy: 0.9825 -
Epoch 65/800
114/114 [=====] - 0s 943us/sample - loss: 0.1156 - accuracy: 0.9825 -
Epoch 66/800
114/114 [=====] - 0s 885us/sample - loss: 0.1094 - accuracy: 0.9825 -
Epoch 67/800
114/114 [=====] - 0s 846us/sample - loss: 0.1091 - accuracy: 0.9825 -
Epoch 68/800
114/114 [=====] - 0s 864us/sample - loss: 0.1031 - accuracy: 0.9825 -
Epoch 69/800
114/114 [=====] - 0s 885us/sample - loss: 0.0997 - accuracy: 0.9825 -
Epoch 70/800
114/114 [=====] - 0s 882us/sample - loss: 0.0981 - accuracy: 0.9912 -
Epoch 71/800
114/114 [=====] - 0s 874us/sample - loss: 0.0906 - accuracy: 0.9825 -
Epoch 72/800
114/114 [=====] - 0s 864us/sample - loss: 0.0913 - accuracy: 0.9825 -
Epoch 73/800
114/114 [=====] - 0s 877us/sample - loss: 0.0941 - accuracy: 0.9737 -
Epoch 74/800
114/114 [=====] - 0s 881us/sample - loss: 0.0913 - accuracy: 0.9825 -
Epoch 75/800
114/114 [=====] - 0s 958us/sample - loss: 0.0904 - accuracy: 0.9825 -
Epoch 76/800
114/114 [=====] - 0s 904us/sample - loss: 0.0828 - accuracy: 0.9912 -
Epoch 77/800
114/114 [=====] - 0s 887us/sample - loss: 0.0824 - accuracy: 0.9825 -
Epoch 78/800
114/114 [=====] - 0s 898us/sample - loss: 0.0755 - accuracy: 0.9825 -
Epoch 79/800
114/114 [=====] - 0s 875us/sample - loss: 0.0756 - accuracy: 0.9825 -
Epoch 80/800
114/114 [=====] - 0s 889us/sample - loss: 0.0704 - accuracy: 0.9825 -
Epoch 81/800
114/114 [=====] - 0s 184us/sample - loss: 0.0695 - accuracy: 0.9825 -
Epoch 82/800
114/114 [=====] - 0s 984us/sample - loss: 0.0694 - accuracy: 0.9825 -
Epoch 83/800
114/114 [=====] - 0s 930us/sample - loss: 0.0663 - accuracy: 0.9825 -
Epoch 84/800
114/114 [=====] - 0s 836us/sample - loss: 0.0647 - accuracy: 0.9912 -
Epoch 85/800
114/114 [=====] - 0s 898us/sample - loss: 0.0632 - accuracy: 0.9825 -
Epoch 86/800
114/114 [=====] - 0s 867us/sample - loss: 0.0616 - accuracy: 0.9825 -
Epoch 87/800
114/114 [=====] - 0s 895us/sample - loss: 0.0650 - accuracy: 0.9912 -
Epoch 88/800

```



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114/114 [=====] - 0s 862us/sample - loss: 0.0602 - accuracy: 0.9825 - v
Epoch 89/800
114/114 [=====] - 0s 881us/sample - loss: 0.0611 - accuracy: 0.9825 - v
Epoch 90/800
114/114 [=====] - 0s 863us/sample - loss: 0.0676 - accuracy: 0.9649 - v
Epoch 91/800
114/114 [=====] - 0s 1ms/sample - loss: 0.0551 - accuracy: 1.0000 - v
Epoch 92/800
114/114 [=====] - 0s 827us/sample - loss: 0.0601 - accuracy: 0.9825 - v
Epoch 93/800
114/114 [=====] - 0s 883us/sample - loss: 0.0547 - accuracy: 0.9825 - v
Epoch 94/800
114/114 [=====] - 0s 928us/sample - loss: 0.0576 - accuracy: 0.9912 - v
Epoch 95/800
114/114 [=====] - 0s 904us/sample - loss: 0.0521 - accuracy: 0.9825 - v
Epoch 96/800
114/114 [=====] - 0s 876us/sample - loss: 0.0570 - accuracy: 0.9825 - v
Epoch 97/800
114/114 [=====] - 0s 173us/sample - loss: 0.0556 - accuracy: 0.9825 - v
Epoch 98/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0533 - accuracy: 0.9912 - v
Epoch 99/800
114/114 [=====] - 0s 881us/sample - loss: 0.0514 - accuracy: 0.9825 - v
Epoch 100/800
114/114 [=====] - 0s 842us/sample - loss: 0.0475 - accuracy: 0.9825 - v
Epoch 101/800
114/114 [=====] - 0s 898us/sample - loss: 0.0546 - accuracy: 1.0000 - v
Epoch 102/800
114/114 [=====] - 0s 868us/sample - loss: 0.0504 - accuracy: 0.9825 - v
Epoch 103/800
114/114 [=====] - 0s 875us/sample - loss: 0.0512 - accuracy: 0.9825 - v
Epoch 104/800
114/114 [=====] - 0s 870us/sample - loss: 0.0539 - accuracy: 0.9825 - v
Epoch 105/800
114/114 [=====] - 0s 185us/sample - loss: 0.0556 - accuracy: 0.9737 - v
Epoch 106/800
114/114 [=====] - 0s 1ms/sample - loss: 0.0521 - accuracy: 0.9825 - v
Epoch 107/800
114/114 [=====] - 0s 896us/sample - loss: 0.0434 - accuracy: 0.9912 - v
Epoch 108/800
114/114 [=====] - 0s 876us/sample - loss: 0.0504 - accuracy: 0.9912 - v
Epoch 109/800
114/114 [=====] - 0s 866us/sample - loss: 0.0526 - accuracy: 0.9825 - v
Epoch 110/800
114/114 [=====] - 0s 848us/sample - loss: 0.0521 - accuracy: 0.9825 - v
Epoch 111/800
114/114 [=====] - 0s 909us/sample - loss: 0.0444 - accuracy: 0.9912 - v
Epoch 112/800

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114/114 [=====] - 0s 178us/sample - loss: 0.0422 - accuracy: 0.9825 -
Epoch 113/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0452 - accuracy: 0.9825 - va
Epoch 114/800
114/114 [=====] - 0s 923us/sample - loss: 0.0465 - accuracy: 0.9825 -
Epoch 115/800
114/114 [=====] - 0s 842us/sample - loss: 0.0458 - accuracy: 0.9825 -
Epoch 116/800
114/114 [=====] - 0s 940us/sample - loss: 0.0435 - accuracy: 0.9912 -
Epoch 117/800
114/114 [=====] - 0s 878us/sample - loss: 0.0415 - accuracy: 0.9825 -
Epoch 118/800
114/114 [=====] - 0s 876us/sample - loss: 0.0412 - accuracy: 0.9825 -
Epoch 119/800
114/114 [=====] - 0s 836us/sample - loss: 0.0442 - accuracy: 0.9912 -
Epoch 120/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0439 - accuracy: 0.9825 - va
Epoch 121/800
114/114 [=====] - 0s 927us/sample - loss: 0.0429 - accuracy: 0.9825 -
Epoch 122/800
114/114 [=====] - 0s 891us/sample - loss: 0.0411 - accuracy: 0.9912 -
Epoch 123/800
114/114 [=====] - 0s 854us/sample - loss: 0.0427 - accuracy: 0.9825 -
Epoch 124/800
114/114 [=====] - 0s 946us/sample - loss: 0.0412 - accuracy: 0.9825 -
Epoch 125/800
114/114 [=====] - 0s 881us/sample - loss: 0.0383 - accuracy: 0.9912 -
Epoch 126/800
114/114 [=====] - 0s 867us/sample - loss: 0.0454 - accuracy: 1.0000 -
Epoch 127/800
114/114 [=====] - 0s 967us/sample - loss: 0.0444 - accuracy: 0.9825 -
Epoch 128/800
114/114 [=====] - 0s 866us/sample - loss: 0.0487 - accuracy: 0.9825 -
Epoch 129/800
114/114 [=====] - 0s 936us/sample - loss: 0.0423 - accuracy: 1.0000 -
Epoch 130/800
114/114 [=====] - 0s 854us/sample - loss: 0.0369 - accuracy: 0.9912 -
Epoch 131/800
114/114 [=====] - 0s 910us/sample - loss: 0.0416 - accuracy: 0.9825 -
Epoch 132/800
114/114 [=====] - 0s 842us/sample - loss: 0.0372 - accuracy: 0.9825 -
Epoch 133/800
114/114 [=====] - 0s 891us/sample - loss: 0.0374 - accuracy: 0.9825 -
Epoch 134/800
114/114 [=====] - 0s 869us/sample - loss: 0.0363 - accuracy: 0.9825 -
Epoch 135/800
114/114 [=====] - 0s 865us/sample - loss: 0.0361 - accuracy: 0.9825 -
Epoch 136/800

```

```

114/114 [=====] - 0s 892us/sample - loss: 0.0364 - accuracy: 0.9825 - v
Epoch 137/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0382 - accuracy: 0.9912 - v
Epoch 138/800
114/114 [=====] - 0s 865us/sample - loss: 0.0355 - accuracy: 0.9825 - v
Epoch 139/800
114/114 [=====] - 0s 903us/sample - loss: 0.0405 - accuracy: 0.9825 - v
Epoch 140/800
114/114 [=====] - 0s 890us/sample - loss: 0.0344 - accuracy: 0.9825 - v
Epoch 141/800
114/114 [=====] - 0s 880us/sample - loss: 0.0380 - accuracy: 0.9825 - v
Epoch 142/800
114/114 [=====] - 0s 903us/sample - loss: 0.0356 - accuracy: 0.9912 - v
Epoch 143/800
114/114 [=====] - 0s 860us/sample - loss: 0.0380 - accuracy: 0.9825 - v
Epoch 144/800
114/114 [=====] - 0s 859us/sample - loss: 0.0350 - accuracy: 0.9825 - v
Epoch 145/800
114/114 [=====] - 0s 922us/sample - loss: 0.0342 - accuracy: 0.9825 - v
Epoch 146/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0360 - accuracy: 0.9912 - v
Epoch 147/800
114/114 [=====] - 0s 906us/sample - loss: 0.0340 - accuracy: 0.9825 - v
Epoch 148/800
114/114 [=====] - 0s 963us/sample - loss: 0.0375 - accuracy: 0.9825 - v
Epoch 149/800
114/114 [=====] - 0s 866us/sample - loss: 0.0356 - accuracy: 0.9912 - v
Epoch 150/800
114/114 [=====] - 0s 885us/sample - loss: 0.0372 - accuracy: 0.9912 - v
Epoch 151/800
114/114 [=====] - 0s 901us/sample - loss: 0.0352 - accuracy: 0.9825 - v
Epoch 152/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0316 - accuracy: 0.9825 - v
Epoch 153/800
114/114 [=====] - 0s 912us/sample - loss: 0.0356 - accuracy: 0.9912 - v
Epoch 154/800
114/114 [=====] - 0s 917us/sample - loss: 0.0341 - accuracy: 0.9912 - v
Epoch 155/800
114/114 [=====] - 0s 910us/sample - loss: 0.0404 - accuracy: 0.9825 - v
Epoch 156/800
114/114 [=====] - 0s 899us/sample - loss: 0.0355 - accuracy: 0.9825 - v
Epoch 157/800
114/114 [=====] - 0s 864us/sample - loss: 0.0410 - accuracy: 0.9912 - v
Epoch 158/800
114/114 [=====] - 0s 872us/sample - loss: 0.0389 - accuracy: 0.9825 - v
Epoch 159/800
114/114 [=====] - 0s 832us/sample - loss: 0.0393 - accuracy: 0.9825 - v
Epoch 160/800

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114/114 [=====] - 0s 897us/sample - loss: 0.0368 - accuracy: 0.9912 - v
Epoch 161/800
114/114 [=====] - 0s 881us/sample - loss: 0.0316 - accuracy: 1.0000 - v
Epoch 162/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0332 - accuracy: 0.9825 - v
Epoch 163/800
114/114 [=====] - 0s 862us/sample - loss: 0.0329 - accuracy: 0.9825 - v
Epoch 164/800
114/114 [=====] - 0s 862us/sample - loss: 0.0317 - accuracy: 0.9912 - v
Epoch 165/800
114/114 [=====] - 0s 922us/sample - loss: 0.0314 - accuracy: 0.9825 - v
Epoch 166/800
114/114 [=====] - 0s 851us/sample - loss: 0.0309 - accuracy: 0.9825 - v
Epoch 167/800
114/114 [=====] - 0s 914us/sample - loss: 0.0330 - accuracy: 0.9825 - v
Epoch 168/800
114/114 [=====] - 0s 850us/sample - loss: 0.0304 - accuracy: 0.9825 - v
Epoch 169/800
114/114 [=====] - 0s 891us/sample - loss: 0.0327 - accuracy: 0.9912 - v
Epoch 170/800
114/114 [=====] - 0s 852us/sample - loss: 0.0310 - accuracy: 0.9825 - v
Epoch 171/800
114/114 [=====] - 0s 901us/sample - loss: 0.0311 - accuracy: 0.9825 - v
Epoch 172/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0298 - accuracy: 0.9912 - v
Epoch 173/800
114/114 [=====] - 0s 862us/sample - loss: 0.0314 - accuracy: 1.0000 - v
Epoch 174/800
114/114 [=====] - 0s 900us/sample - loss: 0.0294 - accuracy: 0.9825 - v
Epoch 175/800
114/114 [=====] - 0s 872us/sample - loss: 0.0347 - accuracy: 0.9825 - v
Epoch 176/800
114/114 [=====] - 0s 907us/sample - loss: 0.0396 - accuracy: 0.9912 - v
Epoch 177/800
114/114 [=====] - 0s 839us/sample - loss: 0.0319 - accuracy: 0.9912 - v
Epoch 178/800
114/114 [=====] - 0s 902us/sample - loss: 0.0447 - accuracy: 0.9825 - v
Epoch 179/800
114/114 [=====] - 0s 976us/sample - loss: 0.0259 - accuracy: 0.9912 - v
Epoch 180/800
114/114 [=====] - 0s 875us/sample - loss: 0.0610 - accuracy: 0.9561 - v
Epoch 181/800
114/114 [=====] - 0s 885us/sample - loss: 0.0594 - accuracy: 0.9825 - v
Epoch 182/800
114/114 [=====] - 0s 906us/sample - loss: 0.0586 - accuracy: 0.9825 - v
Epoch 183/800
114/114 [=====] - 0s 904us/sample - loss: 0.0379 - accuracy: 0.9825 - v
Epoch 184/800

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114/114 [=====] - 0s 854us/sample - loss: 0.0391 - accuracy: 0.9912 - v
Epoch 185/800
114/114 [=====] - 0s 840us/sample - loss: 0.0333 - accuracy: 0.9825 - v
Epoch 186/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0505 - accuracy: 0.9825 - v
Epoch 187/800
114/114 [=====] - 0s 927us/sample - loss: 0.0330 - accuracy: 0.9825 - v
Epoch 188/800
114/114 [=====] - 0s 914us/sample - loss: 0.0455 - accuracy: 0.9737 - v
Epoch 189/800
114/114 [=====] - 0s 893us/sample - loss: 0.0339 - accuracy: 0.9825 - v
Epoch 190/800
114/114 [=====] - 0s 876us/sample - loss: 0.0387 - accuracy: 0.9825 - v
Epoch 191/800
114/114 [=====] - 0s 859us/sample - loss: 0.0325 - accuracy: 0.9912 - v
Epoch 192/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0292 - accuracy: 0.9912 - v
Epoch 193/800
114/114 [=====] - 0s 879us/sample - loss: 0.0321 - accuracy: 0.9825 - v
Epoch 194/800
114/114 [=====] - 0s 900us/sample - loss: 0.0317 - accuracy: 0.9825 - v
Epoch 195/800
114/114 [=====] - 0s 926us/sample - loss: 0.0291 - accuracy: 0.9912 - v
Epoch 196/800
114/114 [=====] - 0s 862us/sample - loss: 0.0279 - accuracy: 0.9912 - v
Epoch 197/800
114/114 [=====] - 0s 871us/sample - loss: 0.0289 - accuracy: 0.9825 - v
Epoch 198/800
114/114 [=====] - 0s 916us/sample - loss: 0.0286 - accuracy: 0.9825 - v
Epoch 199/800
114/114 [=====] - 0s 928us/sample - loss: 0.0316 - accuracy: 1.0000 - v
Epoch 200/800
114/114 [=====] - 0s 885us/sample - loss: 0.0325 - accuracy: 0.9825 - v
Epoch 201/800
114/114 [=====] - 0s 889us/sample - loss: 0.0360 - accuracy: 0.9825 - v
Epoch 202/800
114/114 [=====] - 0s 888us/sample - loss: 0.0233 - accuracy: 0.9825 - v
Epoch 203/800
114/114 [=====] - 0s 845us/sample - loss: 0.0350 - accuracy: 0.9912 - v
Epoch 204/800
114/114 [=====] - 0s 907us/sample - loss: 0.0313 - accuracy: 0.9825 - v
Epoch 205/800
114/114 [=====] - 0s 845us/sample - loss: 0.0328 - accuracy: 0.9825 - v
Epoch 206/800
114/114 [=====] - 0s 845us/sample - loss: 0.0267 - accuracy: 0.9912 - v
Epoch 207/800
114/114 [=====] - 0s 924us/sample - loss: 0.0288 - accuracy: 0.9825 - v
Epoch 208/800

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114/114 [=====] - 0s 834us/sample - loss: 0.0290 - accuracy: 0.9825 -
Epoch 209/800
114/114 [=====] - 0s 877us/sample - loss: 0.0277 - accuracy: 0.9912 -
Epoch 210/800
114/114 [=====] - 0s 877us/sample - loss: 0.0317 - accuracy: 0.9912 -
Epoch 211/800
114/114 [=====] - 0s 875us/sample - loss: 0.0247 - accuracy: 0.9912 -
Epoch 212/800
114/114 [=====] - 0s 862us/sample - loss: 0.0330 - accuracy: 0.9825 -
Epoch 213/800
114/114 [=====] - 0s 876us/sample - loss: 0.0280 - accuracy: 0.9825 -
Epoch 214/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0305 - accuracy: 1.0000 - v
Epoch 215/800
114/114 [=====] - 0s 994us/sample - loss: 0.0250 - accuracy: 1.0000 -
Epoch 216/800
114/114 [=====] - 0s 887us/sample - loss: 0.0354 - accuracy: 0.9825 -
Epoch 217/800
114/114 [=====] - 0s 828us/sample - loss: 0.0380 - accuracy: 0.9825 -
Epoch 218/800
114/114 [=====] - 0s 901us/sample - loss: 0.0330 - accuracy: 0.9912 -
Epoch 219/800
114/114 [=====] - 0s 870us/sample - loss: 0.0247 - accuracy: 0.9912 -
Epoch 220/800
114/114 [=====] - 0s 878us/sample - loss: 0.0335 - accuracy: 0.9825 -
Epoch 221/800
114/114 [=====] - 0s 973us/sample - loss: 0.0244 - accuracy: 0.9912 -
Epoch 222/800
114/114 [=====] - 0s 887us/sample - loss: 0.0280 - accuracy: 1.0000 -
Epoch 223/800
114/114 [=====] - 0s 847us/sample - loss: 0.0252 - accuracy: 0.9912 -
Epoch 224/800
114/114 [=====] - 0s 923us/sample - loss: 0.0333 - accuracy: 0.9825 -
Epoch 225/800
114/114 [=====] - 0s 866us/sample - loss: 0.0241 - accuracy: 0.9912 -
Epoch 226/800
114/114 [=====] - 0s 887us/sample - loss: 0.0333 - accuracy: 1.0000 -
Epoch 227/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0307 - accuracy: 0.9825 - v
Epoch 228/800
114/114 [=====] - 0s 919us/sample - loss: 0.0306 - accuracy: 0.9825 -
Epoch 229/800
114/114 [=====] - 0s 850us/sample - loss: 0.0250 - accuracy: 0.9912 -
Epoch 230/800
114/114 [=====] - 0s 887us/sample - loss: 0.0335 - accuracy: 0.9825 -
Epoch 231/800
114/114 [=====] - 0s 880us/sample - loss: 0.0258 - accuracy: 0.9825 -
Epoch 232/800

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114/114 [=====] - 0s 955us/sample - loss: 0.0254 - accuracy: 0.9912 -
Epoch 233/800
114/114 [=====] - 0s 894us/sample - loss: 0.0242 - accuracy: 0.9912 -
Epoch 234/800
114/114 [=====] - 0s 903us/sample - loss: 0.0245 - accuracy: 0.9912 -
Epoch 235/800
114/114 [=====] - 0s 895us/sample - loss: 0.0268 - accuracy: 0.9825 -
Epoch 236/800
114/114 [=====] - 0s 851us/sample - loss: 0.0246 - accuracy: 0.9825 -
Epoch 237/800
114/114 [=====] - 0s 891us/sample - loss: 0.0246 - accuracy: 1.0000 -
Epoch 238/800
114/114 [=====] - 0s 860us/sample - loss: 0.0244 - accuracy: 0.9912 -
Epoch 239/800
114/114 [=====] - 0s 925us/sample - loss: 0.0322 - accuracy: 0.9825 -
Epoch 240/800
114/114 [=====] - 0s 1ms/sample - loss: 0.0227 - accuracy: 0.9912 - va
Epoch 241/800
114/114 [=====] - 0s 888us/sample - loss: 0.0278 - accuracy: 1.0000 -
Epoch 242/800
114/114 [=====] - 0s 890us/sample - loss: 0.0334 - accuracy: 0.9825 -
Epoch 243/800
114/114 [=====] - 0s 862us/sample - loss: 0.0294 - accuracy: 0.9825 -
Epoch 244/800
114/114 [=====] - 0s 871us/sample - loss: 0.0269 - accuracy: 0.9825 -
Epoch 245/800
114/114 [=====] - 0s 875us/sample - loss: 0.0292 - accuracy: 0.9912 -
Epoch 246/800
114/114 [=====] - 0s 205us/sample - loss: 0.0312 - accuracy: 0.9825 -
Epoch 247/800
114/114 [=====] - 0s 210us/sample - loss: 0.0302 - accuracy: 0.9912 -
Epoch 248/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0260 - accuracy: 1.0000 - va
Epoch 249/800
114/114 [=====] - 0s 887us/sample - loss: 0.0275 - accuracy: 0.9825 -
Epoch 250/800
114/114 [=====] - 0s 857us/sample - loss: 0.0290 - accuracy: 0.9825 -
Epoch 251/800
114/114 [=====] - 0s 939us/sample - loss: 0.0241 - accuracy: 1.0000 -
Epoch 252/800
114/114 [=====] - 0s 878us/sample - loss: 0.0235 - accuracy: 0.9912 -
Epoch 253/800
114/114 [=====] - 0s 855us/sample - loss: 0.0252 - accuracy: 0.9825 -
Epoch 254/800
114/114 [=====] - 0s 887us/sample - loss: 0.0250 - accuracy: 1.0000 -
Epoch 255/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0240 - accuracy: 0.9912 - va
Epoch 256/800

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114/114 [=====] - 0s 892us/sample - loss: 0.0235 - accuracy: 0.9912 -
Epoch 257/800
114/114 [=====] - 0s 898us/sample - loss: 0.0272 - accuracy: 1.0000 -
Epoch 258/800
114/114 [=====] - 0s 892us/sample - loss: 0.0284 - accuracy: 0.9912 -
Epoch 259/800
114/114 [=====] - 0s 920us/sample - loss: 0.0342 - accuracy: 0.9825 -
Epoch 260/800
114/114 [=====] - 0s 862us/sample - loss: 0.0212 - accuracy: 0.9912 -
Epoch 261/800
114/114 [=====] - 0s 844us/sample - loss: 0.0286 - accuracy: 1.0000 -
Epoch 262/800
114/114 [=====] - 0s 864us/sample - loss: 0.0216 - accuracy: 0.9912 -
Epoch 263/800
114/114 [=====] - 0s 880us/sample - loss: 0.0271 - accuracy: 0.9825 -
Epoch 264/800
114/114 [=====] - 0s 869us/sample - loss: 0.0242 - accuracy: 0.9912 -
Epoch 265/800
114/114 [=====] - 0s 888us/sample - loss: 0.0230 - accuracy: 1.0000 -
Epoch 266/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0238 - accuracy: 0.9825 - va
Epoch 267/800
114/114 [=====] - 0s 896us/sample - loss: 0.0282 - accuracy: 0.9825 -
Epoch 268/800
114/114 [=====] - 0s 869us/sample - loss: 0.0233 - accuracy: 1.0000 -
Epoch 269/800
114/114 [=====] - 0s 893us/sample - loss: 0.0254 - accuracy: 0.9825 -
Epoch 270/800
114/114 [=====] - 0s 946us/sample - loss: 0.0299 - accuracy: 0.9912 -
Epoch 271/800
114/114 [=====] - 0s 853us/sample - loss: 0.0228 - accuracy: 0.9912 -
Epoch 272/800
114/114 [=====] - 0s 858us/sample - loss: 0.0243 - accuracy: 0.9825 -
Epoch 273/800
114/114 [=====] - 0s 870us/sample - loss: 0.0216 - accuracy: 0.9825 -
Epoch 274/800
114/114 [=====] - 0s 910us/sample - loss: 0.0267 - accuracy: 0.9912 -
Epoch 275/800
114/114 [=====] - 0s 829us/sample - loss: 0.0208 - accuracy: 1.0000 -
Epoch 276/800
114/114 [=====] - 0s 938us/sample - loss: 0.0337 - accuracy: 0.9825 -
Epoch 277/800
114/114 [=====] - 0s 848us/sample - loss: 0.0304 - accuracy: 0.9825 -
Epoch 278/800
114/114 [=====] - 0s 832us/sample - loss: 0.0254 - accuracy: 1.0000 -
Epoch 279/800
114/114 [=====] - 0s 882us/sample - loss: 0.0248 - accuracy: 0.9912 -
Epoch 280/800

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114/114 [=====] - 0s 857us/sample - loss: 0.0256 - accuracy: 0.9825 -
Epoch 281/800
114/114 [=====] - 0s 924us/sample - loss: 0.0207 - accuracy: 1.0000 -
Epoch 282/800
114/114 [=====] - 0s 877us/sample - loss: 0.0252 - accuracy: 1.0000 -
Epoch 283/800
114/114 [=====] - 0s 868us/sample - loss: 0.0388 - accuracy: 0.9825 -
Epoch 284/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0370 - accuracy: 0.9825 - v
Epoch 285/800
114/114 [=====] - 0s 990us/sample - loss: 0.0316 - accuracy: 0.9912 -
Epoch 286/800
114/114 [=====] - 0s 846us/sample - loss: 0.0215 - accuracy: 1.0000 -
Epoch 287/800
114/114 [=====] - 0s 925us/sample - loss: 0.0364 - accuracy: 0.9825 -
Epoch 288/800
114/114 [=====] - 0s 879us/sample - loss: 0.0341 - accuracy: 0.9825 -
Epoch 289/800
114/114 [=====] - 0s 870us/sample - loss: 0.0252 - accuracy: 1.0000 -
Epoch 290/800
114/114 [=====] - 0s 874us/sample - loss: 0.0222 - accuracy: 0.9912 -
Epoch 291/800
114/114 [=====] - 0s 962us/sample - loss: 0.0282 - accuracy: 0.9825 -
Epoch 292/800
114/114 [=====] - 0s 931us/sample - loss: 0.0224 - accuracy: 1.0000 -
Epoch 293/800
114/114 [=====] - 0s 883us/sample - loss: 0.0208 - accuracy: 0.9912 -
Epoch 294/800
114/114 [=====] - 0s 881us/sample - loss: 0.0214 - accuracy: 0.9912 -
Epoch 295/800
114/114 [=====] - 0s 889us/sample - loss: 0.0210 - accuracy: 0.9912 -
Epoch 296/800
114/114 [=====] - 0s 880us/sample - loss: 0.0203 - accuracy: 0.9912 -
Epoch 297/800
114/114 [=====] - 0s 851us/sample - loss: 0.0208 - accuracy: 0.9912 -
Epoch 298/800
114/114 [=====] - 0s 184us/sample - loss: 0.0253 - accuracy: 0.9912 -
Epoch 299/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0278 - accuracy: 0.9825 - v
Epoch 300/800
114/114 [=====] - 0s 900us/sample - loss: 0.0246 - accuracy: 0.9912 -
Epoch 301/800
114/114 [=====] - 0s 849us/sample - loss: 0.0240 - accuracy: 1.0000 -
Epoch 302/800
114/114 [=====] - 0s 931us/sample - loss: 0.0234 - accuracy: 0.9825 -
Epoch 303/800
114/114 [=====] - 0s 858us/sample - loss: 0.0282 - accuracy: 0.9825 -
Epoch 304/800

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114/114 [=====] - 0s 890us/sample - loss: 0.0235 - accuracy: 1.0000 -
Epoch 305/800
114/114 [=====] - 0s 869us/sample - loss: 0.0218 - accuracy: 1.0000 -
Epoch 306/800
114/114 [=====] - 0s 848us/sample - loss: 0.0300 - accuracy: 0.9825 -
Epoch 307/800
114/114 [=====] - 0s 879us/sample - loss: 0.0254 - accuracy: 0.9825 -
Epoch 308/800
114/114 [=====] - 0s 883us/sample - loss: 0.0258 - accuracy: 1.0000 -
Epoch 309/800
114/114 [=====] - 0s 855us/sample - loss: 0.0250 - accuracy: 0.9825 -
Epoch 310/800
114/114 [=====] - 0s 873us/sample - loss: 0.0216 - accuracy: 0.9825 -
Epoch 311/800
114/114 [=====] - 0s 165us/sample - loss: 0.0235 - accuracy: 1.0000 -
Epoch 312/800
114/114 [=====] - 0s 889us/sample - loss: 0.0267 - accuracy: 1.0000 -
Epoch 313/800
114/114 [=====] - 0s 1ms/sample - loss: 0.0243 - accuracy: 0.9825 - va
Epoch 314/800
114/114 [=====] - 0s 848us/sample - loss: 0.0224 - accuracy: 0.9912 -
Epoch 315/800
114/114 [=====] - 0s 902us/sample - loss: 0.0204 - accuracy: 1.0000 -
Epoch 316/800
114/114 [=====] - 0s 879us/sample - loss: 0.0185 - accuracy: 1.0000 -
Epoch 317/800
114/114 [=====] - 0s 870us/sample - loss: 0.0197 - accuracy: 0.9912 -
Epoch 318/800
114/114 [=====] - 0s 847us/sample - loss: 0.0213 - accuracy: 0.9825 -
Epoch 319/800
114/114 [=====] - 0s 874us/sample - loss: 0.0190 - accuracy: 1.0000 -
Epoch 320/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0181 - accuracy: 1.0000 - va
Epoch 321/800
114/114 [=====] - 0s 942us/sample - loss: 0.0210 - accuracy: 0.9825 -
Epoch 322/800
114/114 [=====] - 0s 900us/sample - loss: 0.0205 - accuracy: 0.9912 -
Epoch 323/800
114/114 [=====] - 0s 843us/sample - loss: 0.0181 - accuracy: 1.0000 -
Epoch 324/800
114/114 [=====] - 0s 900us/sample - loss: 0.0204 - accuracy: 0.9825 -
Epoch 325/800
114/114 [=====] - 0s 919us/sample - loss: 0.0195 - accuracy: 0.9912 -
Epoch 326/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0189 - accuracy: 1.0000 - va
Epoch 327/800
114/114 [=====] - 0s 941us/sample - loss: 0.0186 - accuracy: 1.0000 -
Epoch 328/800

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114/114 [=====] - 0s 889us/sample - loss: 0.0219 - accuracy: 1.0000 -
Epoch 329/800
114/114 [=====] - 0s 909us/sample - loss: 0.0173 - accuracy: 0.9912 -
Epoch 330/800
114/114 [=====] - 0s 889us/sample - loss: 0.0221 - accuracy: 0.9825 -
Epoch 331/800
114/114 [=====] - 0s 885us/sample - loss: 0.0267 - accuracy: 0.9912 -
Epoch 332/800
114/114 [=====] - 0s 197us/sample - loss: 0.0218 - accuracy: 1.0000 -
Epoch 333/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0182 - accuracy: 0.9912 - va
Epoch 334/800
114/114 [=====] - 0s 847us/sample - loss: 0.0183 - accuracy: 0.9912 -
Epoch 335/800
114/114 [=====] - 0s 959us/sample - loss: 0.0178 - accuracy: 1.0000 -
Epoch 336/800
114/114 [=====] - 0s 903us/sample - loss: 0.0183 - accuracy: 1.0000 -
Epoch 337/800
114/114 [=====] - 0s 896us/sample - loss: 0.0162 - accuracy: 1.0000 -
Epoch 338/800
114/114 [=====] - 0s 903us/sample - loss: 0.0207 - accuracy: 0.9825 -
Epoch 339/800
114/114 [=====] - 0s 860us/sample - loss: 0.0291 - accuracy: 0.9912 -
Epoch 340/800
114/114 [=====] - 0s 847us/sample - loss: 0.0164 - accuracy: 1.0000 -
Epoch 341/800
114/114 [=====] - 0s 890us/sample - loss: 0.0258 - accuracy: 0.9825 -
Epoch 342/800
114/114 [=====] - 0s 864us/sample - loss: 0.0222 - accuracy: 0.9912 -
Epoch 343/800
114/114 [=====] - 0s 869us/sample - loss: 0.0189 - accuracy: 1.0000 -
Epoch 344/800
114/114 [=====] - 0s 855us/sample - loss: 0.0166 - accuracy: 1.0000 -
Epoch 345/800
114/114 [=====] - 0s 861us/sample - loss: 0.0171 - accuracy: 1.0000 -
Epoch 346/800
114/114 [=====] - 0s 991us/sample - loss: 0.0162 - accuracy: 0.9912 -
Epoch 347/800
114/114 [=====] - 0s 861us/sample - loss: 0.0174 - accuracy: 1.0000 -
Epoch 348/800
114/114 [=====] - 0s 872us/sample - loss: 0.0167 - accuracy: 1.0000 -
Epoch 349/800
114/114 [=====] - 0s 898us/sample - loss: 0.0169 - accuracy: 1.0000 -
Epoch 350/800
114/114 [=====] - 0s 878us/sample - loss: 0.0166 - accuracy: 0.9912 -
Epoch 351/800
114/114 [=====] - 0s 876us/sample - loss: 0.0156 - accuracy: 1.0000 -
Epoch 352/800

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114/114 [=====] - 0s 890us/sample - loss: 0.0186 - accuracy: 1.0000 - v
Epoch 353/800
114/114 [=====] - 0s 905us/sample - loss: 0.0166 - accuracy: 1.0000 - v
Epoch 354/800
114/114 [=====] - 0s 841us/sample - loss: 0.0156 - accuracy: 1.0000 - v
Epoch 355/800
114/114 [=====] - 0s 888us/sample - loss: 0.0164 - accuracy: 0.9912 - v
Epoch 356/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0159 - accuracy: 1.0000 - v
Epoch 357/800
114/114 [=====] - 0s 946us/sample - loss: 0.0163 - accuracy: 1.0000 - v
Epoch 358/800
114/114 [=====] - 0s 908us/sample - loss: 0.0167 - accuracy: 1.0000 - v
Epoch 359/800
114/114 [=====] - 0s 893us/sample - loss: 0.0201 - accuracy: 0.9825 - v
Epoch 360/800
114/114 [=====] - 0s 853us/sample - loss: 0.0230 - accuracy: 1.0000 - v
Epoch 361/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0174 - accuracy: 1.0000 - v
Epoch 362/800
114/114 [=====] - 0s 958us/sample - loss: 0.0216 - accuracy: 0.9825 - v
Epoch 363/800
114/114 [=====] - 0s 895us/sample - loss: 0.0153 - accuracy: 1.0000 - v
Epoch 364/800
114/114 [=====] - 0s 914us/sample - loss: 0.0181 - accuracy: 1.0000 - v
Epoch 365/800
114/114 [=====] - 0s 880us/sample - loss: 0.0225 - accuracy: 0.9825 - v
Epoch 366/800
114/114 [=====] - 0s 873us/sample - loss: 0.0160 - accuracy: 1.0000 - v
Epoch 367/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0155 - accuracy: 1.0000 - v
Epoch 368/800
114/114 [=====] - 0s 879us/sample - loss: 0.0174 - accuracy: 0.9912 - v
Epoch 369/800
114/114 [=====] - 0s 946us/sample - loss: 0.0157 - accuracy: 1.0000 - v
Epoch 370/800
114/114 [=====] - 0s 868us/sample - loss: 0.0152 - accuracy: 1.0000 - v
Epoch 371/800
114/114 [=====] - 0s 869us/sample - loss: 0.0147 - accuracy: 1.0000 - v
Epoch 372/800
114/114 [=====] - 0s 882us/sample - loss: 0.0150 - accuracy: 1.0000 - v
Epoch 373/800
114/114 [=====] - 0s 859us/sample - loss: 0.0168 - accuracy: 1.0000 - v
Epoch 374/800
114/114 [=====] - 0s 927us/sample - loss: 0.0143 - accuracy: 1.0000 - v
Epoch 375/800
114/114 [=====] - 0s 870us/sample - loss: 0.0153 - accuracy: 1.0000 - v
Epoch 376/800

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114/114 [=====] - 0s 885us/sample - loss: 0.0141 - accuracy: 1.0000 -
Epoch 377/800
114/114 [=====] - 0s 930us/sample - loss: 0.0171 - accuracy: 1.0000 -
Epoch 378/800
114/114 [=====] - 0s 861us/sample - loss: 0.0151 - accuracy: 1.0000 -
Epoch 379/800
114/114 [=====] - 0s 894us/sample - loss: 0.0175 - accuracy: 0.9825 -
Epoch 380/800
114/114 [=====] - 0s 868us/sample - loss: 0.0192 - accuracy: 1.0000 -
Epoch 381/800
114/114 [=====] - 0s 876us/sample - loss: 0.0164 - accuracy: 1.0000 -
Epoch 382/800
114/114 [=====] - 0s 854us/sample - loss: 0.0150 - accuracy: 0.9912 -
Epoch 383/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0137 - accuracy: 1.0000 - va
Epoch 384/800
114/114 [=====] - 0s 839us/sample - loss: 0.0155 - accuracy: 1.0000 -
Epoch 385/800
114/114 [=====] - 0s 911us/sample - loss: 0.0137 - accuracy: 1.0000 -
Epoch 386/800
114/114 [=====] - 0s 920us/sample - loss: 0.0136 - accuracy: 1.0000 -
Epoch 387/800
114/114 [=====] - 0s 816us/sample - loss: 0.0142 - accuracy: 1.0000 -
Epoch 388/800
114/114 [=====] - 0s 928us/sample - loss: 0.0146 - accuracy: 1.0000 -
Epoch 389/800
114/114 [=====] - 0s 842us/sample - loss: 0.0135 - accuracy: 1.0000 -
Epoch 390/800
114/114 [=====] - 0s 883us/sample - loss: 0.0130 - accuracy: 1.0000 -
Epoch 391/800
114/114 [=====] - 0s 852us/sample - loss: 0.0136 - accuracy: 1.0000 -
Epoch 392/800
114/114 [=====] - 0s 875us/sample - loss: 0.0196 - accuracy: 0.9825 -
Epoch 393/800
114/114 [=====] - 0s 889us/sample - loss: 0.0122 - accuracy: 1.0000 -
Epoch 394/800
114/114 [=====] - 0s 850us/sample - loss: 0.0145 - accuracy: 1.0000 -
Epoch 395/800
114/114 [=====] - 0s 894us/sample - loss: 0.0145 - accuracy: 0.9912 -
Epoch 396/800
114/114 [=====] - 0s 827us/sample - loss: 0.0132 - accuracy: 1.0000 -
Epoch 397/800
114/114 [=====] - 0s 923us/sample - loss: 0.0135 - accuracy: 1.0000 -
Epoch 398/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0143 - accuracy: 1.0000 - va
Epoch 399/800
114/114 [=====] - 0s 880us/sample - loss: 0.0218 - accuracy: 0.9825 -
Epoch 400/800

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114/114 [=====] - 0s 974us/sample - loss: 0.0179 - accuracy: 1.0000 -
Epoch 401/800
114/114 [=====] - 0s 851us/sample - loss: 0.0161 - accuracy: 1.0000 -
Epoch 402/800
114/114 [=====] - 0s 913us/sample - loss: 0.0247 - accuracy: 0.9825 -
Epoch 403/800
114/114 [=====] - 0s 889us/sample - loss: 0.0306 - accuracy: 0.9825 -
Epoch 404/800
114/114 [=====] - 0s 879us/sample - loss: 0.0197 - accuracy: 1.0000 -
Epoch 405/800
114/114 [=====] - 0s 872us/sample - loss: 0.0137 - accuracy: 1.0000 -
Epoch 406/800
114/114 [=====] - 0s 894us/sample - loss: 0.0154 - accuracy: 0.9912 -
Epoch 407/800
114/114 [=====] - 0s 839us/sample - loss: 0.0175 - accuracy: 0.9912 -
Epoch 408/800
114/114 [=====] - 0s 898us/sample - loss: 0.0158 - accuracy: 1.0000 -
Epoch 409/800
114/114 [=====] - 0s 859us/sample - loss: 0.0154 - accuracy: 0.9912 -
Epoch 410/800
114/114 [=====] - 0s 843us/sample - loss: 0.0141 - accuracy: 1.0000 -
Epoch 411/800
114/114 [=====] - 0s 889us/sample - loss: 0.0115 - accuracy: 1.0000 -
Epoch 412/800
114/114 [=====] - 0s 843us/sample - loss: 0.0134 - accuracy: 1.0000 -
Epoch 413/800
114/114 [=====] - 0s 885us/sample - loss: 0.0113 - accuracy: 1.0000 -
Epoch 414/800
114/114 [=====] - 0s 892us/sample - loss: 0.0163 - accuracy: 0.9912 -
Epoch 415/800
114/114 [=====] - 0s 869us/sample - loss: 0.0201 - accuracy: 1.0000 -
Epoch 416/800
114/114 [=====] - 0s 854us/sample - loss: 0.0150 - accuracy: 0.9912 -
Epoch 417/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0182 - accuracy: 0.9912 - va
Epoch 418/800
114/114 [=====] - 0s 902us/sample - loss: 0.0134 - accuracy: 1.0000 -
Epoch 419/800
114/114 [=====] - 0s 906us/sample - loss: 0.0158 - accuracy: 0.9912 -
Epoch 420/800
114/114 [=====] - 0s 854us/sample - loss: 0.0143 - accuracy: 0.9912 -
Epoch 421/800
114/114 [=====] - 0s 909us/sample - loss: 0.0115 - accuracy: 1.0000 -
Epoch 422/800
114/114 [=====] - 0s 864us/sample - loss: 0.0167 - accuracy: 1.0000 -
Epoch 423/800
114/114 [=====] - 0s 853us/sample - loss: 0.0218 - accuracy: 0.9912 -
Epoch 424/800

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114/114 [=====] - 0s 915us/sample - loss: 0.0272 - accuracy: 0.9825 -
Epoch 425/800
114/114 [=====] - 0s 871us/sample - loss: 0.0338 - accuracy: 0.9825 -
Epoch 426/800
114/114 [=====] - 0s 944us/sample - loss: 0.0100 - accuracy: 1.0000 -
Epoch 427/800
114/114 [=====] - 0s 952us/sample - loss: 0.0383 - accuracy: 0.9825 -
Epoch 428/800
114/114 [=====] - 0s 845us/sample - loss: 0.0221 - accuracy: 0.9912 -
Epoch 429/800
114/114 [=====] - 0s 959us/sample - loss: 0.0285 - accuracy: 0.9912 -
Epoch 430/800
114/114 [=====] - 0s 859us/sample - loss: 0.0176 - accuracy: 0.9825 -
Epoch 431/800
114/114 [=====] - 0s 865us/sample - loss: 0.0187 - accuracy: 1.0000 -
Epoch 432/800
114/114 [=====] - 0s 216us/sample - loss: 0.0110 - accuracy: 1.0000 -
Epoch 433/800
114/114 [=====] - 0s 970us/sample - loss: 0.0137 - accuracy: 0.9912 -
Epoch 434/800
114/114 [=====] - 0s 890us/sample - loss: 0.0099 - accuracy: 1.0000 -
Epoch 435/800
114/114 [=====] - 0s 946us/sample - loss: 0.0168 - accuracy: 1.0000 -
Epoch 436/800
114/114 [=====] - 0s 861us/sample - loss: 0.0216 - accuracy: 0.9912 -
Epoch 437/800
114/114 [=====] - 0s 848us/sample - loss: 0.0143 - accuracy: 0.9912 -
Epoch 438/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0262 - accuracy: 0.9825 - va
Epoch 439/800
114/114 [=====] - 0s 921us/sample - loss: 0.0150 - accuracy: 0.9912 -
Epoch 440/800
114/114 [=====] - 0s 889us/sample - loss: 0.0205 - accuracy: 0.9825 -
Epoch 441/800
114/114 [=====] - 0s 934us/sample - loss: 0.0346 - accuracy: 0.9825 -
Epoch 442/800
114/114 [=====] - 0s 858us/sample - loss: 0.0274 - accuracy: 0.9825 -
Epoch 443/800
114/114 [=====] - 0s 846us/sample - loss: 0.0364 - accuracy: 0.9825 -
Epoch 444/800
114/114 [=====] - 0s 875us/sample - loss: 0.0261 - accuracy: 0.9825 -
Epoch 445/800
114/114 [=====] - 0s 922us/sample - loss: 0.0133 - accuracy: 1.0000 -
Epoch 446/800
114/114 [=====] - 0s 882us/sample - loss: 0.0287 - accuracy: 0.9825 -
Epoch 447/800
114/114 [=====] - 0s 898us/sample - loss: 0.0101 - accuracy: 1.0000 -
Epoch 448/800

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114/114 [=====] - 0s 960us/sample - loss: 0.0249 - accuracy: 0.9912 -
Epoch 449/800
114/114 [=====] - 0s 901us/sample - loss: 0.0204 - accuracy: 0.9912 -
Epoch 450/800
114/114 [=====] - 0s 907us/sample - loss: 0.0282 - accuracy: 0.9825 -
Epoch 451/800
114/114 [=====] - 0s 858us/sample - loss: 0.0206 - accuracy: 0.9912 -
Epoch 452/800
114/114 [=====] - 0s 866us/sample - loss: 0.0129 - accuracy: 1.0000 -
Epoch 453/800
114/114 [=====] - 0s 878us/sample - loss: 0.0159 - accuracy: 0.9825 -
Epoch 454/800
114/114 [=====] - 0s 207us/sample - loss: 0.0206 - accuracy: 1.0000 -
Epoch 455/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0107 - accuracy: 1.0000 - va
Epoch 456/800
114/114 [=====] - 0s 974us/sample - loss: 0.0108 - accuracy: 1.0000 -
Epoch 457/800
114/114 [=====] - 0s 884us/sample - loss: 0.0222 - accuracy: 0.9825 -
Epoch 458/800
114/114 [=====] - 0s 886us/sample - loss: 0.0286 - accuracy: 0.9912 -
Epoch 459/800
114/114 [=====] - 0s 873us/sample - loss: 0.0207 - accuracy: 0.9912 -
Epoch 460/800
114/114 [=====] - 0s 902us/sample - loss: 0.0296 - accuracy: 0.9825 -
Epoch 461/800
114/114 [=====] - 0s 870us/sample - loss: 0.0230 - accuracy: 0.9912 -
Epoch 462/800
114/114 [=====] - 0s 852us/sample - loss: 0.0274 - accuracy: 0.9737 -
Epoch 463/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0135 - accuracy: 1.0000 - va
Epoch 464/800
114/114 [=====] - 0s 927us/sample - loss: 0.0159 - accuracy: 0.9912 -
Epoch 465/800
114/114 [=====] - 0s 884us/sample - loss: 0.0202 - accuracy: 0.9912 -
Epoch 466/800
114/114 [=====] - 0s 889us/sample - loss: 0.0215 - accuracy: 0.9912 -
Epoch 467/800
114/114 [=====] - 0s 895us/sample - loss: 0.0174 - accuracy: 0.9825 -
Epoch 468/800
114/114 [=====] - 0s 834us/sample - loss: 0.0197 - accuracy: 0.9825 -
Epoch 469/800
114/114 [=====] - 0s 942us/sample - loss: 0.0141 - accuracy: 1.0000 -
Epoch 470/800
114/114 [=====] - 0s 846us/sample - loss: 0.0209 - accuracy: 0.9912 -
Epoch 471/800
114/114 [=====] - 0s 843us/sample - loss: 0.0201 - accuracy: 0.9825 -
Epoch 472/800

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114/114 [=====] - 0s 877us/sample - loss: 0.0144 - accuracy: 1.0000 -
Epoch 473/800
114/114 [=====] - 0s 946us/sample - loss: 0.0241 - accuracy: 0.9825 -
Epoch 474/800
114/114 [=====] - 0s 901us/sample - loss: 0.0180 - accuracy: 0.9912 -
Epoch 475/800
114/114 [=====] - 0s 871us/sample - loss: 0.0159 - accuracy: 0.9825 -
Epoch 476/800
114/114 [=====] - 0s 848us/sample - loss: 0.0131 - accuracy: 1.0000 -
Epoch 477/800
114/114 [=====] - 0s 887us/sample - loss: 0.0117 - accuracy: 1.0000 -
Epoch 478/800
114/114 [=====] - 0s 859us/sample - loss: 0.0141 - accuracy: 0.9912 -
Epoch 479/800
114/114 [=====] - 0s 946us/sample - loss: 0.0102 - accuracy: 1.0000 -
Epoch 480/800
114/114 [=====] - 0s 828us/sample - loss: 0.0115 - accuracy: 1.0000 -
Epoch 481/800
114/114 [=====] - 0s 884us/sample - loss: 0.0142 - accuracy: 1.0000 -
Epoch 482/800
114/114 [=====] - 0s 829us/sample - loss: 0.0133 - accuracy: 1.0000 -
Epoch 483/800
114/114 [=====] - 0s 873us/sample - loss: 0.0089 - accuracy: 1.0000 -
Epoch 484/800
114/114 [=====] - 0s 949us/sample - loss: 0.0107 - accuracy: 1.0000 -
Epoch 485/800
114/114 [=====] - 0s 898us/sample - loss: 0.0095 - accuracy: 1.0000 -
Epoch 486/800
114/114 [=====] - 0s 877us/sample - loss: 0.0100 - accuracy: 1.0000 -
Epoch 487/800
114/114 [=====] - 0s 951us/sample - loss: 0.0103 - accuracy: 1.0000 -
Epoch 488/800
114/114 [=====] - 0s 862us/sample - loss: 0.0099 - accuracy: 1.0000 -
Epoch 489/800
114/114 [=====] - 0s 824us/sample - loss: 0.0096 - accuracy: 1.0000 -
Epoch 490/800
114/114 [=====] - 0s 874us/sample - loss: 0.0097 - accuracy: 1.0000 -
Epoch 491/800
114/114 [=====] - 0s 851us/sample - loss: 0.0094 - accuracy: 1.0000 -
Epoch 492/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0109 - accuracy: 1.0000 - va
Epoch 493/800
114/114 [=====] - 0s 902us/sample - loss: 0.0092 - accuracy: 1.0000 -
Epoch 494/800
114/114 [=====] - 0s 936us/sample - loss: 0.0094 - accuracy: 1.0000 -
Epoch 495/800
114/114 [=====] - 0s 868us/sample - loss: 0.0095 - accuracy: 1.0000 -
Epoch 496/800

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114/114 [=====] - 0s 884us/sample - loss: 0.0116 - accuracy: 1.0000 -
Epoch 497/800
114/114 [=====] - 0s 869us/sample - loss: 0.0112 - accuracy: 1.0000 -
Epoch 498/800
114/114 [=====] - 0s 951us/sample - loss: 0.0113 - accuracy: 1.0000 -
Epoch 499/800
114/114 [=====] - 0s 920us/sample - loss: 0.0104 - accuracy: 1.0000 -
Epoch 500/800
114/114 [=====] - 0s 887us/sample - loss: 0.0107 - accuracy: 1.0000 -
Epoch 501/800
114/114 [=====] - 0s 899us/sample - loss: 0.0090 - accuracy: 1.0000 -
Epoch 502/800
114/114 [=====] - 0s 889us/sample - loss: 0.0156 - accuracy: 0.9825 -
Epoch 503/800
114/114 [=====] - 0s 884us/sample - loss: 0.0082 - accuracy: 1.0000 -
Epoch 504/800
114/114 [=====] - 0s 865us/sample - loss: 0.0108 - accuracy: 1.0000 -
Epoch 505/800
114/114 [=====] - 0s 873us/sample - loss: 0.0085 - accuracy: 1.0000 -
Epoch 506/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0131 - accuracy: 1.0000 - v
Epoch 507/800
114/114 [=====] - 0s 949us/sample - loss: 0.0076 - accuracy: 1.0000 -
Epoch 508/800
114/114 [=====] - 0s 884us/sample - loss: 0.0141 - accuracy: 1.0000 -
Epoch 509/800
114/114 [=====] - 0s 877us/sample - loss: 0.0085 - accuracy: 1.0000 -
Epoch 510/800
114/114 [=====] - 0s 873us/sample - loss: 0.0152 - accuracy: 0.9912 -
Epoch 511/800
114/114 [=====] - 0s 846us/sample - loss: 0.0106 - accuracy: 1.0000 -
Epoch 512/800
114/114 [=====] - 0s 894us/sample - loss: 0.0080 - accuracy: 1.0000 -
Epoch 513/800
114/114 [=====] - 0s 882us/sample - loss: 0.0122 - accuracy: 1.0000 -
Epoch 514/800
114/114 [=====] - 0s 924us/sample - loss: 0.0192 - accuracy: 1.0000 -
Epoch 515/800
114/114 [=====] - 0s 860us/sample - loss: 0.0140 - accuracy: 1.0000 -
Epoch 516/800
114/114 [=====] - 0s 999us/sample - loss: 0.0261 - accuracy: 0.9825 -
Epoch 517/800
114/114 [=====] - 0s 865us/sample - loss: 0.0255 - accuracy: 0.9825 -
Epoch 518/800
114/114 [=====] - 0s 840us/sample - loss: 0.0209 - accuracy: 0.9825 -
Epoch 519/800
114/114 [=====] - 0s 888us/sample - loss: 0.0224 - accuracy: 0.9825 -
Epoch 520/800

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114/114 [=====] - 0s 887us/sample - loss: 0.0230 - accuracy: 0.9912 -
Epoch 521/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0164 - accuracy: 1.0000 - va
Epoch 522/800
114/114 [=====] - 0s 886us/sample - loss: 0.0208 - accuracy: 0.9912 -
Epoch 523/800
114/114 [=====] - 0s 872us/sample - loss: 0.0181 - accuracy: 0.9912 -
Epoch 524/800
114/114 [=====] - 0s 933us/sample - loss: 0.0391 - accuracy: 0.9737 -
Epoch 525/800
114/114 [=====] - 0s 822us/sample - loss: 0.0364 - accuracy: 0.9825 -
Epoch 526/800
114/114 [=====] - 0s 897us/sample - loss: 0.0250 - accuracy: 0.9825 -
Epoch 527/800
114/114 [=====] - 0s 876us/sample - loss: 0.0250 - accuracy: 0.9912 -
Epoch 528/800
114/114 [=====] - 0s 884us/sample - loss: 0.0098 - accuracy: 1.0000 -
Epoch 529/800
114/114 [=====] - 0s 836us/sample - loss: 0.0109 - accuracy: 1.0000 -
Epoch 530/800
114/114 [=====] - 0s 901us/sample - loss: 0.0078 - accuracy: 1.0000 -
Epoch 531/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0106 - accuracy: 1.0000 - va
Epoch 532/800
114/114 [=====] - 0s 896us/sample - loss: 0.0080 - accuracy: 1.0000 -
Epoch 533/800
114/114 [=====] - 0s 918us/sample - loss: 0.0120 - accuracy: 0.9912 -
Epoch 534/800
114/114 [=====] - 0s 876us/sample - loss: 0.0065 - accuracy: 1.0000 -
Epoch 535/800
114/114 [=====] - 0s 891us/sample - loss: 0.0124 - accuracy: 1.0000 -
Epoch 536/800
114/114 [=====] - 0s 876us/sample - loss: 0.0072 - accuracy: 1.0000 -
Epoch 537/800
114/114 [=====] - 0s 916us/sample - loss: 0.0195 - accuracy: 0.9825 -
Epoch 538/800
114/114 [=====] - 0s 821us/sample - loss: 0.0141 - accuracy: 1.0000 -
Epoch 539/800
114/114 [=====] - 0s 217us/sample - loss: 0.0195 - accuracy: 0.9912 -
Epoch 540/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0132 - accuracy: 0.9912 - va
Epoch 541/800
114/114 [=====] - 0s 873us/sample - loss: 0.0129 - accuracy: 1.0000 -
Epoch 542/800
114/114 [=====] - 0s 916us/sample - loss: 0.0106 - accuracy: 1.0000 -
Epoch 543/800
114/114 [=====] - 0s 885us/sample - loss: 0.0110 - accuracy: 1.0000 -
Epoch 544/800

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114/114 [=====] - 0s 906us/sample - loss: 0.0098 - accuracy: 1.0000 -
Epoch 545/800
114/114 [=====] - 0s 866us/sample - loss: 0.0099 - accuracy: 1.0000 -
Epoch 546/800
114/114 [=====] - 0s 883us/sample - loss: 0.0099 - accuracy: 1.0000 -
Epoch 547/800
114/114 [=====] - 0s 872us/sample - loss: 0.0086 - accuracy: 1.0000 -
Epoch 548/800
114/114 [=====] - 0s 873us/sample - loss: 0.0072 - accuracy: 1.0000 -
Epoch 549/800
114/114 [=====] - 0s 908us/sample - loss: 0.0085 - accuracy: 1.0000 -
Epoch 550/800
114/114 [=====] - 0s 893us/sample - loss: 0.0072 - accuracy: 1.0000 -
Epoch 551/800
114/114 [=====] - 0s 930us/sample - loss: 0.0133 - accuracy: 0.9912 -
Epoch 552/800
114/114 [=====] - 0s 868us/sample - loss: 0.0070 - accuracy: 1.0000 -
Epoch 553/800
114/114 [=====] - 0s 900us/sample - loss: 0.0117 - accuracy: 1.0000 -
Epoch 554/800
114/114 [=====] - 0s 869us/sample - loss: 0.0070 - accuracy: 1.0000 -
Epoch 555/800
114/114 [=====] - 0s 883us/sample - loss: 0.0078 - accuracy: 1.0000 -
Epoch 556/800
114/114 [=====] - 0s 877us/sample - loss: 0.0076 - accuracy: 1.0000 -
Epoch 557/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0091 - accuracy: 1.0000 - va
Epoch 558/800
114/114 [=====] - 0s 928us/sample - loss: 0.0084 - accuracy: 1.0000 -
Epoch 559/800
114/114 [=====] - 0s 901us/sample - loss: 0.0099 - accuracy: 1.0000 -
Epoch 560/800
114/114 [=====] - 0s 895us/sample - loss: 0.0106 - accuracy: 1.0000 -
Epoch 561/800
114/114 [=====] - 0s 908us/sample - loss: 0.0071 - accuracy: 1.0000 -
Epoch 562/800
114/114 [=====] - 0s 875us/sample - loss: 0.0161 - accuracy: 0.9825 -
Epoch 563/800
114/114 [=====] - 0s 897us/sample - loss: 0.0117 - accuracy: 1.0000 -
Epoch 564/800
114/114 [=====] - 0s 864us/sample - loss: 0.0071 - accuracy: 1.0000 -
Epoch 565/800
114/114 [=====] - 0s 871us/sample - loss: 0.0095 - accuracy: 1.0000 -
Epoch 566/800
114/114 [=====] - 0s 925us/sample - loss: 0.0092 - accuracy: 1.0000 -
Epoch 567/800
114/114 [=====] - 0s 975us/sample - loss: 0.0075 - accuracy: 1.0000 -
Epoch 568/800

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114/114 [=====] - 0s 874us/sample - loss: 0.0071 - accuracy: 1.0000 - v
Epoch 569/800
114/114 [=====] - 0s 887us/sample - loss: 0.0067 - accuracy: 1.0000 - v
Epoch 570/800
114/114 [=====] - 0s 863us/sample - loss: 0.0072 - accuracy: 1.0000 - v
Epoch 571/800
114/114 [=====] - 0s 892us/sample - loss: 0.0076 - accuracy: 1.0000 - v
Epoch 572/800
114/114 [=====] - 0s 848us/sample - loss: 0.0072 - accuracy: 1.0000 - v
Epoch 573/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0089 - accuracy: 1.0000 - v
Epoch 574/800
114/114 [=====] - 0s 957us/sample - loss: 0.0080 - accuracy: 1.0000 - v
Epoch 575/800
114/114 [=====] - 0s 894us/sample - loss: 0.0076 - accuracy: 1.0000 - v
Epoch 576/800
114/114 [=====] - 0s 890us/sample - loss: 0.0069 - accuracy: 1.0000 - v
Epoch 577/800
114/114 [=====] - 0s 892us/sample - loss: 0.0071 - accuracy: 1.0000 - v
Epoch 578/800
114/114 [=====] - 0s 864us/sample - loss: 0.0061 - accuracy: 1.0000 - v
Epoch 579/800
114/114 [=====] - 0s 869us/sample - loss: 0.0062 - accuracy: 1.0000 - v
Epoch 580/800
114/114 [=====] - 0s 885us/sample - loss: 0.0067 - accuracy: 1.0000 - v
Epoch 581/800
114/114 [=====] - 0s 878us/sample - loss: 0.0057 - accuracy: 1.0000 - v
Epoch 582/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0074 - accuracy: 1.0000 - v
Epoch 583/800
114/114 [=====] - 0s 864us/sample - loss: 0.0061 - accuracy: 1.0000 - v
Epoch 584/800
114/114 [=====] - 0s 948us/sample - loss: 0.0063 - accuracy: 1.0000 - v
Epoch 585/800
114/114 [=====] - 0s 880us/sample - loss: 0.0059 - accuracy: 1.0000 - v
Epoch 586/800
114/114 [=====] - 0s 925us/sample - loss: 0.0059 - accuracy: 1.0000 - v
Epoch 587/800
114/114 [=====] - 0s 903us/sample - loss: 0.0068 - accuracy: 1.0000 - v
Epoch 588/800
114/114 [=====] - 0s 864us/sample - loss: 0.0056 - accuracy: 1.0000 - v
Epoch 589/800
114/114 [=====] - 0s 859us/sample - loss: 0.0076 - accuracy: 1.0000 - v
Epoch 590/800
114/114 [=====] - 0s 915us/sample - loss: 0.0054 - accuracy: 1.0000 - v
Epoch 591/800
114/114 [=====] - 0s 967us/sample - loss: 0.0101 - accuracy: 1.0000 - v
Epoch 592/800

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114/114 [=====] - 0s 879us/sample - loss: 0.0142 - accuracy: 0.9912 -
Epoch 593/800
114/114 [=====] - 0s 934us/sample - loss: 0.0085 - accuracy: 1.0000 -
Epoch 594/800
114/114 [=====] - 0s 851us/sample - loss: 0.0081 - accuracy: 1.0000 -
Epoch 595/800
114/114 [=====] - 0s 884us/sample - loss: 0.0172 - accuracy: 0.9912 -
Epoch 596/800
114/114 [=====] - 0s 909us/sample - loss: 0.0236 - accuracy: 0.9825 -
Epoch 597/800
114/114 [=====] - 0s 866us/sample - loss: 0.0066 - accuracy: 1.0000 -
Epoch 598/800
114/114 [=====] - 0s 871us/sample - loss: 0.0133 - accuracy: 1.0000 -
Epoch 599/800
114/114 [=====] - 0s 861us/sample - loss: 0.0058 - accuracy: 1.0000 -
Epoch 600/800
114/114 [=====] - 0s 853us/sample - loss: 0.0125 - accuracy: 0.9912 -
Epoch 601/800
114/114 [=====] - 0s 989us/sample - loss: 0.0061 - accuracy: 1.0000 -
Epoch 602/800
114/114 [=====] - 0s 837us/sample - loss: 0.0105 - accuracy: 1.0000 -
Epoch 603/800
114/114 [=====] - 0s 933us/sample - loss: 0.0093 - accuracy: 1.0000 -
Epoch 604/800
114/114 [=====] - 0s 871us/sample - loss: 0.0078 - accuracy: 1.0000 -
Epoch 605/800
114/114 [=====] - 0s 891us/sample - loss: 0.0133 - accuracy: 1.0000 -
Epoch 606/800
114/114 [=====] - 0s 875us/sample - loss: 0.0101 - accuracy: 0.9912 -
Epoch 607/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0127 - accuracy: 0.9912 - va
Epoch 608/800
114/114 [=====] - 0s 933us/sample - loss: 0.0080 - accuracy: 1.0000 -
Epoch 609/800
114/114 [=====] - 0s 882us/sample - loss: 0.0058 - accuracy: 1.0000 -
Epoch 610/800
114/114 [=====] - 0s 949us/sample - loss: 0.0069 - accuracy: 1.0000 -
Epoch 611/800
114/114 [=====] - 0s 852us/sample - loss: 0.0059 - accuracy: 1.0000 -
Epoch 612/800
114/114 [=====] - 0s 844us/sample - loss: 0.0069 - accuracy: 1.0000 -
Epoch 613/800
114/114 [=====] - 0s 930us/sample - loss: 0.0053 - accuracy: 1.0000 -
Epoch 614/800
114/114 [=====] - 0s 819us/sample - loss: 0.0080 - accuracy: 1.0000 -
Epoch 615/800
114/114 [=====] - 0s 919us/sample - loss: 0.0055 - accuracy: 1.0000 -
Epoch 616/800

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114/114 [=====] - 0s 909us/sample - loss: 0.0075 - accuracy: 1.0000 -
Epoch 617/800
114/114 [=====] - 0s 876us/sample - loss: 0.0064 - accuracy: 1.0000 -
Epoch 618/800
114/114 [=====] - 0s 922us/sample - loss: 0.0059 - accuracy: 1.0000 -
Epoch 619/800
114/114 [=====] - 0s 865us/sample - loss: 0.0070 - accuracy: 1.0000 -
Epoch 620/800
114/114 [=====] - 0s 876us/sample - loss: 0.0064 - accuracy: 1.0000 -
Epoch 621/800
114/114 [=====] - 0s 867us/sample - loss: 0.0164 - accuracy: 0.9825 -
Epoch 622/800
114/114 [=====] - 0s 899us/sample - loss: 0.0092 - accuracy: 1.0000 -
Epoch 623/800
114/114 [=====] - 0s 830us/sample - loss: 0.0064 - accuracy: 1.0000 -
Epoch 624/800
114/114 [=====] - 0s 851us/sample - loss: 0.0178 - accuracy: 0.9825 -
Epoch 625/800
114/114 [=====] - 0s 873us/sample - loss: 0.0047 - accuracy: 1.0000 -
Epoch 626/800
114/114 [=====] - 0s 896us/sample - loss: 0.0177 - accuracy: 0.9912 -
Epoch 627/800
114/114 [=====] - 0s 943us/sample - loss: 0.0175 - accuracy: 0.9912 -
Epoch 628/800
114/114 [=====] - 0s 951us/sample - loss: 0.0303 - accuracy: 0.9825 -
Epoch 629/800
114/114 [=====] - 0s 864us/sample - loss: 0.0289 - accuracy: 0.9912 -
Epoch 630/800
114/114 [=====] - 0s 896us/sample - loss: 0.0383 - accuracy: 0.9912 -
Epoch 631/800
114/114 [=====] - 0s 836us/sample - loss: 0.0561 - accuracy: 0.9825 -
Epoch 632/800
114/114 [=====] - 0s 920us/sample - loss: 0.0218 - accuracy: 0.9912 -
Epoch 633/800
114/114 [=====] - 0s 940us/sample - loss: 0.0086 - accuracy: 1.0000 -
Epoch 634/800
114/114 [=====] - 0s 901us/sample - loss: 0.0155 - accuracy: 0.9825 -
Epoch 635/800
114/114 [=====] - 0s 946us/sample - loss: 0.0069 - accuracy: 1.0000 -
Epoch 636/800
114/114 [=====] - 0s 854us/sample - loss: 0.0066 - accuracy: 1.0000 -
Epoch 637/800
114/114 [=====] - 0s 863us/sample - loss: 0.0068 - accuracy: 1.0000 -
Epoch 638/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0043 - accuracy: 1.0000 - va
Epoch 639/800
114/114 [=====] - 0s 871us/sample - loss: 0.0086 - accuracy: 1.0000 -
Epoch 640/800

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114/114 [=====] - 0s 917us/sample - loss: 0.0053 - accuracy: 1.0000 -
 Epoch 641/800
 114/114 [=====] - 0s 858us/sample - loss: 0.0064 - accuracy: 1.0000 -
 Epoch 642/800
 114/114 [=====] - 0s 890us/sample - loss: 0.0048 - accuracy: 1.0000 -
 Epoch 643/800
 114/114 [=====] - 0s 900us/sample - loss: 0.0047 - accuracy: 1.0000 -
 Epoch 644/800
 114/114 [=====] - 0s 850us/sample - loss: 0.0053 - accuracy: 1.0000 -
 Epoch 645/800
 114/114 [=====] - 0s 938us/sample - loss: 0.0047 - accuracy: 1.0000 -
 Epoch 646/800
 114/114 [=====] - 0s 913us/sample - loss: 0.0044 - accuracy: 1.0000 -
 Epoch 647/800
 114/114 [=====] - 0s 911us/sample - loss: 0.0049 - accuracy: 1.0000 -
 Epoch 648/800
 114/114 [=====] - 0s 896us/sample - loss: 0.0044 - accuracy: 1.0000 -
 Epoch 649/800
 114/114 [=====] - 0s 873us/sample - loss: 0.0048 - accuracy: 1.0000 -
 Epoch 650/800
 114/114 [=====] - 0s 869us/sample - loss: 0.0043 - accuracy: 1.0000 -
 Epoch 651/800
 114/114 [=====] - 0s 875us/sample - loss: 0.0044 - accuracy: 1.0000 -
 Epoch 652/800
 114/114 [=====] - 0s 867us/sample - loss: 0.0043 - accuracy: 1.0000 -
 Epoch 653/800
 114/114 [=====] - 0s 889us/sample - loss: 0.0055 - accuracy: 1.0000 -
 Epoch 654/800
 114/114 [=====] - 0s 872us/sample - loss: 0.0038 - accuracy: 1.0000 -
 Epoch 655/800
 114/114 [=====] - 0s 846us/sample - loss: 0.0050 - accuracy: 1.0000 -
 Epoch 656/800
 114/114 [=====] - 0s 889us/sample - loss: 0.0044 - accuracy: 1.0000 -
 Epoch 657/800
 114/114 [=====] - 0s 2ms/sample - loss: 0.0048 - accuracy: 1.0000 - v
 Epoch 658/800
 114/114 [=====] - 0s 971us/sample - loss: 0.0041 - accuracy: 1.0000 -
 Epoch 659/800
 114/114 [=====] - 0s 932us/sample - loss: 0.0044 - accuracy: 1.0000 -
 Epoch 660/800
 114/114 [=====] - 0s 863us/sample - loss: 0.0043 - accuracy: 1.0000 -
 Epoch 661/800
 114/114 [=====] - 0s 868us/sample - loss: 0.0057 - accuracy: 1.0000 -
 Epoch 662/800
 114/114 [=====] - 0s 873us/sample - loss: 0.0039 - accuracy: 1.0000 -
 Epoch 663/800
 114/114 [=====] - 0s 885us/sample - loss: 0.0051 - accuracy: 1.0000 -
 Epoch 664/800


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114/114 [=====] - 0s 869us/sample - loss: 0.0040 - accuracy: 1.0000 - v
Epoch 665/800
114/114 [=====] - 0s 857us/sample - loss: 0.0041 - accuracy: 1.0000 - v
Epoch 666/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0051 - accuracy: 1.0000 - v
Epoch 667/800
114/114 [=====] - 0s 869us/sample - loss: 0.0047 - accuracy: 1.0000 - v
Epoch 668/800
114/114 [=====] - 0s 886us/sample - loss: 0.0051 - accuracy: 1.0000 - v
Epoch 669/800
114/114 [=====] - 0s 882us/sample - loss: 0.0040 - accuracy: 1.0000 - v
Epoch 670/800
114/114 [=====] - 0s 924us/sample - loss: 0.0048 - accuracy: 1.0000 - v
Epoch 671/800
114/114 [=====] - 0s 856us/sample - loss: 0.0038 - accuracy: 1.0000 - v
Epoch 672/800
114/114 [=====] - 0s 859us/sample - loss: 0.0041 - accuracy: 1.0000 - v
Epoch 673/800
114/114 [=====] - 0s 929us/sample - loss: 0.0039 - accuracy: 1.0000 - v
Epoch 674/800
114/114 [=====] - 0s 816us/sample - loss: 0.0039 - accuracy: 1.0000 - v
Epoch 675/800
114/114 [=====] - 0s 889us/sample - loss: 0.0039 - accuracy: 1.0000 - v
Epoch 676/800
114/114 [=====] - 0s 849us/sample - loss: 0.0037 - accuracy: 1.0000 - v
Epoch 677/800
114/114 [=====] - 0s 933us/sample - loss: 0.0039 - accuracy: 1.0000 - v
Epoch 678/800
114/114 [=====] - 0s 847us/sample - loss: 0.0039 - accuracy: 1.0000 - v
Epoch 679/800
114/114 [=====] - 0s 1ms/sample - loss: 0.0051 - accuracy: 1.0000 - v
Epoch 680/800
114/114 [=====] - 0s 846us/sample - loss: 0.0035 - accuracy: 1.0000 - v
Epoch 681/800
114/114 [=====] - 0s 893us/sample - loss: 0.0040 - accuracy: 1.0000 - v
Epoch 682/800
114/114 [=====] - 0s 857us/sample - loss: 0.0045 - accuracy: 1.0000 - v
Epoch 683/800
114/114 [=====] - 0s 848us/sample - loss: 0.0036 - accuracy: 1.0000 - v
Epoch 684/800
114/114 [=====] - 0s 916us/sample - loss: 0.0058 - accuracy: 1.0000 - v
Epoch 685/800
114/114 [=====] - 0s 885us/sample - loss: 0.0049 - accuracy: 1.0000 - v
Epoch 686/800
114/114 [=====] - 0s 843us/sample - loss: 0.0056 - accuracy: 1.0000 - v
Epoch 687/800
114/114 [=====] - 0s 191us/sample - loss: 0.0056 - accuracy: 1.0000 - v
Epoch 688/800

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114/114 [=====] - 0s 866us/sample - loss: 0.0052 - accuracy: 1.0000 -
Epoch 689/800
114/114 [=====] - 0s 882us/sample - loss: 0.0031 - accuracy: 1.0000 -
Epoch 690/800
114/114 [=====] - 0s 924us/sample - loss: 0.0059 - accuracy: 1.0000 -
Epoch 691/800
114/114 [=====] - 0s 886us/sample - loss: 0.0036 - accuracy: 1.0000 -
Epoch 692/800
114/114 [=====] - 0s 904us/sample - loss: 0.0040 - accuracy: 1.0000 -
Epoch 693/800
114/114 [=====] - 0s 907us/sample - loss: 0.0048 - accuracy: 1.0000 -
Epoch 694/800
114/114 [=====] - 0s 879us/sample - loss: 0.0035 - accuracy: 1.0000 -
Epoch 695/800
114/114 [=====] - 0s 832us/sample - loss: 0.0034 - accuracy: 1.0000 -
Epoch 696/800
114/114 [=====] - 0s 898us/sample - loss: 0.0043 - accuracy: 1.0000 -
Epoch 697/800
114/114 [=====] - 0s 887us/sample - loss: 0.0033 - accuracy: 1.0000 -
Epoch 698/800
114/114 [=====] - 0s 882us/sample - loss: 0.0036 - accuracy: 1.0000 -
Epoch 699/800
114/114 [=====] - 0s 846us/sample - loss: 0.0035 - accuracy: 1.0000 -
Epoch 700/800
114/114 [=====] - 0s 869us/sample - loss: 0.0040 - accuracy: 1.0000 -
Epoch 701/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0030 - accuracy: 1.0000 - va
Epoch 702/800
114/114 [=====] - 0s 921us/sample - loss: 0.0047 - accuracy: 1.0000 -
Epoch 703/800
114/114 [=====] - 0s 880us/sample - loss: 0.0096 - accuracy: 1.0000 -
Epoch 704/800
114/114 [=====] - 0s 903us/sample - loss: 0.0034 - accuracy: 1.0000 -
Epoch 705/800
114/114 [=====] - 0s 890us/sample - loss: 0.0093 - accuracy: 1.0000 -
Epoch 706/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0082 - accuracy: 1.0000 - va
Epoch 707/800
114/114 [=====] - 0s 915us/sample - loss: 0.0052 - accuracy: 1.0000 -
Epoch 708/800
114/114 [=====] - 0s 896us/sample - loss: 0.0076 - accuracy: 1.0000 -
Epoch 709/800
114/114 [=====] - 0s 896us/sample - loss: 0.0035 - accuracy: 1.0000 -
Epoch 710/800
114/114 [=====] - 0s 886us/sample - loss: 0.0070 - accuracy: 1.0000 -
Epoch 711/800
114/114 [=====] - 0s 874us/sample - loss: 0.0029 - accuracy: 1.0000 -
Epoch 712/800

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114/114 [=====] - 0s 912us/sample - loss: 0.0135 - accuracy: 0.9912 -
 Epoch 713/800
 114/114 [=====] - 0s 917us/sample - loss: 0.0061 - accuracy: 1.0000 -
 Epoch 714/800
 114/114 [=====] - 0s 866us/sample - loss: 0.0110 - accuracy: 0.9912 -
 Epoch 715/800
 114/114 [=====] - 0s 958us/sample - loss: 0.0025 - accuracy: 1.0000 -
 Epoch 716/800
 114/114 [=====] - 0s 818us/sample - loss: 0.0405 - accuracy: 0.9737 -
 Epoch 717/800
 114/114 [=====] - 0s 906us/sample - loss: 0.1034 - accuracy: 0.9825 -
 Epoch 718/800
 114/114 [=====] - 0s 833us/sample - loss: 0.1413 - accuracy: 0.9825 -
 Epoch 719/800
 114/114 [=====] - 0s 886us/sample - loss: 0.0460 - accuracy: 0.9825 -
 Epoch 720/800
 114/114 [=====] - 0s 891us/sample - loss: 0.0573 - accuracy: 0.9737 -
 Epoch 721/800
 114/114 [=====] - 0s 876us/sample - loss: 0.0094 - accuracy: 1.0000 -
 Epoch 722/800
 114/114 [=====] - 0s 835us/sample - loss: 0.0328 - accuracy: 0.9825 -
 Epoch 723/800
 114/114 [=====] - 0s 891us/sample - loss: 0.0122 - accuracy: 1.0000 -
 Epoch 724/800
 114/114 [=====] - 0s 926us/sample - loss: 0.0073 - accuracy: 1.0000 -
 Epoch 725/800
 114/114 [=====] - 0s 954us/sample - loss: 0.0164 - accuracy: 0.9825 -
 Epoch 726/800
 114/114 [=====] - 0s 879us/sample - loss: 0.0039 - accuracy: 1.0000 -
 Epoch 727/800
 114/114 [=====] - 0s 885us/sample - loss: 0.0076 - accuracy: 1.0000 -
 Epoch 728/800
 114/114 [=====] - 0s 866us/sample - loss: 0.0046 - accuracy: 1.0000 -
 Epoch 729/800
 114/114 [=====] - 0s 907us/sample - loss: 0.0065 - accuracy: 1.0000 -
 Epoch 730/800
 114/114 [=====] - 0s 859us/sample - loss: 0.0047 - accuracy: 1.0000 -
 Epoch 731/800
 114/114 [=====] - 0s 882us/sample - loss: 0.0049 - accuracy: 1.0000 -
 Epoch 732/800
 114/114 [=====] - 0s 975us/sample - loss: 0.0040 - accuracy: 1.0000 -
 Epoch 733/800
 114/114 [=====] - 0s 882us/sample - loss: 0.0045 - accuracy: 1.0000 -
 Epoch 734/800
 114/114 [=====] - 0s 897us/sample - loss: 0.0045 - accuracy: 1.0000 -
 Epoch 735/800
 114/114 [=====] - 0s 899us/sample - loss: 0.0040 - accuracy: 1.0000 -
 Epoch 736/800

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114/114 [=====] - 0s 855us/sample - loss: 0.0042 - accuracy: 1.0000 -
Epoch 737/800
114/114 [=====] - 0s 905us/sample - loss: 0.0045 - accuracy: 1.0000 -
Epoch 738/800
114/114 [=====] - 0s 867us/sample - loss: 0.0039 - accuracy: 1.0000 -
Epoch 739/800
114/114 [=====] - 0s 871us/sample - loss: 0.0045 - accuracy: 1.0000 -
Epoch 740/800
114/114 [=====] - 0s 850us/sample - loss: 0.0048 - accuracy: 1.0000 -
Epoch 741/800
114/114 [=====] - 0s 929us/sample - loss: 0.0078 - accuracy: 1.0000 -
Epoch 742/800
114/114 [=====] - 0s 900us/sample - loss: 0.0047 - accuracy: 1.0000 -
Epoch 743/800
114/114 [=====] - 0s 903us/sample - loss: 0.0067 - accuracy: 1.0000 -
Epoch 744/800
114/114 [=====] - 0s 866us/sample - loss: 0.0051 - accuracy: 1.0000 -
Epoch 745/800
114/114 [=====] - 0s 939us/sample - loss: 0.0064 - accuracy: 1.0000 -
Epoch 746/800
114/114 [=====] - 0s 863us/sample - loss: 0.0039 - accuracy: 1.0000 -
Epoch 747/800
114/114 [=====] - 0s 883us/sample - loss: 0.0036 - accuracy: 1.0000 -
Epoch 748/800
114/114 [=====] - 0s 927us/sample - loss: 0.0037 - accuracy: 1.0000 -
Epoch 749/800
114/114 [=====] - 0s 948us/sample - loss: 0.0037 - accuracy: 1.0000 -
Epoch 750/800
114/114 [=====] - 0s 825us/sample - loss: 0.0034 - accuracy: 1.0000 -
Epoch 751/800
114/114 [=====] - 0s 927us/sample - loss: 0.0040 - accuracy: 1.0000 -
Epoch 752/800
114/114 [=====] - 0s 898us/sample - loss: 0.0039 - accuracy: 1.0000 -
Epoch 753/800
114/114 [=====] - 0s 873us/sample - loss: 0.0045 - accuracy: 1.0000 -
Epoch 754/800
114/114 [=====] - 0s 888us/sample - loss: 0.0033 - accuracy: 1.0000 -
Epoch 755/800
114/114 [=====] - 0s 874us/sample - loss: 0.0043 - accuracy: 1.0000 -
Epoch 756/800
114/114 [=====] - 0s 810us/sample - loss: 0.0032 - accuracy: 1.0000 -
Epoch 757/800
114/114 [=====] - 0s 927us/sample - loss: 0.0037 - accuracy: 1.0000 -
Epoch 758/800
114/114 [=====] - 0s 876us/sample - loss: 0.0035 - accuracy: 1.0000 -
Epoch 759/800
114/114 [=====] - 0s 918us/sample - loss: 0.0038 - accuracy: 1.0000 -
Epoch 760/800

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114/114 [=====] - 0s 907us/sample - loss: 0.0033 - accuracy: 1.0000 -
 Epoch 761/800
 114/114 [=====] - 0s 887us/sample - loss: 0.0032 - accuracy: 1.0000 -
 Epoch 762/800
 114/114 [=====] - 0s 889us/sample - loss: 0.0041 - accuracy: 1.0000 -
 Epoch 763/800
 114/114 [=====] - 0s 893us/sample - loss: 0.0032 - accuracy: 1.0000 -
 Epoch 764/800
 114/114 [=====] - 0s 849us/sample - loss: 0.0034 - accuracy: 1.0000 -
 Epoch 765/800
 114/114 [=====] - 0s 889us/sample - loss: 0.0036 - accuracy: 1.0000 -
 Epoch 766/800
 114/114 [=====] - 0s 889us/sample - loss: 0.0036 - accuracy: 1.0000 -
 Epoch 767/800
 114/114 [=====] - 0s 886us/sample - loss: 0.0034 - accuracy: 1.0000 -
 Epoch 768/800
 114/114 [=====] - 0s 825us/sample - loss: 0.0032 - accuracy: 1.0000 -
 Epoch 769/800
 114/114 [=====] - 0s 897us/sample - loss: 0.0039 - accuracy: 1.0000 -
 Epoch 770/800
 114/114 [=====] - 0s 889us/sample - loss: 0.0034 - accuracy: 1.0000 -
 Epoch 771/800
 114/114 [=====] - 0s 966us/sample - loss: 0.0034 - accuracy: 1.0000 -
 Epoch 772/800
 114/114 [=====] - 0s 885us/sample - loss: 0.0038 - accuracy: 1.0000 -
 Epoch 773/800
 114/114 [=====] - 0s 872us/sample - loss: 0.0042 - accuracy: 1.0000 -
 Epoch 774/800
 114/114 [=====] - 0s 906us/sample - loss: 0.0033 - accuracy: 1.0000 -
 Epoch 775/800
 114/114 [=====] - 0s 856us/sample - loss: 0.0033 - accuracy: 1.0000 -
 Epoch 776/800
 114/114 [=====] - 0s 954us/sample - loss: 0.0031 - accuracy: 1.0000 -
 Epoch 777/800
 114/114 [=====] - 0s 963us/sample - loss: 0.0034 - accuracy: 1.0000 -
 Epoch 778/800
 114/114 [=====] - 0s 838us/sample - loss: 0.0030 - accuracy: 1.0000 -
 Epoch 779/800
 114/114 [=====] - 0s 916us/sample - loss: 0.0033 - accuracy: 1.0000 -
 Epoch 780/800
 114/114 [=====] - 0s 867us/sample - loss: 0.0032 - accuracy: 1.0000 -
 Epoch 781/800
 114/114 [=====] - 0s 875us/sample - loss: 0.0030 - accuracy: 1.0000 -
 Epoch 782/800
 114/114 [=====] - 0s 886us/sample - loss: 0.0033 - accuracy: 1.0000 -
 Epoch 783/800
 114/114 [=====] - 0s 843us/sample - loss: 0.0029 - accuracy: 1.0000 -
 Epoch 784/800

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114/114 [=====] - 0s 2ms/sample - loss: 0.0031 - accuracy: 1.0000 - v
Epoch 785/800
114/114 [=====] - 0s 877us/sample - loss: 0.0030 - accuracy: 1.0000 -
Epoch 786/800
114/114 [=====] - 0s 884us/sample - loss: 0.0028 - accuracy: 1.0000 -
Epoch 787/800
114/114 [=====] - 0s 895us/sample - loss: 0.0029 - accuracy: 1.0000 -
Epoch 788/800
114/114 [=====] - 0s 877us/sample - loss: 0.0028 - accuracy: 1.0000 -
Epoch 789/800
114/114 [=====] - 0s 869us/sample - loss: 0.0032 - accuracy: 1.0000 -
Epoch 790/800
114/114 [=====] - 0s 877us/sample - loss: 0.0032 - accuracy: 1.0000 -
Epoch 791/800
114/114 [=====] - 0s 874us/sample - loss: 0.0032 - accuracy: 1.0000 -
Epoch 792/800
114/114 [=====] - 0s 901us/sample - loss: 0.0030 - accuracy: 1.0000 -
Epoch 793/800
114/114 [=====] - 0s 909us/sample - loss: 0.0030 - accuracy: 1.0000 -
Epoch 794/800
114/114 [=====] - 0s 952us/sample - loss: 0.0040 - accuracy: 1.0000 -
Epoch 795/800
114/114 [=====] - 0s 899us/sample - loss: 0.0030 - accuracy: 1.0000 -
Epoch 796/800
114/114 [=====] - 0s 809us/sample - loss: 0.0046 - accuracy: 1.0000 -
Epoch 797/800
114/114 [=====] - 0s 871us/sample - loss: 0.0037 - accuracy: 1.0000 -
Epoch 798/800
114/114 [=====] - 0s 208us/sample - loss: 0.0046 - accuracy: 1.0000 -
Epoch 799/800
114/114 [=====] - 0s 821us/sample - loss: 0.0023 - accuracy: 1.0000 -
Epoch 800/800
114/114 [=====] - 0s 2ms/sample - loss: 0.0050 - accuracy: 1.0000 - v

```

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

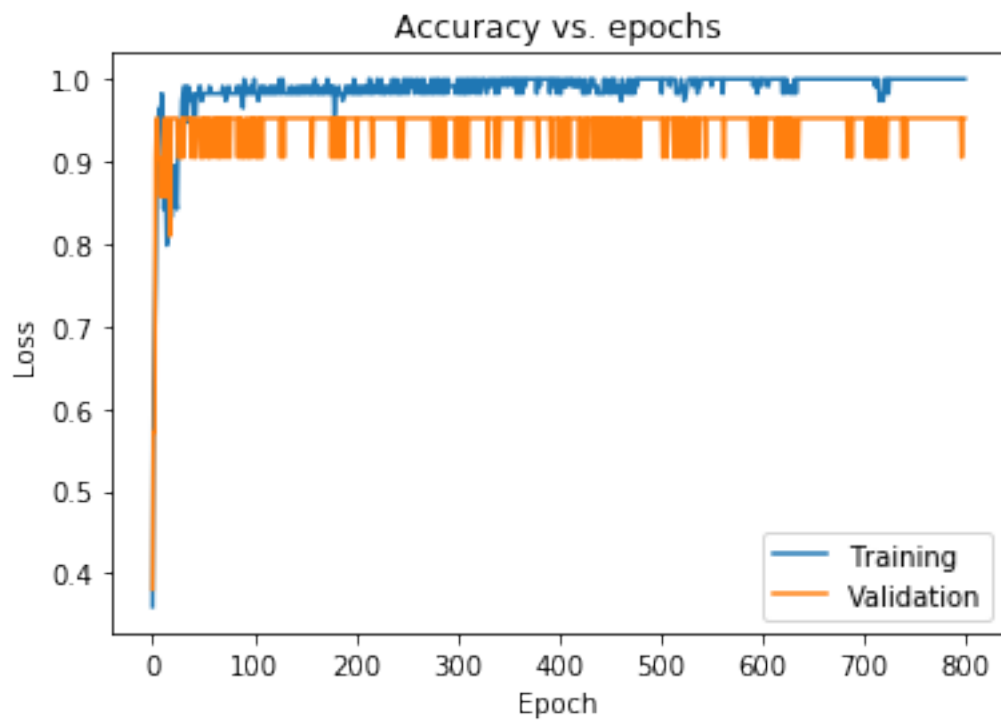
In [29]: *# Run this cell to plot the epoch vs accuracy graph*

```

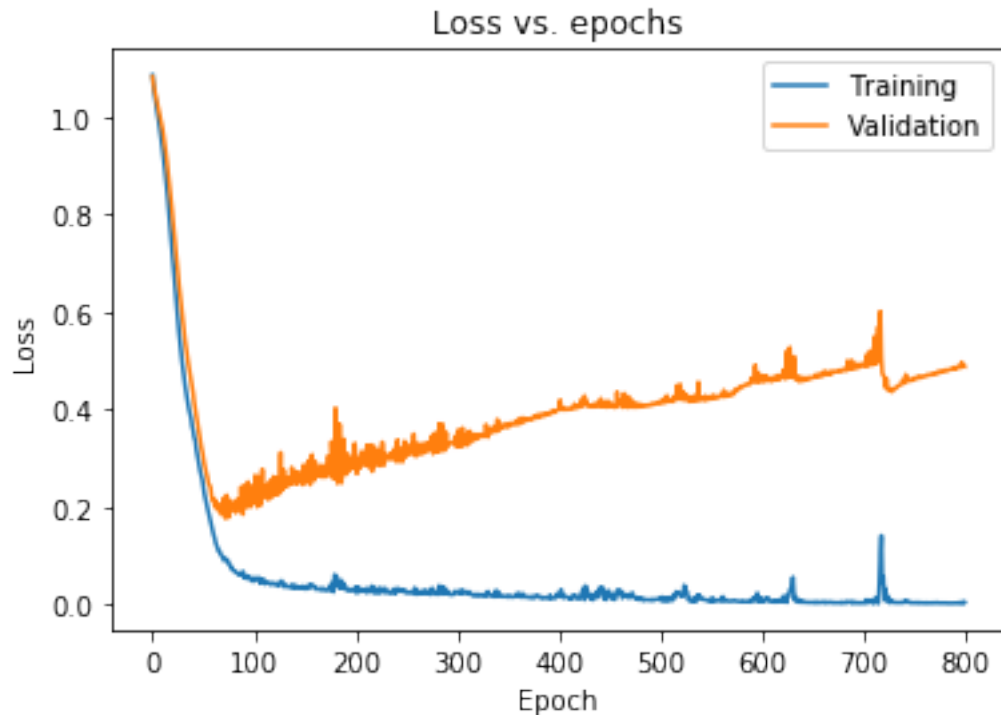
try:
    plt.plot(history.history['accuracy'])
    plt.plot(history.history['val_accuracy'])
except KeyError:
    plt.plot(history.history['acc'])
    plt.plot(history.history['val_acc'])
plt.title('Accuracy vs. epochs')
plt.ylabel('Loss')
plt.xlabel('Epoch')

```

```
plt.legend(['Training', 'Validation'], loc='lower right')
plt.show()
```



```
In [30]: #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

In [33]: `#### GRADED CELL ####`

```
# Complete the following function.
# Make sure to not change the function name or arguments.
from tensorflow.keras.layers import BatchNormalization
```

```
def get_regularised_model(input_shape, dropout_rate, weight_decay):
    """
```

*This function should build a regularised Sequential model according to the above .
The dropout_rate argument in the function should be used to set the Dropout rate .*

L2 kernel regularisation (weight decay) should be added using the weight_decay argument. 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 function argument input_shape.

Your function should return the model.

"""

```
model = Sequential([
    Dense(units = 64, activation = 'relu', input_shape = input_shape,
          kernel_initializer = tf.keras.initializers.he_uniform(seed = None),
          bias_initializer = tf.keras.initializers.Ones(),
          kernel_regularizer = regularizers.l2(weight_decay)),
    Dense(units = 128, activation = 'relu',
          kernel_regularizer = regularizers.l2(weight_decay)),
    Dense(units = 128, activation = 'relu',
          kernel_regularizer = regularizers.l2(weight_decay)),
    Dropout(dropout_rate),
    Dense(units = 128, activation = 'relu',
          kernel_regularizer = regularizers.l2(weight_decay)),
    Dense(units = 128, activation = 'relu',
          kernel_regularizer = regularizers.l2(weight_decay)),
    BatchNormalization(),
    Dense(units = 64, activation = 'relu',
          kernel_regularizer = regularizers.l2(weight_decay)),
    Dense(units = 64, activation = 'relu',
          kernel_regularizer = regularizers.l2(weight_decay)),
    Dropout(dropout_rate),
    Dense(units = 64, activation = 'relu',
          kernel_regularizer = regularizers.l2(weight_decay)),
    Dense(units = 64, activation = 'relu',
          kernel_regularizer = regularizers.l2(weight_decay)),
    Dense(units = 3, activation = 'softmax')
])

return model
```

Instantiate, compile and train the model

In [34]: *# 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)
```

In [35]: *# Compile the model*

```
compile_model(reg_model)
```

In [36]: *# 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 [=====] - 2s 21ms/sample - loss: 1.9697 - accuracy: 0.4211 - v

Epoch 2/800

114/114 [=====] - 0s 874us/sample - loss: 1.9265 - accuracy: 0.4298 - v

Epoch 3/800

114/114 [=====] - 0s 895us/sample - loss: 1.9565 - accuracy: 0.3860 - v

Epoch 4/800

114/114 [=====] - 0s 887us/sample - loss: 1.9112 - accuracy: 0.4035 - v

Epoch 5/800

114/114 [=====] - 0s 874us/sample - loss: 1.9728 - accuracy: 0.3421 - v

Epoch 6/800

114/114 [=====] - 0s 2ms/sample - loss: 1.9780 - accuracy: 0.3421 - v

Epoch 7/800

114/114 [=====] - 0s 945us/sample - loss: 1.9229 - accuracy: 0.4035 - v

Epoch 8/800

114/114 [=====] - 0s 877us/sample - loss: 1.9483 - accuracy: 0.4035 - v

Epoch 9/800

114/114 [=====] - 0s 903us/sample - loss: 1.9263 - accuracy: 0.4123 - v

Epoch 10/800

114/114 [=====] - 0s 874us/sample - loss: 1.9546 - accuracy: 0.3772 - v

Epoch 11/800

114/114 [=====] - 0s 2ms/sample - loss: 1.9171 - accuracy: 0.4298 - v

Epoch 12/800

114/114 [=====] - 0s 886us/sample - loss: 1.9165 - accuracy: 0.4298 - v

Epoch 13/800

114/114 [=====] - 0s 882us/sample - loss: 1.9061 - accuracy: 0.4561 - v

Epoch 14/800

114/114 [=====] - 0s 883us/sample - loss: 1.8835 - accuracy: 0.5088 - v

Epoch 15/800

114/114 [=====] - 0s 2ms/sample - loss: 1.8779 - accuracy: 0.4649 - v

Epoch 16/800

114/114 [=====] - 0s 954us/sample - loss: 1.8927 - accuracy: 0.4474 - v

Epoch 17/800

114/114 [=====] - 0s 880us/sample - loss: 1.8546 - accuracy: 0.5702 - v

Epoch 18/800

114/114 [=====] - 0s 895us/sample - loss: 1.8655 - accuracy: 0.5263 - v

Epoch 19/800

114/114 [=====] - 0s 2ms/sample - loss: 1.8639 - accuracy: 0.5263 - v

Epoch 20/800

114/114 [=====] - 0s 885us/sample - loss: 1.8471 - accuracy: 0.5614 - v

Epoch 21/800

114/114 [=====] - 0s 924us/sample - loss: 1.8256 - accuracy: 0.5439 - v

Epoch 22/800

114/114 [=====] - 0s 875us/sample - loss: 1.8362 - accuracy: 0.5351 - v

Epoch 23/800

114/114 [=====] - 0s 891us/sample - loss: 1.8475 - accuracy: 0.5000 - v

Epoch 24/800

```

114/114 [=====] - 0s 2ms/sample - loss: 1.8132 - accuracy: 0.5439 - v
Epoch 25/800
114/114 [=====] - 0s 928us/sample - loss: 1.7957 - accuracy: 0.5877 -
Epoch 26/800
114/114 [=====] - 0s 892us/sample - loss: 1.7930 - accuracy: 0.6140 -
Epoch 27/800
114/114 [=====] - 0s 887us/sample - loss: 1.7927 - accuracy: 0.5702 -
Epoch 28/800
114/114 [=====] - 0s 876us/sample - loss: 1.8009 - accuracy: 0.5614 -
Epoch 29/800
114/114 [=====] - 0s 885us/sample - loss: 1.8320 - accuracy: 0.5263 -
Epoch 30/800
114/114 [=====] - 0s 2ms/sample - loss: 1.7589 - accuracy: 0.6228 - v
Epoch 31/800
114/114 [=====] - 0s 952us/sample - loss: 1.7337 - accuracy: 0.6140 -
Epoch 32/800
114/114 [=====] - 0s 869us/sample - loss: 1.7155 - accuracy: 0.6667 -
Epoch 33/800
114/114 [=====] - 0s 3ms/sample - loss: 1.6651 - accuracy: 0.6842 - v
Epoch 34/800
114/114 [=====] - 0s 932us/sample - loss: 1.6884 - accuracy: 0.6754 -
Epoch 35/800
114/114 [=====] - 0s 919us/sample - loss: 1.7077 - accuracy: 0.6404 -
Epoch 36/800
114/114 [=====] - 0s 882us/sample - loss: 1.6956 - accuracy: 0.6579 -
Epoch 37/800
114/114 [=====] - 0s 875us/sample - loss: 1.6689 - accuracy: 0.6667 -
Epoch 38/800
114/114 [=====] - 0s 972us/sample - loss: 1.6540 - accuracy: 0.5702 -
Epoch 39/800
114/114 [=====] - 0s 888us/sample - loss: 1.6570 - accuracy: 0.6140 -
Epoch 40/800
114/114 [=====] - 0s 888us/sample - loss: 1.6416 - accuracy: 0.6316 -
Epoch 41/800
114/114 [=====] - 0s 879us/sample - loss: 1.6092 - accuracy: 0.6491 -
Epoch 42/800
114/114 [=====] - 0s 2ms/sample - loss: 1.6022 - accuracy: 0.6140 - v
Epoch 43/800
114/114 [=====] - 0s 885us/sample - loss: 1.6083 - accuracy: 0.6404 -
Epoch 44/800
114/114 [=====] - 0s 882us/sample - loss: 1.5464 - accuracy: 0.7105 -
Epoch 45/800
114/114 [=====] - 0s 2ms/sample - loss: 1.5505 - accuracy: 0.6930 - v
Epoch 46/800
114/114 [=====] - 0s 932us/sample - loss: 1.5061 - accuracy: 0.6579 -
Epoch 47/800
114/114 [=====] - 0s 875us/sample - loss: 1.5316 - accuracy: 0.6579 -
Epoch 48/800

```

```

114/114 [=====] - 0s 885us/sample - loss: 1.4902 - accuracy: 0.7544 -
Epoch 49/800
114/114 [=====] - 0s 887us/sample - loss: 1.5306 - accuracy: 0.5965 -
Epoch 50/800
114/114 [=====] - 0s 878us/sample - loss: 1.4987 - accuracy: 0.6842 -
Epoch 51/800
114/114 [=====] - 0s 886us/sample - loss: 1.4990 - accuracy: 0.6316 -
Epoch 52/800
114/114 [=====] - 0s 910us/sample - loss: 1.4606 - accuracy: 0.7018 -
Epoch 53/800
114/114 [=====] - 0s 900us/sample - loss: 1.4475 - accuracy: 0.6491 -
Epoch 54/800
114/114 [=====] - 0s 902us/sample - loss: 1.4199 - accuracy: 0.6754 -
Epoch 55/800
114/114 [=====] - 0s 867us/sample - loss: 1.4552 - accuracy: 0.6491 -
Epoch 56/800
114/114 [=====] - 0s 893us/sample - loss: 1.4157 - accuracy: 0.7632 -
Epoch 57/800
114/114 [=====] - 0s 867us/sample - loss: 1.3905 - accuracy: 0.7368 -
Epoch 58/800
114/114 [=====] - 0s 2ms/sample - loss: 1.3950 - accuracy: 0.6754 - va
Epoch 59/800
114/114 [=====] - 0s 915us/sample - loss: 1.3891 - accuracy: 0.6667 -
Epoch 60/800
114/114 [=====] - 0s 886us/sample - loss: 1.3465 - accuracy: 0.7632 -
Epoch 61/800
114/114 [=====] - 0s 867us/sample - loss: 1.3765 - accuracy: 0.7193 -
Epoch 62/800
114/114 [=====] - 0s 887us/sample - loss: 1.3505 - accuracy: 0.7456 -
Epoch 63/800
114/114 [=====] - 0s 898us/sample - loss: 1.3442 - accuracy: 0.7105 -
Epoch 64/800
114/114 [=====] - 0s 878us/sample - loss: 1.3145 - accuracy: 0.7544 -
Epoch 65/800
114/114 [=====] - 0s 2ms/sample - loss: 1.3475 - accuracy: 0.7018 - va
Epoch 66/800
114/114 [=====] - 0s 876us/sample - loss: 1.3261 - accuracy: 0.7018 -
Epoch 67/800
114/114 [=====] - 0s 914us/sample - loss: 1.3292 - accuracy: 0.7368 -
Epoch 68/800
114/114 [=====] - 0s 872us/sample - loss: 1.3498 - accuracy: 0.6579 -
Epoch 69/800
114/114 [=====] - 0s 895us/sample - loss: 1.2783 - accuracy: 0.7719 -
Epoch 70/800
114/114 [=====] - 0s 879us/sample - loss: 1.3235 - accuracy: 0.7368 -
Epoch 71/800
114/114 [=====] - 0s 867us/sample - loss: 1.3066 - accuracy: 0.7193 -
Epoch 72/800

```

114/114 [=====] - 0s 870us/sample - loss: 1.2920 - accuracy: 0.7281 -
 Epoch 73/800
 114/114 [=====] - 0s 881us/sample - loss: 1.2768 - accuracy: 0.7632 -
 Epoch 74/800
 114/114 [=====] - 0s 870us/sample - loss: 1.2564 - accuracy: 0.7544 -
 Epoch 75/800
 114/114 [=====] - 0s 2ms/sample - loss: 1.2685 - accuracy: 0.7982 - v
 Epoch 76/800
 114/114 [=====] - 0s 939us/sample - loss: 1.2806 - accuracy: 0.7281 -
 Epoch 77/800
 114/114 [=====] - 0s 871us/sample - loss: 1.2779 - accuracy: 0.7544 -
 Epoch 78/800
 114/114 [=====] - 0s 876us/sample - loss: 1.2403 - accuracy: 0.7632 -
 Epoch 79/800
 114/114 [=====] - 0s 892us/sample - loss: 1.2563 - accuracy: 0.7544 -
 Epoch 80/800
 114/114 [=====] - 0s 883us/sample - loss: 1.2702 - accuracy: 0.7281 -
 Epoch 81/800
 114/114 [=====] - 0s 877us/sample - loss: 1.2437 - accuracy: 0.7544 -
 Epoch 82/800
 114/114 [=====] - 0s 887us/sample - loss: 1.2273 - accuracy: 0.7982 -
 Epoch 83/800
 114/114 [=====] - 0s 2ms/sample - loss: 1.2490 - accuracy: 0.7807 - v
 Epoch 84/800
 114/114 [=====] - 0s 899us/sample - loss: 1.2500 - accuracy: 0.7456 -
 Epoch 85/800
 114/114 [=====] - 0s 889us/sample - loss: 1.2269 - accuracy: 0.7632 -
 Epoch 86/800
 114/114 [=====] - 0s 898us/sample - loss: 1.2082 - accuracy: 0.7895 -
 Epoch 87/800
 114/114 [=====] - 0s 872us/sample - loss: 1.2030 - accuracy: 0.8070 -
 Epoch 88/800
 114/114 [=====] - 0s 873us/sample - loss: 1.2086 - accuracy: 0.7982 -
 Epoch 89/800
 114/114 [=====] - 0s 2ms/sample - loss: 1.2037 - accuracy: 0.7807 - v
 Epoch 90/800
 114/114 [=====] - 0s 878us/sample - loss: 1.2428 - accuracy: 0.7456 -
 Epoch 91/800
 114/114 [=====] - 0s 885us/sample - loss: 1.2263 - accuracy: 0.7544 -
 Epoch 92/800
 114/114 [=====] - 0s 884us/sample - loss: 1.1968 - accuracy: 0.8158 -
 Epoch 93/800
 114/114 [=====] - 0s 891us/sample - loss: 1.1508 - accuracy: 0.8772 -
 Epoch 94/800
 114/114 [=====] - 0s 869us/sample - loss: 1.1275 - accuracy: 0.9123 -
 Epoch 95/800
 114/114 [=====] - 0s 2ms/sample - loss: 1.1651 - accuracy: 0.8684 - v
 Epoch 96/800

```

114/114 [=====] - 0s 962us/sample - loss: 1.1846 - accuracy: 0.8333 -
Epoch 97/800
114/114 [=====] - 0s 861us/sample - loss: 1.1777 - accuracy: 0.8421 -
Epoch 98/800
114/114 [=====] - 0s 905us/sample - loss: 1.1731 - accuracy: 0.8246 -
Epoch 99/800
114/114 [=====] - 0s 884us/sample - loss: 1.1710 - accuracy: 0.8070 -
Epoch 100/800
114/114 [=====] - 0s 2ms/sample - loss: 1.1172 - accuracy: 0.8509 - v
Epoch 101/800
114/114 [=====] - 0s 944us/sample - loss: 1.1574 - accuracy: 0.7982 -
Epoch 102/800
114/114 [=====] - 0s 863us/sample - loss: 1.1506 - accuracy: 0.7895 -
Epoch 103/800
114/114 [=====] - 0s 883us/sample - loss: 1.1102 - accuracy: 0.8684 -
Epoch 104/800
114/114 [=====] - 0s 896us/sample - loss: 1.1225 - accuracy: 0.8333 -
Epoch 105/800
114/114 [=====] - 0s 877us/sample - loss: 1.1086 - accuracy: 0.8509 -
Epoch 106/800
114/114 [=====] - 0s 890us/sample - loss: 1.1249 - accuracy: 0.8509 -
Epoch 107/800
114/114 [=====] - 0s 921us/sample - loss: 1.1326 - accuracy: 0.8684 -
Epoch 108/800
114/114 [=====] - 0s 873us/sample - loss: 1.1394 - accuracy: 0.8070 -
Epoch 109/800
114/114 [=====] - 0s 898us/sample - loss: 1.1280 - accuracy: 0.8772 -
Epoch 110/800
114/114 [=====] - 0s 884us/sample - loss: 1.1510 - accuracy: 0.7895 -
Epoch 111/800
114/114 [=====] - 0s 875us/sample - loss: 1.0872 - accuracy: 0.8860 -
Epoch 112/800
114/114 [=====] - 0s 877us/sample - loss: 1.1113 - accuracy: 0.8596 -
Epoch 113/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0950 - accuracy: 0.8509 - v
Epoch 114/800
114/114 [=====] - 0s 919us/sample - loss: 1.1068 - accuracy: 0.8333 -
Epoch 115/800
114/114 [=====] - 0s 876us/sample - loss: 1.0295 - accuracy: 0.9211 -
Epoch 116/800
114/114 [=====] - 0s 898us/sample - loss: 1.0378 - accuracy: 0.8772 -
Epoch 117/800
114/114 [=====] - 0s 871us/sample - loss: 1.0604 - accuracy: 0.8684 -
Epoch 118/800
114/114 [=====] - 0s 884us/sample - loss: 1.0290 - accuracy: 0.9386 -
Epoch 119/800
114/114 [=====] - 0s 889us/sample - loss: 0.9948 - accuracy: 0.9474 -
Epoch 120/800

```

```

114/114 [=====] - 0s 2ms/sample - loss: 0.9874 - accuracy: 0.9298 - v
Epoch 121/800
114/114 [=====] - 0s 882us/sample - loss: 1.0240 - accuracy: 0.9123 -
Epoch 122/800
114/114 [=====] - 0s 874us/sample - loss: 1.0188 - accuracy: 0.8860 -
Epoch 123/800
114/114 [=====] - 0s 909us/sample - loss: 0.9991 - accuracy: 0.9298 -
Epoch 124/800
114/114 [=====] - 0s 879us/sample - loss: 0.9674 - accuracy: 0.9211 -
Epoch 125/800
114/114 [=====] - 0s 873us/sample - loss: 0.9833 - accuracy: 0.9123 -
Epoch 126/800
114/114 [=====] - 0s 886us/sample - loss: 1.0132 - accuracy: 0.8947 -
Epoch 127/800
114/114 [=====] - 0s 2ms/sample - loss: 1.0009 - accuracy: 0.9035 - v
Epoch 128/800
114/114 [=====] - 0s 872us/sample - loss: 0.9836 - accuracy: 0.9211 -
Epoch 129/800
114/114 [=====] - 0s 939us/sample - loss: 0.9308 - accuracy: 0.9649 -
Epoch 130/800
114/114 [=====] - 0s 850us/sample - loss: 0.8957 - accuracy: 0.9474 -
Epoch 131/800
114/114 [=====] - 0s 896us/sample - loss: 0.9261 - accuracy: 0.9386 -
Epoch 132/800
114/114 [=====] - 0s 882us/sample - loss: 0.9678 - accuracy: 0.9211 -
Epoch 133/800
114/114 [=====] - 0s 873us/sample - loss: 0.9230 - accuracy: 0.9386 -
Epoch 134/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8754 - accuracy: 0.9737 - v
Epoch 135/800
114/114 [=====] - 0s 912us/sample - loss: 0.8788 - accuracy: 0.9561 -
Epoch 136/800
114/114 [=====] - 0s 829us/sample - loss: 0.8904 - accuracy: 0.9649 -
Epoch 137/800
114/114 [=====] - 0s 914us/sample - loss: 0.9051 - accuracy: 0.9474 -
Epoch 138/800
114/114 [=====] - 0s 891us/sample - loss: 0.9580 - accuracy: 0.9386 -
Epoch 139/800
114/114 [=====] - 0s 892us/sample - loss: 0.9145 - accuracy: 0.9474 -
Epoch 140/800
114/114 [=====] - 0s 873us/sample - loss: 0.8844 - accuracy: 0.9561 -
Epoch 141/800
114/114 [=====] - 0s 872us/sample - loss: 0.8867 - accuracy: 0.9561 -
Epoch 142/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8407 - accuracy: 0.9737 - v
Epoch 143/800
114/114 [=====] - 0s 878us/sample - loss: 0.8735 - accuracy: 0.9561 -
Epoch 144/800

```

```

114/114 [=====] - 0s 869us/sample - loss: 0.8899 - accuracy: 0.9386 -
Epoch 145/800
114/114 [=====] - 0s 900us/sample - loss: 0.8145 - accuracy: 0.9825 -
Epoch 146/800
114/114 [=====] - 0s 891us/sample - loss: 0.8826 - accuracy: 0.9386 -
Epoch 147/800
114/114 [=====] - 0s 866us/sample - loss: 0.8243 - accuracy: 0.9474 -
Epoch 148/800
114/114 [=====] - 0s 888us/sample - loss: 0.8361 - accuracy: 0.9825 -
Epoch 149/800
114/114 [=====] - 0s 906us/sample - loss: 0.8048 - accuracy: 0.9737 -
Epoch 150/800
114/114 [=====] - 0s 915us/sample - loss: 0.8076 - accuracy: 0.9825 -
Epoch 151/800
114/114 [=====] - 0s 869us/sample - loss: 0.8493 - accuracy: 0.9561 -
Epoch 152/800
114/114 [=====] - 0s 892us/sample - loss: 0.8488 - accuracy: 0.9561 -
Epoch 153/800
114/114 [=====] - 0s 886us/sample - loss: 0.8333 - accuracy: 0.9561 -
Epoch 154/800
114/114 [=====] - 0s 877us/sample - loss: 0.8287 - accuracy: 0.9561 -
Epoch 155/800
114/114 [=====] - 0s 877us/sample - loss: 0.8388 - accuracy: 0.9649 -
Epoch 156/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8560 - accuracy: 0.9561 - va
Epoch 157/800
114/114 [=====] - 0s 927us/sample - loss: 0.7935 - accuracy: 0.9825 -
Epoch 158/800
114/114 [=====] - 0s 876us/sample - loss: 0.8206 - accuracy: 0.9474 -
Epoch 159/800
114/114 [=====] - 0s 875us/sample - loss: 0.8787 - accuracy: 0.9211 -
Epoch 160/800
114/114 [=====] - 0s 887us/sample - loss: 0.8038 - accuracy: 0.9737 -
Epoch 161/800
114/114 [=====] - 0s 890us/sample - loss: 0.8118 - accuracy: 0.9825 -
Epoch 162/800
114/114 [=====] - 0s 882us/sample - loss: 0.7873 - accuracy: 0.9912 -
Epoch 163/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8054 - accuracy: 0.9474 - va
Epoch 164/800
114/114 [=====] - 0s 927us/sample - loss: 0.8165 - accuracy: 0.9737 -
Epoch 165/800
114/114 [=====] - 0s 903us/sample - loss: 0.8483 - accuracy: 0.9649 -
Epoch 166/800
114/114 [=====] - 0s 886us/sample - loss: 0.8077 - accuracy: 0.9737 -
Epoch 167/800
114/114 [=====] - 0s 869us/sample - loss: 0.8535 - accuracy: 0.9474 -
Epoch 168/800

```



```

114/114 [=====] - 0s 882us/sample - loss: 0.8130 - accuracy: 0.9561 -
Epoch 169/800
114/114 [=====] - 0s 884us/sample - loss: 0.8218 - accuracy: 0.9561 -
Epoch 170/800
114/114 [=====] - 0s 902us/sample - loss: 0.7725 - accuracy: 0.9737 -
Epoch 171/800
114/114 [=====] - 0s 873us/sample - loss: 0.7642 - accuracy: 0.9825 -
Epoch 172/800
114/114 [=====] - 0s 921us/sample - loss: 0.7655 - accuracy: 0.9737 -
Epoch 173/800
114/114 [=====] - 0s 859us/sample - loss: 0.7908 - accuracy: 0.9737 -
Epoch 174/800
114/114 [=====] - 0s 902us/sample - loss: 0.7963 - accuracy: 0.9561 -
Epoch 175/800
114/114 [=====] - 0s 873us/sample - loss: 0.8155 - accuracy: 0.9561 -
Epoch 176/800
114/114 [=====] - 0s 878us/sample - loss: 0.8203 - accuracy: 0.9474 -
Epoch 177/800
114/114 [=====] - 0s 867us/sample - loss: 0.7787 - accuracy: 0.9649 -
Epoch 178/800
114/114 [=====] - 0s 2ms/sample - loss: 0.8003 - accuracy: 0.9649 - va
Epoch 179/800
114/114 [=====] - 0s 931us/sample - loss: 0.8359 - accuracy: 0.9561 -
Epoch 180/800
114/114 [=====] - 0s 868us/sample - loss: 0.7847 - accuracy: 0.9737 -
Epoch 181/800
114/114 [=====] - 0s 898us/sample - loss: 0.7746 - accuracy: 0.9649 -
Epoch 182/800
114/114 [=====] - 0s 882us/sample - loss: 0.7617 - accuracy: 0.9825 -
Epoch 183/800
114/114 [=====] - 0s 891us/sample - loss: 0.7775 - accuracy: 0.9561 -
Epoch 184/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7586 - accuracy: 0.9737 - va
Epoch 185/800
114/114 [=====] - 0s 872us/sample - loss: 0.7988 - accuracy: 0.9737 -
Epoch 186/800
114/114 [=====] - 0s 934us/sample - loss: 0.7664 - accuracy: 0.9649 -
Epoch 187/800
114/114 [=====] - 0s 871us/sample - loss: 0.8532 - accuracy: 0.9298 -
Epoch 188/800
114/114 [=====] - 0s 895us/sample - loss: 0.7832 - accuracy: 0.9649 -
Epoch 189/800
114/114 [=====] - 0s 869us/sample - loss: 0.7748 - accuracy: 0.9825 -
Epoch 190/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7563 - accuracy: 0.9825 - va
Epoch 191/800
114/114 [=====] - 0s 871us/sample - loss: 0.7651 - accuracy: 0.9737 -
Epoch 192/800

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114/114 [=====] - 0s 918us/sample - loss: 0.7903 - accuracy: 0.9649 -
Epoch 193/800
114/114 [=====] - 0s 871us/sample - loss: 0.7322 - accuracy: 0.9825 -
Epoch 194/800
114/114 [=====] - 0s 894us/sample - loss: 0.7832 - accuracy: 0.9825 -
Epoch 195/800
114/114 [=====] - 0s 891us/sample - loss: 0.7578 - accuracy: 0.9825 -
Epoch 196/800
114/114 [=====] - 0s 875us/sample - loss: 0.7496 - accuracy: 0.9737 -
Epoch 197/800
114/114 [=====] - 0s 863us/sample - loss: 0.7918 - accuracy: 0.9649 -
Epoch 198/800
114/114 [=====] - 0s 881us/sample - loss: 0.7698 - accuracy: 0.9825 -
Epoch 199/800
114/114 [=====] - 0s 862us/sample - loss: 0.7217 - accuracy: 0.9912 -
Epoch 200/800
114/114 [=====] - 0s 906us/sample - loss: 0.7405 - accuracy: 0.9825 -
Epoch 201/800
114/114 [=====] - 0s 909us/sample - loss: 0.8019 - accuracy: 0.9737 -
Epoch 202/800
114/114 [=====] - 0s 877us/sample - loss: 0.7860 - accuracy: 0.9649 -
Epoch 203/800
114/114 [=====] - 0s 871us/sample - loss: 0.7643 - accuracy: 0.9737 -
Epoch 204/800
114/114 [=====] - 0s 904us/sample - loss: 0.7899 - accuracy: 0.9386 -
Epoch 205/800
114/114 [=====] - 0s 853us/sample - loss: 0.7515 - accuracy: 0.9737 -
Epoch 206/800
114/114 [=====] - 0s 890us/sample - loss: 0.7292 - accuracy: 0.9912 -
Epoch 207/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7387 - accuracy: 0.9737 - va
Epoch 208/800
114/114 [=====] - 0s 923us/sample - loss: 0.7581 - accuracy: 0.9649 -
Epoch 209/800
114/114 [=====] - 0s 890us/sample - loss: 0.7718 - accuracy: 0.9561 -
Epoch 210/800
114/114 [=====] - 0s 875us/sample - loss: 0.7472 - accuracy: 0.9561 -
Epoch 211/800
114/114 [=====] - 0s 865us/sample - loss: 0.7396 - accuracy: 0.9737 -
Epoch 212/800
114/114 [=====] - 0s 890us/sample - loss: 0.8083 - accuracy: 0.9474 -
Epoch 213/800
114/114 [=====] - 0s 884us/sample - loss: 0.7461 - accuracy: 0.9737 -
Epoch 214/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7762 - accuracy: 0.9474 - va
Epoch 215/800
114/114 [=====] - 0s 938us/sample - loss: 0.7406 - accuracy: 0.9649 -
Epoch 216/800

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114/114 [=====] - 0s 873us/sample - loss: 0.7405 - accuracy: 0.9649 -
Epoch 217/800
114/114 [=====] - 0s 899us/sample - loss: 0.8103 - accuracy: 0.9561 -
Epoch 218/800
114/114 [=====] - 0s 875us/sample - loss: 0.7740 - accuracy: 0.9649 -
Epoch 219/800
114/114 [=====] - 0s 877us/sample - loss: 0.7125 - accuracy: 1.0000 -
Epoch 220/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7077 - accuracy: 0.9912 - v
Epoch 221/800
114/114 [=====] - 0s 875us/sample - loss: 0.7318 - accuracy: 0.9649 -
Epoch 222/800
114/114 [=====] - 0s 940us/sample - loss: 0.7166 - accuracy: 0.9912 -
Epoch 223/800
114/114 [=====] - 0s 858us/sample - loss: 0.7466 - accuracy: 0.9649 -
Epoch 224/800
114/114 [=====] - 0s 892us/sample - loss: 0.7094 - accuracy: 0.9912 -
Epoch 225/800
114/114 [=====] - 0s 879us/sample - loss: 0.7397 - accuracy: 0.9649 -
Epoch 226/800
114/114 [=====] - 0s 879us/sample - loss: 0.7422 - accuracy: 0.9737 -
Epoch 227/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7173 - accuracy: 0.9912 - v
Epoch 228/800
114/114 [=====] - 0s 903us/sample - loss: 0.7241 - accuracy: 0.9737 -
Epoch 229/800
114/114 [=====] - 0s 874us/sample - loss: 0.7143 - accuracy: 0.9737 -
Epoch 230/800
114/114 [=====] - 0s 893us/sample - loss: 0.7348 - accuracy: 0.9737 -
Epoch 231/800
114/114 [=====] - 0s 893us/sample - loss: 0.7029 - accuracy: 0.9825 -
Epoch 232/800
114/114 [=====] - 0s 869us/sample - loss: 0.7116 - accuracy: 0.9825 -
Epoch 233/800
114/114 [=====] - 0s 884us/sample - loss: 0.7128 - accuracy: 0.9649 -
Epoch 234/800
114/114 [=====] - 0s 940us/sample - loss: 0.7388 - accuracy: 0.9649 -
Epoch 235/800
114/114 [=====] - 0s 870us/sample - loss: 0.7278 - accuracy: 0.9737 -
Epoch 236/800
114/114 [=====] - 0s 900us/sample - loss: 0.7121 - accuracy: 0.9825 -
Epoch 237/800
114/114 [=====] - 0s 877us/sample - loss: 0.7164 - accuracy: 0.9825 -
Epoch 238/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7132 - accuracy: 0.9912 - v
Epoch 239/800
114/114 [=====] - 0s 920us/sample - loss: 0.6973 - accuracy: 0.9912 -
Epoch 240/800

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114/114 [=====] - 0s 877us/sample - loss: 0.7222 - accuracy: 0.9737 -
Epoch 241/800
114/114 [=====] - 0s 889us/sample - loss: 0.7081 - accuracy: 0.9737 -
Epoch 242/800
114/114 [=====] - 0s 893us/sample - loss: 0.6939 - accuracy: 0.9912 -
Epoch 243/800
114/114 [=====] - 0s 866us/sample - loss: 0.7042 - accuracy: 0.9737 -
Epoch 244/800
114/114 [=====] - 0s 887us/sample - loss: 0.7400 - accuracy: 0.9649 -
Epoch 245/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7150 - accuracy: 0.9737 - va
Epoch 246/800
114/114 [=====] - 0s 912us/sample - loss: 0.7487 - accuracy: 0.9561 -
Epoch 247/800
114/114 [=====] - 0s 877us/sample - loss: 0.6954 - accuracy: 0.9825 -
Epoch 248/800
114/114 [=====] - 0s 886us/sample - loss: 0.7178 - accuracy: 0.9737 -
Epoch 249/800
114/114 [=====] - 0s 894us/sample - loss: 0.7314 - accuracy: 0.9737 -
Epoch 250/800
114/114 [=====] - 0s 875us/sample - loss: 0.7029 - accuracy: 0.9825 -
Epoch 251/800
114/114 [=====] - 0s 867us/sample - loss: 0.7308 - accuracy: 0.9649 -
Epoch 252/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6901 - accuracy: 0.9825 - va
Epoch 253/800
114/114 [=====] - 0s 933us/sample - loss: 0.7070 - accuracy: 0.9825 -
Epoch 254/800
114/114 [=====] - 0s 882us/sample - loss: 0.7092 - accuracy: 0.9825 -
Epoch 255/800
114/114 [=====] - 0s 887us/sample - loss: 0.7154 - accuracy: 0.9737 -
Epoch 256/800
114/114 [=====] - 0s 874us/sample - loss: 0.6982 - accuracy: 0.9649 -
Epoch 257/800
114/114 [=====] - 0s 872us/sample - loss: 0.6937 - accuracy: 0.9912 -
Epoch 258/800
114/114 [=====] - 0s 881us/sample - loss: 0.6797 - accuracy: 0.9912 -
Epoch 259/800
114/114 [=====] - 0s 910us/sample - loss: 0.7148 - accuracy: 0.9825 -
Epoch 260/800
114/114 [=====] - 0s 910us/sample - loss: 0.7295 - accuracy: 0.9737 -
Epoch 261/800
114/114 [=====] - 0s 876us/sample - loss: 0.7099 - accuracy: 0.9737 -
Epoch 262/800
114/114 [=====] - 0s 894us/sample - loss: 0.6962 - accuracy: 0.9825 -
Epoch 263/800
114/114 [=====] - 0s 885us/sample - loss: 0.6726 - accuracy: 0.9912 -
Epoch 264/800

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114/114 [=====] - 0s 869us/sample - loss: 0.7056 - accuracy: 0.9825 - v
Epoch 265/800
114/114 [=====] - 0s 871us/sample - loss: 0.6958 - accuracy: 0.9737 - v
Epoch 266/800
114/114 [=====] - 0s 2ms/sample - loss: 0.7235 - accuracy: 0.9737 - v
Epoch 267/800
114/114 [=====] - 0s 903us/sample - loss: 0.7399 - accuracy: 0.9474 - v
Epoch 268/800
114/114 [=====] - 0s 904us/sample - loss: 0.7292 - accuracy: 0.9649 - v
Epoch 269/800
114/114 [=====] - 0s 864us/sample - loss: 0.6769 - accuracy: 0.9737 - v
Epoch 270/800
114/114 [=====] - 0s 879us/sample - loss: 0.6831 - accuracy: 0.9825 - v
Epoch 271/800
114/114 [=====] - 0s 913us/sample - loss: 0.6777 - accuracy: 0.9825 - v
Epoch 272/800
114/114 [=====] - 0s 869us/sample - loss: 0.7750 - accuracy: 0.9561 - v
Epoch 273/800
114/114 [=====] - 0s 880us/sample - loss: 0.6831 - accuracy: 0.9825 - v
Epoch 274/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6734 - accuracy: 0.9912 - v
Epoch 275/800
114/114 [=====] - 0s 881us/sample - loss: 0.7191 - accuracy: 0.9649 - v
Epoch 276/800
114/114 [=====] - 0s 918us/sample - loss: 0.6840 - accuracy: 0.9912 - v
Epoch 277/800
114/114 [=====] - 0s 879us/sample - loss: 0.6853 - accuracy: 0.9825 - v
Epoch 278/800
114/114 [=====] - 0s 883us/sample - loss: 0.6942 - accuracy: 0.9825 - v
Epoch 279/800
114/114 [=====] - 0s 873us/sample - loss: 0.6691 - accuracy: 1.0000 - v
Epoch 280/800
114/114 [=====] - 0s 867us/sample - loss: 0.7019 - accuracy: 0.9825 - v
Epoch 281/800
114/114 [=====] - 0s 872us/sample - loss: 0.7033 - accuracy: 0.9825 - v
Epoch 282/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6737 - accuracy: 0.9912 - v
Epoch 283/800
114/114 [=====] - 0s 871us/sample - loss: 0.6714 - accuracy: 0.9912 - v
Epoch 284/800
114/114 [=====] - 0s 873us/sample - loss: 0.7395 - accuracy: 0.9211 - v
Epoch 285/800
114/114 [=====] - 0s 897us/sample - loss: 0.6847 - accuracy: 0.9825 - v
Epoch 286/800
114/114 [=====] - 0s 890us/sample - loss: 0.6676 - accuracy: 0.9912 - v
Epoch 287/800
114/114 [=====] - 0s 882us/sample - loss: 0.6658 - accuracy: 0.9912 - v
Epoch 288/800

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114/114 [=====] - 0s 2ms/sample - loss: 0.6927 - accuracy: 0.9737 - v
Epoch 289/800
114/114 [=====] - 0s 924us/sample - loss: 0.7166 - accuracy: 0.9649 -
Epoch 290/800
114/114 [=====] - 0s 911us/sample - loss: 0.7314 - accuracy: 0.9649 -
Epoch 291/800
114/114 [=====] - 0s 878us/sample - loss: 0.7213 - accuracy: 0.9649 -
Epoch 292/800
114/114 [=====] - 0s 871us/sample - loss: 0.7403 - accuracy: 0.9561 -
Epoch 293/800
114/114 [=====] - 0s 877us/sample - loss: 0.6657 - accuracy: 0.9912 -
Epoch 294/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6665 - accuracy: 0.9912 - v
Epoch 295/800
114/114 [=====] - 0s 910us/sample - loss: 0.6919 - accuracy: 0.9825 -
Epoch 296/800
114/114 [=====] - 0s 881us/sample - loss: 0.6703 - accuracy: 0.9912 -
Epoch 297/800
114/114 [=====] - 0s 867us/sample - loss: 0.7142 - accuracy: 0.9649 -
Epoch 298/800
114/114 [=====] - 0s 895us/sample - loss: 0.6797 - accuracy: 0.9825 -
Epoch 299/800
114/114 [=====] - 0s 880us/sample - loss: 0.7168 - accuracy: 0.9561 -
Epoch 300/800
114/114 [=====] - 0s 876us/sample - loss: 0.6785 - accuracy: 0.9737 -
Epoch 301/800
114/114 [=====] - 0s 875us/sample - loss: 0.6755 - accuracy: 0.9912 -
Epoch 302/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6631 - accuracy: 0.9825 - v
Epoch 303/800
114/114 [=====] - 0s 872us/sample - loss: 0.6668 - accuracy: 0.9825 -
Epoch 304/800
114/114 [=====] - 0s 912us/sample - loss: 0.6710 - accuracy: 0.9912 -
Epoch 305/800
114/114 [=====] - 0s 893us/sample - loss: 0.6744 - accuracy: 0.9825 -
Epoch 306/800
114/114 [=====] - 0s 887us/sample - loss: 0.6680 - accuracy: 0.9825 -
Epoch 307/800
114/114 [=====] - 0s 884us/sample - loss: 0.6715 - accuracy: 0.9737 -
Epoch 308/800
114/114 [=====] - 0s 874us/sample - loss: 0.6460 - accuracy: 0.9912 -
Epoch 309/800
114/114 [=====] - 0s 879us/sample - loss: 0.6471 - accuracy: 0.9912 -
Epoch 310/800
114/114 [=====] - 0s 913us/sample - loss: 0.6508 - accuracy: 0.9912 -
Epoch 311/800
114/114 [=====] - 0s 911us/sample - loss: 0.6610 - accuracy: 0.9825 -
Epoch 312/800

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114/114 [=====] - 0s 887us/sample - loss: 0.6753 - accuracy: 0.9825 -
Epoch 313/800
114/114 [=====] - 0s 887us/sample - loss: 0.6697 - accuracy: 0.9825 -
Epoch 314/800
114/114 [=====] - 0s 874us/sample - loss: 0.6655 - accuracy: 0.9825 -
Epoch 315/800
114/114 [=====] - 0s 895us/sample - loss: 0.6693 - accuracy: 0.9912 -
Epoch 316/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6789 - accuracy: 0.9737 - va
Epoch 317/800
114/114 [=====] - 0s 936us/sample - loss: 0.6850 - accuracy: 0.9825 -
Epoch 318/800
114/114 [=====] - 0s 875us/sample - loss: 0.6732 - accuracy: 0.9825 -
Epoch 319/800
114/114 [=====] - 0s 869us/sample - loss: 0.6775 - accuracy: 0.9649 -
Epoch 320/800
114/114 [=====] - 0s 898us/sample - loss: 0.6603 - accuracy: 0.9825 -
Epoch 321/800
114/114 [=====] - 0s 876us/sample - loss: 0.6572 - accuracy: 0.9912 -
Epoch 322/800
114/114 [=====] - 0s 883us/sample - loss: 0.6469 - accuracy: 0.9912 -
Epoch 323/800
114/114 [=====] - 0s 889us/sample - loss: 0.6617 - accuracy: 0.9825 -
Epoch 324/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6533 - accuracy: 0.9912 - va
Epoch 325/800
114/114 [=====] - 0s 861us/sample - loss: 0.6379 - accuracy: 1.0000 -
Epoch 326/800
114/114 [=====] - 0s 891us/sample - loss: 0.6928 - accuracy: 0.9737 -
Epoch 327/800
114/114 [=====] - 0s 895us/sample - loss: 0.6569 - accuracy: 0.9825 -
Epoch 328/800
114/114 [=====] - 0s 877us/sample - loss: 0.6600 - accuracy: 0.9825 -
Epoch 329/800
114/114 [=====] - 0s 874us/sample - loss: 0.6730 - accuracy: 0.9825 -
Epoch 330/800
114/114 [=====] - 0s 867us/sample - loss: 0.6610 - accuracy: 0.9825 -
Epoch 331/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6422 - accuracy: 0.9912 - va
Epoch 332/800
114/114 [=====] - 0s 906us/sample - loss: 0.6778 - accuracy: 0.9737 -
Epoch 333/800
114/114 [=====] - 0s 897us/sample - loss: 0.6455 - accuracy: 0.9912 -
Epoch 334/800
114/114 [=====] - 0s 895us/sample - loss: 0.7024 - accuracy: 0.9737 -
Epoch 335/800
114/114 [=====] - 0s 888us/sample - loss: 0.6411 - accuracy: 0.9912 -
Epoch 336/800

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114/114 [=====] - 0s 876us/sample - loss: 0.6557 - accuracy: 0.9825 - v
Epoch 337/800
114/114 [=====] - 0s 873us/sample - loss: 0.6455 - accuracy: 0.9825 - v
Epoch 338/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6365 - accuracy: 1.0000 - v
Epoch 339/800
114/114 [=====] - 0s 870us/sample - loss: 0.6524 - accuracy: 0.9912 - v
Epoch 340/800
114/114 [=====] - 0s 913us/sample - loss: 0.6531 - accuracy: 0.9825 - v
Epoch 341/800
114/114 [=====] - 0s 868us/sample - loss: 0.6246 - accuracy: 1.0000 - v
Epoch 342/800
114/114 [=====] - 0s 892us/sample - loss: 0.6445 - accuracy: 0.9825 - v
Epoch 343/800
114/114 [=====] - 0s 878us/sample - loss: 0.6620 - accuracy: 0.9737 - v
Epoch 344/800
114/114 [=====] - 0s 885us/sample - loss: 0.6271 - accuracy: 1.0000 - v
Epoch 345/800
114/114 [=====] - 0s 878us/sample - loss: 0.6555 - accuracy: 0.9737 - v
Epoch 346/800
114/114 [=====] - 0s 881us/sample - loss: 0.6653 - accuracy: 0.9649 - v
Epoch 347/800
114/114 [=====] - 0s 917us/sample - loss: 0.6405 - accuracy: 0.9912 - v
Epoch 348/800
114/114 [=====] - 0s 918us/sample - loss: 0.6555 - accuracy: 0.9737 - v
Epoch 349/800
114/114 [=====] - 0s 866us/sample - loss: 0.6378 - accuracy: 0.9912 - v
Epoch 350/800
114/114 [=====] - 0s 887us/sample - loss: 0.6495 - accuracy: 0.9912 - v
Epoch 351/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6317 - accuracy: 0.9912 - v
Epoch 352/800
114/114 [=====] - 0s 883us/sample - loss: 0.6334 - accuracy: 0.9825 - v
Epoch 353/800
114/114 [=====] - 0s 920us/sample - loss: 0.6651 - accuracy: 0.9825 - v
Epoch 354/800
114/114 [=====] - 0s 897us/sample - loss: 0.6566 - accuracy: 0.9825 - v
Epoch 355/800
114/114 [=====] - 0s 896us/sample - loss: 0.6605 - accuracy: 0.9649 - v
Epoch 356/800
114/114 [=====] - 0s 871us/sample - loss: 0.6778 - accuracy: 0.9649 - v
Epoch 357/800
114/114 [=====] - 0s 879us/sample - loss: 0.6487 - accuracy: 0.9825 - v
Epoch 358/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6777 - accuracy: 0.9737 - v
Epoch 359/800
114/114 [=====] - 0s 871us/sample - loss: 0.6399 - accuracy: 0.9825 - v
Epoch 360/800

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114/114 [=====] - 0s 892us/sample - loss: 0.6288 - accuracy: 0.9825 -
Epoch 361/800
114/114 [=====] - 0s 923us/sample - loss: 0.6594 - accuracy: 0.9912 -
Epoch 362/800
114/114 [=====] - 0s 851us/sample - loss: 0.6482 - accuracy: 0.9737 -
Epoch 363/800
114/114 [=====] - 0s 938us/sample - loss: 0.6247 - accuracy: 0.9912 -
Epoch 364/800
114/114 [=====] - 0s 887us/sample - loss: 0.6282 - accuracy: 1.0000 -
Epoch 365/800
114/114 [=====] - 0s 894us/sample - loss: 0.6642 - accuracy: 0.9825 -
Epoch 366/800
114/114 [=====] - 0s 886us/sample - loss: 0.6373 - accuracy: 0.9912 -
Epoch 367/800
114/114 [=====] - 0s 860us/sample - loss: 0.6349 - accuracy: 0.9912 -
Epoch 368/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6526 - accuracy: 0.9825 - va
Epoch 369/800
114/114 [=====] - 0s 865us/sample - loss: 0.6791 - accuracy: 0.9825 -
Epoch 370/800
114/114 [=====] - 0s 909us/sample - loss: 0.6444 - accuracy: 0.9825 -
Epoch 371/800
114/114 [=====] - 0s 916us/sample - loss: 0.6652 - accuracy: 0.9737 -
Epoch 372/800
114/114 [=====] - 0s 897us/sample - loss: 0.6584 - accuracy: 0.9825 -
Epoch 373/800
114/114 [=====] - 0s 859us/sample - loss: 0.6368 - accuracy: 0.9825 -
Epoch 374/800
114/114 [=====] - 0s 894us/sample - loss: 0.6916 - accuracy: 0.9737 -
Epoch 375/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6170 - accuracy: 1.0000 - va
Epoch 376/800
114/114 [=====] - 0s 875us/sample - loss: 0.6505 - accuracy: 0.9737 -
Epoch 377/800
114/114 [=====] - 0s 901us/sample - loss: 0.6303 - accuracy: 0.9825 -
Epoch 378/800
114/114 [=====] - 0s 905us/sample - loss: 0.6379 - accuracy: 0.9912 -
Epoch 379/800
114/114 [=====] - 0s 905us/sample - loss: 0.6638 - accuracy: 0.9737 -
Epoch 380/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6481 - accuracy: 0.9737 - va
Epoch 381/800
114/114 [=====] - 0s 938us/sample - loss: 0.6451 - accuracy: 0.9912 -
Epoch 382/800
114/114 [=====] - 0s 872us/sample - loss: 0.6452 - accuracy: 0.9737 -
Epoch 383/800
114/114 [=====] - 0s 877us/sample - loss: 0.6131 - accuracy: 1.0000 -
Epoch 384/800

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114/114 [=====] - 0s 882us/sample - loss: 0.6362 - accuracy: 0.9825 - v
Epoch 385/800
114/114 [=====] - 0s 888us/sample - loss: 0.6311 - accuracy: 0.9825 - v
Epoch 386/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6461 - accuracy: 0.9737 - v
Epoch 387/800
114/114 [=====] - 0s 913us/sample - loss: 0.6411 - accuracy: 0.9825 - v
Epoch 388/800
114/114 [=====] - 0s 896us/sample - loss: 0.6487 - accuracy: 0.9737 - v
Epoch 389/800
114/114 [=====] - 0s 881us/sample - loss: 0.6196 - accuracy: 0.9912 - v
Epoch 390/800
114/114 [=====] - 0s 888us/sample - loss: 0.7373 - accuracy: 0.9474 - v
Epoch 391/800
114/114 [=====] - 0s 867us/sample - loss: 0.6699 - accuracy: 0.9737 - v
Epoch 392/800
114/114 [=====] - 0s 896us/sample - loss: 0.6418 - accuracy: 0.9737 - v
Epoch 393/800
114/114 [=====] - 0s 864us/sample - loss: 0.6142 - accuracy: 0.9912 - v
Epoch 394/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6066 - accuracy: 1.0000 - v
Epoch 395/800
114/114 [=====] - 0s 944us/sample - loss: 0.6235 - accuracy: 0.9912 - v
Epoch 396/800
114/114 [=====] - 0s 902us/sample - loss: 0.6133 - accuracy: 1.0000 - v
Epoch 397/800
114/114 [=====] - 0s 886us/sample - loss: 0.6370 - accuracy: 0.9825 - v
Epoch 398/800
114/114 [=====] - 0s 872us/sample - loss: 0.6126 - accuracy: 0.9912 - v
Epoch 399/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6369 - accuracy: 0.9912 - v
Epoch 400/800
114/114 [=====] - 0s 902us/sample - loss: 0.6667 - accuracy: 0.9649 - v
Epoch 401/800
114/114 [=====] - 0s 877us/sample - loss: 0.6650 - accuracy: 0.9737 - v
Epoch 402/800
114/114 [=====] - 0s 890us/sample - loss: 0.6164 - accuracy: 0.9912 - v
Epoch 403/800
114/114 [=====] - 0s 884us/sample - loss: 0.6394 - accuracy: 0.9825 - v
Epoch 404/800
114/114 [=====] - 0s 876us/sample - loss: 0.5993 - accuracy: 1.0000 - v
Epoch 405/800
114/114 [=====] - 0s 876us/sample - loss: 0.6081 - accuracy: 0.9912 - v
Epoch 406/800
114/114 [=====] - 0s 866us/sample - loss: 0.6363 - accuracy: 0.9737 - v
Epoch 407/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6311 - accuracy: 0.9825 - v
Epoch 408/800

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114/114 [=====] - 0s 906us/sample - loss: 0.6104 - accuracy: 0.9912 -
Epoch 409/800
114/114 [=====] - 0s 873us/sample - loss: 0.6340 - accuracy: 0.9825 -
Epoch 410/800
114/114 [=====] - 0s 880us/sample - loss: 0.6165 - accuracy: 0.9912 -
Epoch 411/800
114/114 [=====] - 0s 888us/sample - loss: 0.6102 - accuracy: 1.0000 -
Epoch 412/800
114/114 [=====] - 0s 889us/sample - loss: 0.6192 - accuracy: 0.9825 -
Epoch 413/800
114/114 [=====] - 0s 868us/sample - loss: 0.6166 - accuracy: 0.9825 -
Epoch 414/800
114/114 [=====] - 0s 873us/sample - loss: 0.6293 - accuracy: 0.9825 -
Epoch 415/800
114/114 [=====] - 0s 913us/sample - loss: 0.6877 - accuracy: 0.9649 -
Epoch 416/800
114/114 [=====] - 0s 906us/sample - loss: 0.6143 - accuracy: 0.9825 -
Epoch 417/800
114/114 [=====] - 0s 878us/sample - loss: 0.6089 - accuracy: 0.9825 -
Epoch 418/800
114/114 [=====] - 0s 885us/sample - loss: 0.6262 - accuracy: 0.9825 -
Epoch 419/800
114/114 [=====] - 0s 889us/sample - loss: 0.6280 - accuracy: 0.9737 -
Epoch 420/800
114/114 [=====] - 0s 876us/sample - loss: 0.6178 - accuracy: 0.9825 -
Epoch 421/800
114/114 [=====] - 0s 868us/sample - loss: 0.6052 - accuracy: 0.9912 -
Epoch 422/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6265 - accuracy: 0.9737 - va
Epoch 423/800
114/114 [=====] - 0s 873us/sample - loss: 0.6249 - accuracy: 0.9737 -
Epoch 424/800
114/114 [=====] - 0s 920us/sample - loss: 0.6122 - accuracy: 0.9825 -
Epoch 425/800
114/114 [=====] - 0s 885us/sample - loss: 0.5926 - accuracy: 1.0000 -
Epoch 426/800
114/114 [=====] - 0s 885us/sample - loss: 0.6065 - accuracy: 0.9825 -
Epoch 427/800
114/114 [=====] - 0s 898us/sample - loss: 0.6137 - accuracy: 0.9825 -
Epoch 428/800
114/114 [=====] - 0s 891us/sample - loss: 0.6155 - accuracy: 0.9825 -
Epoch 429/800
114/114 [=====] - 0s 922us/sample - loss: 0.6610 - accuracy: 0.9649 -
Epoch 430/800
114/114 [=====] - 0s 893us/sample - loss: 0.6216 - accuracy: 0.9825 -
Epoch 431/800
114/114 [=====] - 0s 896us/sample - loss: 0.6429 - accuracy: 0.9825 -
Epoch 432/800

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114/114 [=====] - 0s 889us/sample - loss: 0.6263 - accuracy: 0.9912 -
Epoch 433/800
114/114 [=====] - 0s 871us/sample - loss: 0.6172 - accuracy: 0.9912 -
Epoch 434/800
114/114 [=====] - 0s 880us/sample - loss: 0.5993 - accuracy: 1.0000 -
Epoch 435/800
114/114 [=====] - 0s 872us/sample - loss: 0.6348 - accuracy: 0.9737 -
Epoch 436/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6034 - accuracy: 0.9825 - v
Epoch 437/800
114/114 [=====] - 0s 934us/sample - loss: 0.5999 - accuracy: 0.9912 -
Epoch 438/800
114/114 [=====] - 0s 870us/sample - loss: 0.6326 - accuracy: 0.9825 -
Epoch 439/800
114/114 [=====] - 0s 893us/sample - loss: 0.5843 - accuracy: 1.0000 -
Epoch 440/800
114/114 [=====] - 0s 872us/sample - loss: 0.6148 - accuracy: 0.9825 -
Epoch 441/800
114/114 [=====] - 0s 889us/sample - loss: 0.6195 - accuracy: 0.9737 -
Epoch 442/800
114/114 [=====] - 0s 877us/sample - loss: 0.6112 - accuracy: 0.9912 -
Epoch 443/800
114/114 [=====] - 0s 886us/sample - loss: 0.6409 - accuracy: 0.9737 -
Epoch 444/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5945 - accuracy: 0.9912 - v
Epoch 445/800
114/114 [=====] - 0s 870us/sample - loss: 0.6196 - accuracy: 0.9737 -
Epoch 446/800
114/114 [=====] - 0s 910us/sample - loss: 0.6261 - accuracy: 0.9825 -
Epoch 447/800
114/114 [=====] - 0s 867us/sample - loss: 0.6533 - accuracy: 0.9561 -
Epoch 448/800
114/114 [=====] - 0s 883us/sample - loss: 0.6170 - accuracy: 0.9825 -
Epoch 449/800
114/114 [=====] - 0s 874us/sample - loss: 0.6081 - accuracy: 0.9825 -
Epoch 450/800
114/114 [=====] - 0s 871us/sample - loss: 0.6232 - accuracy: 0.9737 -
Epoch 451/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6401 - accuracy: 0.9825 - v
Epoch 452/800
114/114 [=====] - 0s 906us/sample - loss: 0.5964 - accuracy: 0.9912 -
Epoch 453/800
114/114 [=====] - 0s 881us/sample - loss: 0.5914 - accuracy: 0.9912 -
Epoch 454/800
114/114 [=====] - 0s 893us/sample - loss: 0.6168 - accuracy: 0.9825 -
Epoch 455/800
114/114 [=====] - 0s 881us/sample - loss: 0.5821 - accuracy: 1.0000 -
Epoch 456/800

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114/114 [=====] - 0s 863us/sample - loss: 0.5833 - accuracy: 0.9912 -
Epoch 457/800
114/114 [=====] - 0s 2ms/sample - loss: 0.6066 - accuracy: 0.9825 - va
Epoch 458/800
114/114 [=====] - 0s 872us/sample - loss: 0.6335 - accuracy: 0.9737 -
Epoch 459/800
114/114 [=====] - 0s 911us/sample - loss: 0.5828 - accuracy: 1.0000 -
Epoch 460/800
114/114 [=====] - 0s 894us/sample - loss: 0.6140 - accuracy: 0.9825 -
Epoch 461/800
114/114 [=====] - 0s 871us/sample - loss: 0.6136 - accuracy: 0.9825 -
Epoch 462/800
114/114 [=====] - 0s 886us/sample - loss: 0.5874 - accuracy: 1.0000 -
Epoch 463/800
114/114 [=====] - 0s 875us/sample - loss: 0.6473 - accuracy: 0.9649 -
Epoch 464/800
114/114 [=====] - 0s 870us/sample - loss: 0.6010 - accuracy: 0.9912 -
Epoch 465/800
114/114 [=====] - 0s 897us/sample - loss: 0.6265 - accuracy: 0.9649 -
Epoch 466/800
114/114 [=====] - 0s 869us/sample - loss: 0.6112 - accuracy: 0.9825 -
Epoch 467/800
114/114 [=====] - 0s 919us/sample - loss: 0.6045 - accuracy: 0.9912 -
Epoch 468/800
114/114 [=====] - 0s 872us/sample - loss: 0.5802 - accuracy: 1.0000 -
Epoch 469/800
114/114 [=====] - 0s 868us/sample - loss: 0.5841 - accuracy: 0.9912 -
Epoch 470/800
114/114 [=====] - 0s 895us/sample - loss: 0.5815 - accuracy: 0.9912 -
Epoch 471/800
114/114 [=====] - 0s 888us/sample - loss: 0.5956 - accuracy: 0.9912 -
Epoch 472/800
114/114 [=====] - 0s 879us/sample - loss: 0.5990 - accuracy: 0.9825 -
Epoch 473/800
114/114 [=====] - 0s 127us/sample - loss: 0.5997 - accuracy: 0.9912 -
Epoch 474/800
114/114 [=====] - 0s 934us/sample - loss: 0.6343 - accuracy: 0.9649 -
Epoch 475/800
114/114 [=====] - 0s 860us/sample - loss: 0.6146 - accuracy: 0.9825 -
Epoch 476/800
114/114 [=====] - 0s 898us/sample - loss: 0.5989 - accuracy: 0.9825 -
Epoch 477/800
114/114 [=====] - 0s 878us/sample - loss: 0.5663 - accuracy: 1.0000 -
Epoch 478/800
114/114 [=====] - 0s 891us/sample - loss: 0.6359 - accuracy: 0.9737 -
Epoch 479/800
114/114 [=====] - 0s 869us/sample - loss: 0.5972 - accuracy: 0.9912 -
Epoch 480/800

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114/114 [=====] - 0s 869us/sample - loss: 0.6065 - accuracy: 0.9825 -
Epoch 481/800
114/114 [=====] - 0s 875us/sample - loss: 0.5768 - accuracy: 0.9912 -
Epoch 482/800
114/114 [=====] - 0s 893us/sample - loss: 0.5922 - accuracy: 0.9825 -
Epoch 483/800
114/114 [=====] - 0s 939us/sample - loss: 0.5697 - accuracy: 1.0000 -
Epoch 484/800
114/114 [=====] - 0s 868us/sample - loss: 0.5900 - accuracy: 0.9825 -
Epoch 485/800
114/114 [=====] - 0s 876us/sample - loss: 0.5755 - accuracy: 0.9912 -
Epoch 486/800
114/114 [=====] - 0s 867us/sample - loss: 0.5962 - accuracy: 0.9737 -
Epoch 487/800
114/114 [=====] - 0s 880us/sample - loss: 0.6161 - accuracy: 0.9649 -
Epoch 488/800
114/114 [=====] - 0s 906us/sample - loss: 0.6051 - accuracy: 0.9825 -
Epoch 489/800
114/114 [=====] - 0s 874us/sample - loss: 0.5890 - accuracy: 0.9912 -
Epoch 490/800
114/114 [=====] - 0s 914us/sample - loss: 0.5713 - accuracy: 1.0000 -
Epoch 491/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5772 - accuracy: 1.0000 - va
Epoch 492/800
114/114 [=====] - 0s 903us/sample - loss: 0.6151 - accuracy: 0.9912 -
Epoch 493/800
114/114 [=====] - 0s 902us/sample - loss: 0.6749 - accuracy: 0.9474 -
Epoch 494/800
114/114 [=====] - 0s 866us/sample - loss: 0.6042 - accuracy: 0.9825 -
Epoch 495/800
114/114 [=====] - 0s 872us/sample - loss: 0.5830 - accuracy: 0.9912 -
Epoch 496/800
114/114 [=====] - 0s 900us/sample - loss: 0.5865 - accuracy: 0.9912 -
Epoch 497/800
114/114 [=====] - 0s 873us/sample - loss: 0.6375 - accuracy: 0.9561 -
Epoch 498/800
114/114 [=====] - 0s 887us/sample - loss: 0.5757 - accuracy: 0.9912 -
Epoch 499/800
114/114 [=====] - 0s 867us/sample - loss: 0.6082 - accuracy: 0.9825 -
Epoch 500/800
114/114 [=====] - 0s 888us/sample - loss: 0.5841 - accuracy: 0.9912 -
Epoch 501/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5957 - accuracy: 0.9825 - va
Epoch 502/800
114/114 [=====] - 0s 901us/sample - loss: 0.6116 - accuracy: 0.9825 -
Epoch 503/800
114/114 [=====] - 0s 897us/sample - loss: 0.5921 - accuracy: 0.9912 -
Epoch 504/800

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114/114 [=====] - 0s 882us/sample - loss: 0.5763 - accuracy: 0.9912 -
Epoch 505/800
114/114 [=====] - 0s 884us/sample - loss: 0.6098 - accuracy: 0.9737 -
Epoch 506/800
114/114 [=====] - 0s 873us/sample - loss: 0.5916 - accuracy: 0.9825 -
Epoch 507/800
114/114 [=====] - 0s 872us/sample - loss: 0.5852 - accuracy: 0.9825 -
Epoch 508/800
114/114 [=====] - 0s 890us/sample - loss: 0.6255 - accuracy: 0.9737 -
Epoch 509/800
114/114 [=====] - 0s 871us/sample - loss: 0.6008 - accuracy: 0.9737 -
Epoch 510/800
114/114 [=====] - 0s 868us/sample - loss: 0.6316 - accuracy: 0.9737 -
Epoch 511/800
114/114 [=====] - 0s 877us/sample - loss: 0.5845 - accuracy: 0.9912 -
Epoch 512/800
114/114 [=====] - 0s 888us/sample - loss: 0.5794 - accuracy: 0.9912 -
Epoch 513/800
114/114 [=====] - 0s 898us/sample - loss: 0.6051 - accuracy: 0.9737 -
Epoch 514/800
114/114 [=====] - 0s 907us/sample - loss: 0.5745 - accuracy: 0.9912 -
Epoch 515/800
114/114 [=====] - 0s 878us/sample - loss: 0.5769 - accuracy: 0.9737 -
Epoch 516/800
114/114 [=====] - 0s 866us/sample - loss: 0.5774 - accuracy: 0.9912 -
Epoch 517/800
114/114 [=====] - 0s 873us/sample - loss: 0.5630 - accuracy: 0.9912 -
Epoch 518/800
114/114 [=====] - 0s 894us/sample - loss: 0.6159 - accuracy: 0.9737 -
Epoch 519/800
114/114 [=====] - 0s 884us/sample - loss: 0.6096 - accuracy: 0.9737 -
Epoch 520/800
114/114 [=====] - 0s 878us/sample - loss: 0.5976 - accuracy: 0.9825 -
Epoch 521/800
114/114 [=====] - 0s 871us/sample - loss: 0.5623 - accuracy: 1.0000 -
Epoch 522/800
114/114 [=====] - 0s 873us/sample - loss: 0.5843 - accuracy: 0.9737 -
Epoch 523/800
114/114 [=====] - 0s 878us/sample - loss: 0.6031 - accuracy: 0.9737 -
Epoch 524/800
114/114 [=====] - 0s 873us/sample - loss: 0.5934 - accuracy: 0.9825 -
Epoch 525/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5801 - accuracy: 0.9825 - v
Epoch 526/800
114/114 [=====] - 0s 900us/sample - loss: 0.5584 - accuracy: 1.0000 -
Epoch 527/800
114/114 [=====] - 0s 893us/sample - loss: 0.5725 - accuracy: 0.9912 -
Epoch 528/800

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114/114 [=====] - 0s 873us/sample - loss: 0.5633 - accuracy: 1.0000 -
Epoch 529/800
114/114 [=====] - 0s 869us/sample - loss: 0.6127 - accuracy: 0.9737 -
Epoch 530/800
114/114 [=====] - 0s 884us/sample - loss: 0.5789 - accuracy: 0.9825 -
Epoch 531/800
114/114 [=====] - 0s 884us/sample - loss: 0.5750 - accuracy: 0.9912 -
Epoch 532/800
114/114 [=====] - 0s 888us/sample - loss: 0.6107 - accuracy: 0.9737 -
Epoch 533/800
114/114 [=====] - 0s 872us/sample - loss: 0.6050 - accuracy: 0.9737 -
Epoch 534/800
114/114 [=====] - 0s 876us/sample - loss: 0.5723 - accuracy: 0.9825 -
Epoch 535/800
114/114 [=====] - 0s 865us/sample - loss: 0.5792 - accuracy: 0.9825 -
Epoch 536/800
114/114 [=====] - 0s 885us/sample - loss: 0.5920 - accuracy: 0.9737 -
Epoch 537/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5780 - accuracy: 0.9912 - va
Epoch 538/800
114/114 [=====] - 0s 895us/sample - loss: 0.5640 - accuracy: 1.0000 -
Epoch 539/800
114/114 [=====] - 0s 887us/sample - loss: 0.5764 - accuracy: 0.9912 -
Epoch 540/800
114/114 [=====] - 0s 876us/sample - loss: 0.5953 - accuracy: 0.9825 -
Epoch 541/800
114/114 [=====] - 0s 892us/sample - loss: 0.5621 - accuracy: 0.9912 -
Epoch 542/800
114/114 [=====] - 0s 874us/sample - loss: 0.5595 - accuracy: 1.0000 -
Epoch 543/800
114/114 [=====] - 0s 885us/sample - loss: 0.5616 - accuracy: 0.9912 -
Epoch 544/800
114/114 [=====] - 0s 877us/sample - loss: 0.5858 - accuracy: 0.9912 -
Epoch 545/800
114/114 [=====] - 0s 886us/sample - loss: 0.5677 - accuracy: 0.9912 -
Epoch 546/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5512 - accuracy: 1.0000 - va
Epoch 547/800
114/114 [=====] - 0s 881us/sample - loss: 0.6080 - accuracy: 0.9737 -
Epoch 548/800
114/114 [=====] - 0s 910us/sample - loss: 0.5906 - accuracy: 0.9825 -
Epoch 549/800
114/114 [=====] - 0s 873us/sample - loss: 0.5702 - accuracy: 0.9825 -
Epoch 550/800
114/114 [=====] - 0s 879us/sample - loss: 0.6064 - accuracy: 0.9737 -
Epoch 551/800
114/114 [=====] - 0s 874us/sample - loss: 0.5972 - accuracy: 0.9825 -
Epoch 552/800

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114/114 [=====] - 0s 880us/sample - loss: 0.6346 - accuracy: 0.9561 -
Epoch 553/800
114/114 [=====] - 0s 887us/sample - loss: 0.5931 - accuracy: 0.9825 -
Epoch 554/800
114/114 [=====] - 0s 878us/sample - loss: 0.5766 - accuracy: 0.9825 -
Epoch 555/800
114/114 [=====] - 0s 883us/sample - loss: 0.5551 - accuracy: 0.9912 -
Epoch 556/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5647 - accuracy: 0.9825 - v
Epoch 557/800
114/114 [=====] - 0s 857us/sample - loss: 0.5691 - accuracy: 0.9825 -
Epoch 558/800
114/114 [=====] - 0s 886us/sample - loss: 0.5788 - accuracy: 0.9825 -
Epoch 559/800
114/114 [=====] - 0s 897us/sample - loss: 0.5558 - accuracy: 1.0000 -
Epoch 560/800
114/114 [=====] - 0s 873us/sample - loss: 0.5655 - accuracy: 0.9825 -
Epoch 561/800
114/114 [=====] - 0s 889us/sample - loss: 0.5819 - accuracy: 0.9737 -
Epoch 562/800
114/114 [=====] - 0s 879us/sample - loss: 0.5781 - accuracy: 0.9912 -
Epoch 563/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5795 - accuracy: 0.9737 - v
Epoch 564/800
114/114 [=====] - 0s 933us/sample - loss: 0.5785 - accuracy: 0.9825 -
Epoch 565/800
114/114 [=====] - 0s 829us/sample - loss: 0.5598 - accuracy: 0.9912 -
Epoch 566/800
114/114 [=====] - 0s 909us/sample - loss: 0.5854 - accuracy: 0.9825 -
Epoch 567/800
114/114 [=====] - 0s 897us/sample - loss: 0.5727 - accuracy: 0.9912 -
Epoch 568/800
114/114 [=====] - 0s 872us/sample - loss: 0.5497 - accuracy: 1.0000 -
Epoch 569/800
114/114 [=====] - 0s 894us/sample - loss: 0.5599 - accuracy: 0.9825 -
Epoch 570/800
114/114 [=====] - 0s 866us/sample - loss: 0.5783 - accuracy: 0.9737 -
Epoch 571/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5598 - accuracy: 0.9912 - v
Epoch 572/800
114/114 [=====] - 0s 897us/sample - loss: 0.5490 - accuracy: 1.0000 -
Epoch 573/800
114/114 [=====] - 0s 891us/sample - loss: 0.5621 - accuracy: 0.9825 -
Epoch 574/800
114/114 [=====] - 0s 876us/sample - loss: 0.5614 - accuracy: 0.9912 -
Epoch 575/800
114/114 [=====] - 0s 880us/sample - loss: 0.5760 - accuracy: 0.9912 -
Epoch 576/800

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114/114 [=====] - 0s 885us/sample - loss: 0.5392 - accuracy: 1.0000 -
Epoch 577/800
114/114 [=====] - 0s 885us/sample - loss: 0.5469 - accuracy: 1.0000 -
Epoch 578/800
114/114 [=====] - 0s 878us/sample - loss: 0.5422 - accuracy: 1.0000 -
Epoch 579/800
114/114 [=====] - 0s 879us/sample - loss: 0.5601 - accuracy: 0.9825 -
Epoch 580/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5546 - accuracy: 0.9825 - v
Epoch 581/800
114/114 [=====] - 0s 927us/sample - loss: 0.5439 - accuracy: 1.0000 -
Epoch 582/800
114/114 [=====] - 0s 870us/sample - loss: 0.5713 - accuracy: 0.9737 -
Epoch 583/800
114/114 [=====] - 0s 896us/sample - loss: 0.5618 - accuracy: 0.9737 -
Epoch 584/800
114/114 [=====] - 0s 885us/sample - loss: 0.5518 - accuracy: 0.9912 -
Epoch 585/800
114/114 [=====] - 0s 875us/sample - loss: 0.5830 - accuracy: 0.9825 -
Epoch 586/800
114/114 [=====] - 0s 875us/sample - loss: 0.5590 - accuracy: 0.9825 -
Epoch 587/800
114/114 [=====] - 0s 870us/sample - loss: 0.5487 - accuracy: 0.9912 -
Epoch 588/800
114/114 [=====] - 0s 877us/sample - loss: 0.5487 - accuracy: 1.0000 -
Epoch 589/800
114/114 [=====] - 0s 869us/sample - loss: 0.5629 - accuracy: 0.9912 -
Epoch 590/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5764 - accuracy: 0.9737 - v
Epoch 591/800
114/114 [=====] - 0s 869us/sample - loss: 0.5481 - accuracy: 0.9912 -
Epoch 592/800
114/114 [=====] - 0s 899us/sample - loss: 0.5530 - accuracy: 0.9912 -
Epoch 593/800
114/114 [=====] - 0s 842us/sample - loss: 0.5624 - accuracy: 0.9912 -
Epoch 594/800
114/114 [=====] - 0s 896us/sample - loss: 0.5836 - accuracy: 0.9737 -
Epoch 595/800
114/114 [=====] - 0s 893us/sample - loss: 0.5679 - accuracy: 0.9737 -
Epoch 596/800
114/114 [=====] - 0s 868us/sample - loss: 0.5886 - accuracy: 0.9737 -
Epoch 597/800
114/114 [=====] - 0s 872us/sample - loss: 0.5505 - accuracy: 0.9912 -
Epoch 598/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5597 - accuracy: 0.9912 - v
Epoch 599/800
114/114 [=====] - 0s 866us/sample - loss: 0.5746 - accuracy: 0.9825 -
Epoch 600/800

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114/114 [=====] - 0s 927us/sample - loss: 0.5782 - accuracy: 0.9649 -
Epoch 601/800
114/114 [=====] - 0s 875us/sample - loss: 0.5717 - accuracy: 0.9912 -
Epoch 602/800
114/114 [=====] - 0s 870us/sample - loss: 0.5915 - accuracy: 0.9825 -
Epoch 603/800
114/114 [=====] - 0s 875us/sample - loss: 0.5575 - accuracy: 0.9912 -
Epoch 604/800
114/114 [=====] - 0s 891us/sample - loss: 0.5788 - accuracy: 0.9649 -
Epoch 605/800
114/114 [=====] - 0s 876us/sample - loss: 0.5490 - accuracy: 0.9912 -
Epoch 606/800
114/114 [=====] - 0s 890us/sample - loss: 0.5679 - accuracy: 0.9825 -
Epoch 607/800
114/114 [=====] - 0s 869us/sample - loss: 0.6288 - accuracy: 0.9649 -
Epoch 608/800
114/114 [=====] - 0s 886us/sample - loss: 0.5556 - accuracy: 0.9825 -
Epoch 609/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5672 - accuracy: 0.9912 - va
Epoch 610/800
114/114 [=====] - 0s 895us/sample - loss: 0.5784 - accuracy: 0.9649 -
Epoch 611/800
114/114 [=====] - 0s 900us/sample - loss: 0.5468 - accuracy: 0.9825 -
Epoch 612/800
114/114 [=====] - 0s 872us/sample - loss: 0.5601 - accuracy: 0.9912 -
Epoch 613/800
114/114 [=====] - 0s 875us/sample - loss: 0.5648 - accuracy: 0.9825 -
Epoch 614/800
114/114 [=====] - 0s 895us/sample - loss: 0.5490 - accuracy: 0.9912 -
Epoch 615/800
114/114 [=====] - 0s 887us/sample - loss: 0.5653 - accuracy: 0.9912 -
Epoch 616/800
114/114 [=====] - 0s 874us/sample - loss: 0.5736 - accuracy: 0.9825 -
Epoch 617/800
114/114 [=====] - 0s 876us/sample - loss: 0.5428 - accuracy: 0.9912 -
Epoch 618/800
114/114 [=====] - 0s 864us/sample - loss: 0.5672 - accuracy: 0.9737 -
Epoch 619/800
114/114 [=====] - 0s 883us/sample - loss: 0.5418 - accuracy: 0.9912 -
Epoch 620/800
114/114 [=====] - 0s 897us/sample - loss: 0.5465 - accuracy: 0.9912 -
Epoch 621/800
114/114 [=====] - 0s 902us/sample - loss: 0.5550 - accuracy: 0.9912 -
Epoch 622/800
114/114 [=====] - 0s 870us/sample - loss: 0.5496 - accuracy: 0.9912 -
Epoch 623/800
114/114 [=====] - 0s 880us/sample - loss: 0.5449 - accuracy: 0.9912 -
Epoch 624/800

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114/114 [=====] - 0s 900us/sample - loss: 0.5728 - accuracy: 0.9649 -
Epoch 625/800
114/114 [=====] - 0s 880us/sample - loss: 0.5847 - accuracy: 0.9912 -
Epoch 626/800
114/114 [=====] - 0s 876us/sample - loss: 0.5360 - accuracy: 1.0000 -
Epoch 627/800
114/114 [=====] - 0s 868us/sample - loss: 0.5492 - accuracy: 0.9825 -
Epoch 628/800
114/114 [=====] - 0s 875us/sample - loss: 0.5782 - accuracy: 0.9737 -
Epoch 629/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5297 - accuracy: 1.0000 - va
Epoch 630/800
114/114 [=====] - 0s 901us/sample - loss: 0.5534 - accuracy: 0.9825 -
Epoch 631/800
114/114 [=====] - 0s 881us/sample - loss: 0.5939 - accuracy: 0.9561 -
Epoch 632/800
114/114 [=====] - 0s 861us/sample - loss: 0.5658 - accuracy: 0.9737 -
Epoch 633/800
114/114 [=====] - 0s 899us/sample - loss: 0.5726 - accuracy: 0.9825 -
Epoch 634/800
114/114 [=====] - 0s 884us/sample - loss: 0.5410 - accuracy: 0.9912 -
Epoch 635/800
114/114 [=====] - 0s 869us/sample - loss: 0.5639 - accuracy: 0.9737 -
Epoch 636/800
114/114 [=====] - 0s 868us/sample - loss: 0.5419 - accuracy: 0.9912 -
Epoch 637/800
114/114 [=====] - 0s 891us/sample - loss: 0.5442 - accuracy: 1.0000 -
Epoch 638/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5478 - accuracy: 0.9825 - va
Epoch 639/800
114/114 [=====] - 0s 860us/sample - loss: 0.5480 - accuracy: 0.9825 -
Epoch 640/800
114/114 [=====] - 0s 900us/sample - loss: 0.5598 - accuracy: 0.9825 -
Epoch 641/800
114/114 [=====] - 0s 914us/sample - loss: 0.5319 - accuracy: 1.0000 -
Epoch 642/800
114/114 [=====] - 0s 869us/sample - loss: 0.5337 - accuracy: 1.0000 -
Epoch 643/800
114/114 [=====] - 0s 892us/sample - loss: 0.5476 - accuracy: 0.9825 -
Epoch 644/800
114/114 [=====] - 0s 868us/sample - loss: 0.5401 - accuracy: 0.9912 -
Epoch 645/800
114/114 [=====] - 0s 886us/sample - loss: 0.5420 - accuracy: 0.9912 -
Epoch 646/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5667 - accuracy: 0.9737 - va
Epoch 647/800
114/114 [=====] - 0s 899us/sample - loss: 0.5574 - accuracy: 0.9825 -
Epoch 648/800

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114/114 [=====] - 0s 891us/sample - loss: 0.5504 - accuracy: 0.9912 -
Epoch 649/800
114/114 [=====] - 0s 875us/sample - loss: 0.5340 - accuracy: 1.0000 -
Epoch 650/800
114/114 [=====] - 0s 895us/sample - loss: 0.5240 - accuracy: 1.0000 -
Epoch 651/800
114/114 [=====] - 0s 873us/sample - loss: 0.5349 - accuracy: 0.9912 -
Epoch 652/800
114/114 [=====] - 0s 883us/sample - loss: 0.5437 - accuracy: 0.9912 -
Epoch 653/800
114/114 [=====] - 0s 875us/sample - loss: 0.5302 - accuracy: 0.9912 -
Epoch 654/800
114/114 [=====] - 0s 872us/sample - loss: 0.5470 - accuracy: 0.9825 -
Epoch 655/800
114/114 [=====] - 0s 872us/sample - loss: 0.5280 - accuracy: 0.9912 -
Epoch 656/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5354 - accuracy: 0.9912 - va
Epoch 657/800
114/114 [=====] - 0s 895us/sample - loss: 0.6257 - accuracy: 0.9561 -
Epoch 658/800
114/114 [=====] - 0s 902us/sample - loss: 0.5302 - accuracy: 0.9912 -
Epoch 659/800
114/114 [=====] - 0s 873us/sample - loss: 0.5406 - accuracy: 0.9912 -
Epoch 660/800
114/114 [=====] - 0s 872us/sample - loss: 0.5528 - accuracy: 0.9912 -
Epoch 661/800
114/114 [=====] - 0s 884us/sample - loss: 0.5395 - accuracy: 0.9912 -
Epoch 662/800
114/114 [=====] - 0s 883us/sample - loss: 0.5433 - accuracy: 0.9825 -
Epoch 663/800
114/114 [=====] - 0s 889us/sample - loss: 0.5335 - accuracy: 1.0000 -
Epoch 664/800
114/114 [=====] - 0s 872us/sample - loss: 0.5446 - accuracy: 0.9825 -
Epoch 665/800
114/114 [=====] - 0s 875us/sample - loss: 0.5368 - accuracy: 0.9912 -
Epoch 666/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5450 - accuracy: 0.9825 - va
Epoch 667/800
114/114 [=====] - 0s 872us/sample - loss: 0.5235 - accuracy: 1.0000 -
Epoch 668/800
114/114 [=====] - 0s 912us/sample - loss: 0.5331 - accuracy: 0.9912 -
Epoch 669/800
114/114 [=====] - 0s 871us/sample - loss: 0.5419 - accuracy: 0.9825 -
Epoch 670/800
114/114 [=====] - 0s 894us/sample - loss: 0.5433 - accuracy: 0.9737 -
Epoch 671/800
114/114 [=====] - 0s 871us/sample - loss: 0.5327 - accuracy: 0.9825 -
Epoch 672/800

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114/114 [=====] - 0s 891us/sample - loss: 0.5480 - accuracy: 0.9825 -
Epoch 673/800
114/114 [=====] - 0s 869us/sample - loss: 0.5252 - accuracy: 0.9912 -
Epoch 674/800
114/114 [=====] - 0s 875us/sample - loss: 0.5740 - accuracy: 0.9649 -
Epoch 675/800
114/114 [=====] - 0s 878us/sample - loss: 0.6296 - accuracy: 0.9649 -
Epoch 676/800
114/114 [=====] - 0s 896us/sample - loss: 0.5303 - accuracy: 0.9912 -
Epoch 677/800
114/114 [=====] - 0s 901us/sample - loss: 0.5361 - accuracy: 0.9912 -
Epoch 678/800
114/114 [=====] - 0s 872us/sample - loss: 0.5438 - accuracy: 0.9825 -
Epoch 679/800
114/114 [=====] - 0s 874us/sample - loss: 0.5604 - accuracy: 0.9825 -
Epoch 680/800
114/114 [=====] - 0s 896us/sample - loss: 0.5161 - accuracy: 1.0000 -
Epoch 681/800
114/114 [=====] - 0s 886us/sample - loss: 0.5172 - accuracy: 1.0000 -
Epoch 682/800
114/114 [=====] - 0s 872us/sample - loss: 0.5276 - accuracy: 0.9825 -
Epoch 683/800
114/114 [=====] - 0s 874us/sample - loss: 0.5392 - accuracy: 0.9825 -
Epoch 684/800
114/114 [=====] - 0s 871us/sample - loss: 0.5254 - accuracy: 0.9912 -
Epoch 685/800
114/114 [=====] - 0s 883us/sample - loss: 0.5261 - accuracy: 0.9912 -
Epoch 686/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5552 - accuracy: 0.9737 - va
Epoch 687/800
114/114 [=====] - 0s 929us/sample - loss: 0.5275 - accuracy: 0.9912 -
Epoch 688/800
114/114 [=====] - 0s 857us/sample - loss: 0.5419 - accuracy: 0.9825 -
Epoch 689/800
114/114 [=====] - 0s 900us/sample - loss: 0.5557 - accuracy: 0.9737 -
Epoch 690/800
114/114 [=====] - 0s 878us/sample - loss: 0.5258 - accuracy: 0.9912 -
Epoch 691/800
114/114 [=====] - 0s 875us/sample - loss: 0.5410 - accuracy: 0.9737 -
Epoch 692/800
114/114 [=====] - 0s 887us/sample - loss: 0.5439 - accuracy: 0.9825 -
Epoch 693/800
114/114 [=====] - 0s 870us/sample - loss: 0.5694 - accuracy: 0.9649 -
Epoch 694/800
114/114 [=====] - 0s 880us/sample - loss: 0.5439 - accuracy: 0.9825 -
Epoch 695/800
114/114 [=====] - 0s 885us/sample - loss: 0.5411 - accuracy: 0.9825 -
Epoch 696/800

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114/114 [=====] - 0s 894us/sample - loss: 0.5090 - accuracy: 1.0000 -
Epoch 697/800
114/114 [=====] - 0s 915us/sample - loss: 0.5432 - accuracy: 0.9737 -
Epoch 698/800
114/114 [=====] - 0s 869us/sample - loss: 0.5124 - accuracy: 1.0000 -
Epoch 699/800
114/114 [=====] - 0s 900us/sample - loss: 0.5377 - accuracy: 0.9825 -
Epoch 700/800
114/114 [=====] - 0s 871us/sample - loss: 0.5249 - accuracy: 0.9912 -
Epoch 701/800
114/114 [=====] - 0s 871us/sample - loss: 0.5076 - accuracy: 1.0000 -
Epoch 702/800
114/114 [=====] - 0s 891us/sample - loss: 0.5292 - accuracy: 0.9912 -
Epoch 703/800
114/114 [=====] - 0s 869us/sample - loss: 0.5172 - accuracy: 1.0000 -
Epoch 704/800
114/114 [=====] - 0s 891us/sample - loss: 0.5535 - accuracy: 0.9737 -
Epoch 705/800
114/114 [=====] - 0s 872us/sample - loss: 0.5189 - accuracy: 0.9912 -
Epoch 706/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5772 - accuracy: 0.9649 - va
Epoch 707/800
114/114 [=====] - 0s 890us/sample - loss: 0.5364 - accuracy: 0.9825 -
Epoch 708/800
114/114 [=====] - 0s 871us/sample - loss: 0.5656 - accuracy: 0.9649 -
Epoch 709/800
114/114 [=====] - 0s 897us/sample - loss: 0.5238 - accuracy: 0.9825 -
Epoch 710/800
114/114 [=====] - 0s 866us/sample - loss: 0.5182 - accuracy: 0.9912 -
Epoch 711/800
114/114 [=====] - 0s 893us/sample - loss: 0.5512 - accuracy: 0.9825 -
Epoch 712/800
114/114 [=====] - 0s 870us/sample - loss: 0.5155 - accuracy: 0.9912 -
Epoch 713/800
114/114 [=====] - 0s 872us/sample - loss: 0.5809 - accuracy: 0.9737 -
Epoch 714/800
114/114 [=====] - 0s 879us/sample - loss: 0.5298 - accuracy: 0.9825 -
Epoch 715/800
114/114 [=====] - 0s 878us/sample - loss: 0.5602 - accuracy: 0.9825 -
Epoch 716/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5244 - accuracy: 0.9912 - va
Epoch 717/800
114/114 [=====] - 0s 895us/sample - loss: 0.5072 - accuracy: 1.0000 -
Epoch 718/800
114/114 [=====] - 0s 865us/sample - loss: 0.5199 - accuracy: 0.9912 -
Epoch 719/800
114/114 [=====] - 0s 911us/sample - loss: 0.5624 - accuracy: 0.9737 -
Epoch 720/800

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114/114 [=====] - 0s 897us/sample - loss: 0.5235 - accuracy: 0.9912 -
Epoch 721/800
114/114 [=====] - 0s 866us/sample - loss: 0.5175 - accuracy: 0.9912 -
Epoch 722/800
114/114 [=====] - 0s 892us/sample - loss: 0.5176 - accuracy: 0.9912 -
Epoch 723/800
114/114 [=====] - 0s 873us/sample - loss: 0.5127 - accuracy: 1.0000 -
Epoch 724/800
114/114 [=====] - 0s 870us/sample - loss: 0.5161 - accuracy: 0.9912 -
Epoch 725/800
114/114 [=====] - 0s 889us/sample - loss: 0.5348 - accuracy: 0.9825 -
Epoch 726/800
114/114 [=====] - 0s 871us/sample - loss: 0.5311 - accuracy: 0.9825 -
Epoch 727/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5213 - accuracy: 0.9912 - va
Epoch 728/800
114/114 [=====] - 0s 874us/sample - loss: 0.5150 - accuracy: 0.9912 -
Epoch 729/800
114/114 [=====] - 0s 868us/sample - loss: 0.5046 - accuracy: 1.0000 -
Epoch 730/800
114/114 [=====] - 0s 897us/sample - loss: 0.5217 - accuracy: 0.9825 -
Epoch 731/800
114/114 [=====] - 0s 875us/sample - loss: 0.5067 - accuracy: 1.0000 -
Epoch 732/800
114/114 [=====] - 0s 882us/sample - loss: 0.5155 - accuracy: 0.9912 -
Epoch 733/800
114/114 [=====] - 0s 876us/sample - loss: 0.5211 - accuracy: 0.9912 -
Epoch 734/800
114/114 [=====] - 0s 869us/sample - loss: 0.5283 - accuracy: 0.9912 -
Epoch 735/800
114/114 [=====] - 0s 876us/sample - loss: 0.5018 - accuracy: 1.0000 -
Epoch 736/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5087 - accuracy: 1.0000 - va
Epoch 737/800
114/114 [=====] - 0s 897us/sample - loss: 0.5240 - accuracy: 0.9825 -
Epoch 738/800
114/114 [=====] - 0s 904us/sample - loss: 0.5116 - accuracy: 0.9912 -
Epoch 739/800
114/114 [=====] - 0s 873us/sample - loss: 0.5016 - accuracy: 1.0000 -
Epoch 740/800
114/114 [=====] - 0s 880us/sample - loss: 0.5054 - accuracy: 1.0000 -
Epoch 741/800
114/114 [=====] - 0s 890us/sample - loss: 0.5225 - accuracy: 0.9912 -
Epoch 742/800
114/114 [=====] - 0s 873us/sample - loss: 0.5849 - accuracy: 0.9649 -
Epoch 743/800
114/114 [=====] - 0s 892us/sample - loss: 0.5445 - accuracy: 0.9825 -
Epoch 744/800

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114/114 [=====] - 0s 868us/sample - loss: 0.5033 - accuracy: 1.0000 -
Epoch 745/800
114/114 [=====] - 0s 884us/sample - loss: 0.5123 - accuracy: 0.9912 -
Epoch 746/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5222 - accuracy: 0.9912 - va
Epoch 747/800
114/114 [=====] - 0s 897us/sample - loss: 0.5281 - accuracy: 0.9825 -
Epoch 748/800
114/114 [=====] - 0s 903us/sample - loss: 0.5426 - accuracy: 0.9737 -
Epoch 749/800
114/114 [=====] - 0s 874us/sample - loss: 0.5364 - accuracy: 0.9825 -
Epoch 750/800
114/114 [=====] - 0s 885us/sample - loss: 0.5238 - accuracy: 0.9825 -
Epoch 751/800
114/114 [=====] - 0s 870us/sample - loss: 0.5085 - accuracy: 0.9912 -
Epoch 752/800
114/114 [=====] - 0s 881us/sample - loss: 0.5677 - accuracy: 0.9649 -
Epoch 753/800
114/114 [=====] - 0s 886us/sample - loss: 0.5203 - accuracy: 0.9825 -
Epoch 754/800
114/114 [=====] - 0s 874us/sample - loss: 0.5099 - accuracy: 0.9912 -
Epoch 755/800
114/114 [=====] - 0s 870us/sample - loss: 0.5728 - accuracy: 0.9649 -
Epoch 756/800
114/114 [=====] - 0s 874us/sample - loss: 0.5095 - accuracy: 0.9912 -
Epoch 757/800
114/114 [=====] - 0s 890us/sample - loss: 0.5132 - accuracy: 0.9825 -
Epoch 758/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5112 - accuracy: 0.9825 - va
Epoch 759/800
114/114 [=====] - 0s 894us/sample - loss: 0.4972 - accuracy: 1.0000 -
Epoch 760/800
114/114 [=====] - 0s 911us/sample - loss: 0.5140 - accuracy: 0.9825 -
Epoch 761/800
114/114 [=====] - 0s 873us/sample - loss: 0.5219 - accuracy: 0.9825 -
Epoch 762/800
114/114 [=====] - 0s 891us/sample - loss: 0.5171 - accuracy: 0.9912 -
Epoch 763/800
114/114 [=====] - 0s 912us/sample - loss: 0.4981 - accuracy: 0.9912 -
Epoch 764/800
114/114 [=====] - 0s 845us/sample - loss: 0.5350 - accuracy: 0.9737 -
Epoch 765/800
114/114 [=====] - 0s 867us/sample - loss: 0.5012 - accuracy: 1.0000 -
Epoch 766/800
114/114 [=====] - 0s 880us/sample - loss: 0.4987 - accuracy: 0.9912 -
Epoch 767/800
114/114 [=====] - 0s 873us/sample - loss: 0.5093 - accuracy: 0.9912 -
Epoch 768/800

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114/114 [=====] - 0s 2ms/sample - loss: 0.5015 - accuracy: 1.0000 - v
Epoch 769/800
114/114 [=====] - 0s 899us/sample - loss: 0.5282 - accuracy: 0.9912 -
Epoch 770/800
114/114 [=====] - 0s 871us/sample - loss: 0.5242 - accuracy: 0.9737 -
Epoch 771/800
114/114 [=====] - 0s 921us/sample - loss: 0.5020 - accuracy: 0.9912 -
Epoch 772/800
114/114 [=====] - 0s 858us/sample - loss: 0.4940 - accuracy: 1.0000 -
Epoch 773/800
114/114 [=====] - 0s 891us/sample - loss: 0.4901 - accuracy: 1.0000 -
Epoch 774/800
114/114 [=====] - 0s 871us/sample - loss: 0.5000 - accuracy: 0.9912 -
Epoch 775/800
114/114 [=====] - 0s 888us/sample - loss: 0.4913 - accuracy: 1.0000 -
Epoch 776/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5224 - accuracy: 0.9825 - v
Epoch 777/800
114/114 [=====] - 0s 915us/sample - loss: 0.5013 - accuracy: 0.9912 -
Epoch 778/800
114/114 [=====] - 0s 864us/sample - loss: 0.4981 - accuracy: 1.0000 -
Epoch 779/800
114/114 [=====] - 0s 879us/sample - loss: 0.5418 - accuracy: 0.9737 -
Epoch 780/800
114/114 [=====] - 0s 896us/sample - loss: 0.4911 - accuracy: 1.0000 -
Epoch 781/800
114/114 [=====] - 0s 889us/sample - loss: 0.5063 - accuracy: 0.9912 -
Epoch 782/800
114/114 [=====] - 0s 871us/sample - loss: 0.5034 - accuracy: 0.9912 -
Epoch 783/800
114/114 [=====] - 0s 874us/sample - loss: 0.5435 - accuracy: 0.9825 -
Epoch 784/800
114/114 [=====] - 0s 870us/sample - loss: 0.5346 - accuracy: 0.9825 -
Epoch 785/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5044 - accuracy: 0.9912 - v
Epoch 786/800
114/114 [=====] - 0s 896us/sample - loss: 0.5148 - accuracy: 0.9825 -
Epoch 787/800
114/114 [=====] - 0s 905us/sample - loss: 0.4853 - accuracy: 1.0000 -
Epoch 788/800
114/114 [=====] - 0s 870us/sample - loss: 0.5051 - accuracy: 0.9825 -
Epoch 789/800
114/114 [=====] - 0s 895us/sample - loss: 0.4983 - accuracy: 0.9912 -
Epoch 790/800
114/114 [=====] - 0s 874us/sample - loss: 0.4934 - accuracy: 1.0000 -
Epoch 791/800
114/114 [=====] - 0s 890us/sample - loss: 0.4983 - accuracy: 0.9912 -
Epoch 792/800

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114/114 [=====] - 0s 872us/sample - loss: 0.5400 - accuracy: 0.9737 - v
Epoch 793/800
114/114 [=====] - 0s 868us/sample - loss: 0.5014 - accuracy: 0.9825 - v
Epoch 794/800
114/114 [=====] - 0s 876us/sample - loss: 0.5038 - accuracy: 0.9825 - v
Epoch 795/800
114/114 [=====] - 0s 868us/sample - loss: 0.5030 - accuracy: 0.9912 - v
Epoch 796/800
114/114 [=====] - 0s 2ms/sample - loss: 0.5260 - accuracy: 0.9649 - v
Epoch 797/800
114/114 [=====] - 0s 914us/sample - loss: 0.5070 - accuracy: 0.9912 - v
Epoch 798/800
114/114 [=====] - 0s 877us/sample - loss: 0.4873 - accuracy: 1.0000 - v
Epoch 799/800
114/114 [=====] - 0s 894us/sample - loss: 0.4946 - accuracy: 0.9912 - v
Epoch 800/800
114/114 [=====] - 0s 870us/sample - loss: 0.4972 - accuracy: 0.9912 - v

```

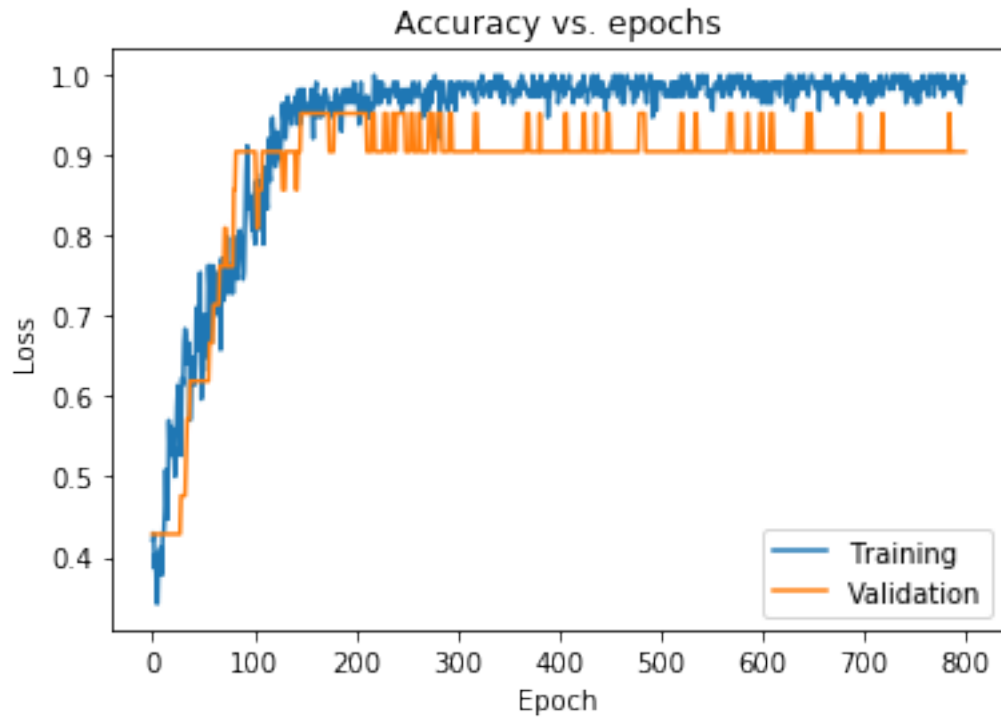
Plot the learning curves Let's now plot the loss and accuracy for the training and validation sets.

In [37]: *#Run this cell to plot the new accuracy vs epoch graph*

```

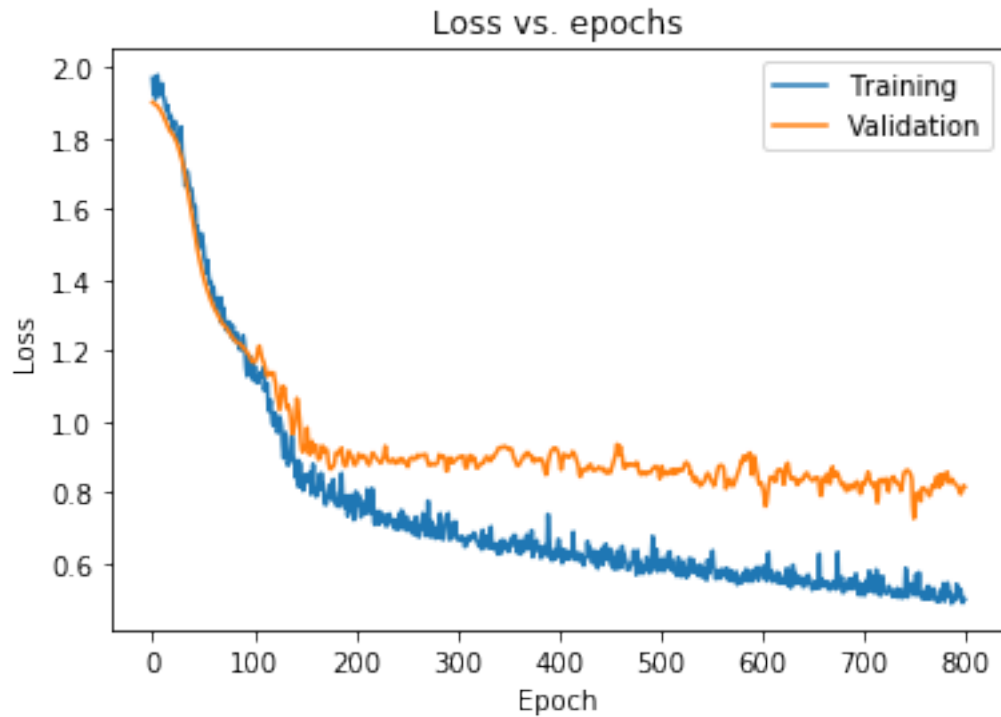
try:
    plt.plot(reg_history.history['accuracy'])
    plt.plot(reg_history.history['val_accuracy'])
except KeyError:
    plt.plot(reg_history.history['acc'])
    plt.plot(reg_history.history['val_acc'])
plt.title('Accuracy vs. epochs')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(['Training', 'Validation'],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

```



In [38]: *#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.

In [40]: ##### GRADED CELL #####

```
# Complete the following function.
# Make sure to not change the function name or arguments.
from tensorflow.keras import callbacks

def get_callbacks():
    """
    This function should create and return a tuple (early_stopping, learning_rate_red)
    The callbacks should be instantiated according to the above requirements.
    """
    early_stopping = tf.keras.callbacks.EarlyStopping(monitor = 'val_loss',
                                                        patience = 30,
                                                        mode = 'min')
```

```

learning_rate_reduction = tf.keras.callbacks.ReduceLROnPlateau(monitor = 'val_loss',
                                                                factor = 0.2,
                                                                patience = 20)

return early_stopping, learning_rate_reduction

```

Run the cell below to instantiate and train the regularised model with the callbacks.

```

In [41]: 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=0.2,
                             callbacks=[early_stopping, learning_rate_reduction], verbose=0)

```

```

In [42]: learning_rate_reduction.patience

```

```

Out[42]: 20

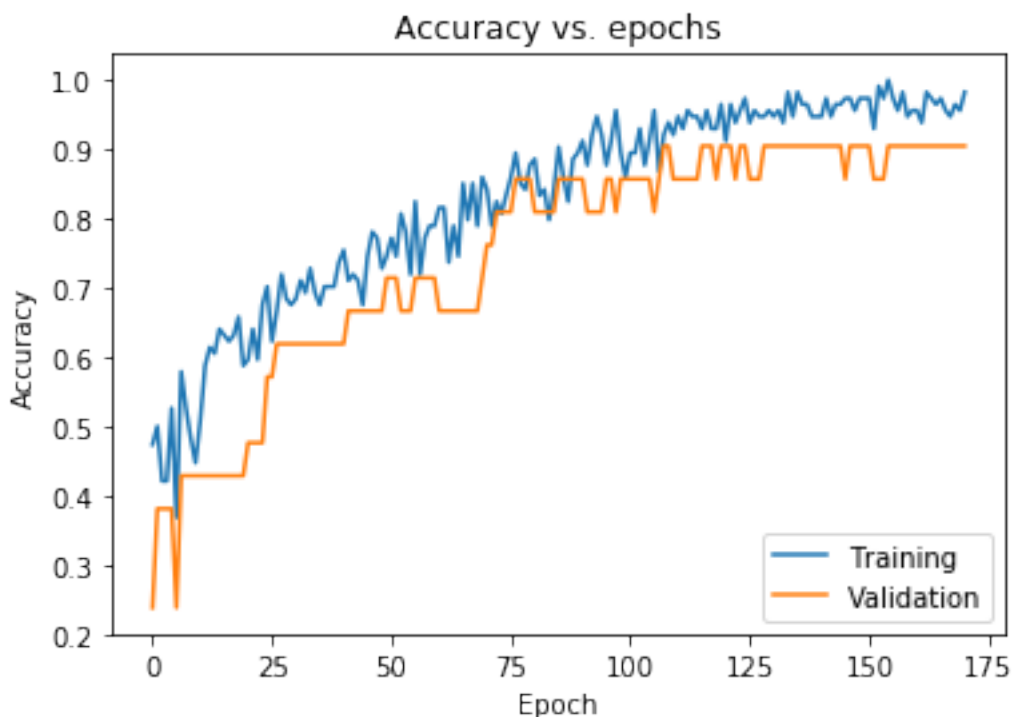
```

Finally, let's replot the accuracy and loss graphs for our new model.

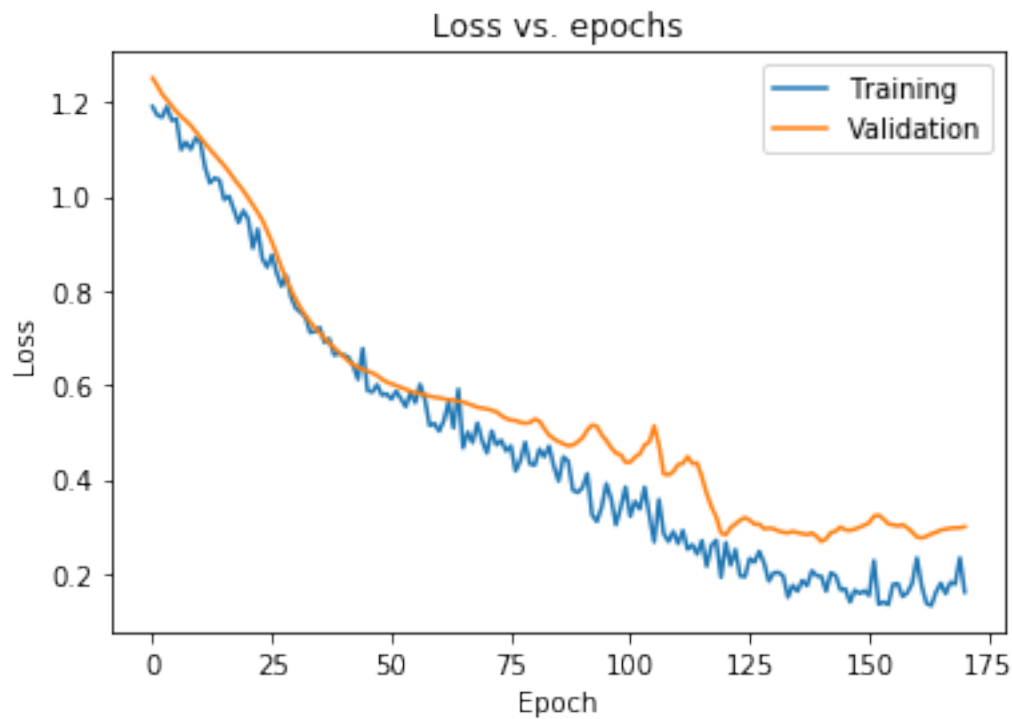
```

In [43]: 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()

```



```
In [44]: 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()
```



```
In [45]: # 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: 0.115

Test accuracy: 100.00%

Congratulations for completing this programming assignment! In the next week of the course we will learn how to save and load pre-trained models.