lab-solution

November 27, 2023

1 Assignment: Neural Networks for Music Classification

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TODO: Edit this cell to fill in your NYU Net ID and your name:

- **Net ID**:
- **Name**:

Note: This experiment is designed to run on a Google Colab **GPU** runtime. You should use a GPU runtime on Colab to work on this assignment. You should not run it outside of Google Colab. However, if you have been using Colab GPU runtimes a lot, you may be alerted that you have exhausted the "free" compute units allocated to you by Google Colab. If that happens, you do not have to purchase compute units - use a CPU runtime instead, and modify the experiment as instructed for CPU-only runtime.

In this assignment, we will look at an audio classification problem. Given a sample of music, we want to determine which instrument (e.g. trumpet, violin, piano) is playing.

This assignment is closely based on one by Sundeep Rangan, from his IntroML GitHub repo.

[ ]:
```
import tensorflow as tf
import numpy as np
import matplotlib
import matplotlib.pyplot as plt
import seaborn as sns
import time
%matplotlib inline
```

1.1 Audio Feature Extraction with Librosa

The key to audio classification is to extract the correct features. The `librosa` package in python has a rich set of methods for extracting the features of audio samples commonly used in machine learning tasks, such as speech recognition and sound classification.

[ ]:
```
import librosa
import librosa.display
import librosa.feature
```

In this lab, we will use a set of music samples from the website:

http://theremin.music.uiowa.edu

This website has a great set of samples for audio processing.

We will use the `wget` command to retrieve one file to our Google Colab storage area. (We can run `wget` and many other basic Linux commands in Colab by prefixing them with a `!` or `%`.)

[ ]:
```
!wget "http://theremin.music.uiowa.edu/sound files/MIS/Woodwinds/
↪sopranosaxophone/SopSax.Vib.pp.C6Eb6.aiff"
```

```
--2023-11-26 05:56:37--  http://theremin.music.uiowa.edu/sound%20files/MIS/Woodw
inds/sopranosaxophone/SopSax.Vib.pp.C6Eb6.aiff
Resolving theremin.music.uiowa.edu (theremin.music.uiowa.edu)… 128.255.102.97,
2620:0:e50:680c::4e
Connecting to theremin.music.uiowa.edu
(theremin.music.uiowa.edu)|128.255.102.97|:80… connected.
HTTP request sent, awaiting response… 301 Moved Permanently
Location: https://theremin.music.uiowa.edu/sound%20files/MIS/Woodwinds/sopranosa
xophone/SopSax.Vib.pp.C6Eb6.aiff [following]
--2023-11-26 05:56:38--  https://theremin.music.uiowa.edu/sound%20files/MIS/Wood
winds/sopranosaxophone/SopSax.Vib.pp.C6Eb6.aiff
Connecting to theremin.music.uiowa.edu
(theremin.music.uiowa.edu)|128.255.102.97|:443… connected.
HTTP request sent, awaiting response… 200 OK
Length: 1418242 (1.4M) [audio/aiff]
Saving to: ‘SopSax.Vib.pp.C6Eb6.aiff.2’

SopSax.Vib.pp.C6Eb6 100%[===================>]   1.35M   823KB/s    in 1.7s

2023-11-26 05:56:40 (823 KB/s) - ‘SopSax.Vib.pp.C6Eb6.aiff.2’ saved
[1418242/1418242]
```

Now, if you click on the small folder icon on the far left of the Colab interface, you can see the files in your Colab storage. You should see the "SopSax.Vib.pp.C6Eb6.aiff" file appear there.

In order to listen to this file, we'll first convert it into the `wav` format. Again, we'll use a magic command to run a basic command-line utility: `ffmpeg`, a powerful tool for working with audio and video files.

[ ]:
```
aiff_file = 'SopSax.Vib.pp.C6Eb6.aiff'
wav_file = 'SopSax.Vib.pp.C6Eb6.wav'

!ffmpeg -y -i $aiff_file $wav_file
```

```
ffmpeg version 4.4.2-0ubuntu0.22.04.1 Copyright (c) 2000-2021 the FFmpeg
developers
  built with gcc 11 (Ubuntu 11.2.0-19ubuntu1)
  configuration: --prefix=/usr --extra-version=0ubuntu0.22.04.1
--toolchain=hardened --libdir=/usr/lib/x86_64-linux-gnu
```

```
--incdir=/usr/include/x86_64-linux-gnu --arch=amd64 --enable-gpl --disable-
stripping --enable-gnutls --enable-ladspa --enable-libaom --enable-libass
--enable-libbluray --enable-libbs2b --enable-libcaca --enable-libcdio --enable-
libcodec2 --enable-libdav1d --enable-libflite --enable-libfontconfig --enable-
libfreetype --enable-libfribidi --enable-libgme --enable-libgsm --enable-libjack
--enable-libmp3lame --enable-libmysofa --enable-libopenjpeg --enable-libopenmpt
--enable-libopus --enable-libpulse --enable-librabbitmq --enable-librubberband
--enable-libshine --enable-libsnappy --enable-libsoxr --enable-libspeex
--enable-libsrt --enable-libssh --enable-libtheora --enable-libtwolame --enable-
libvidstab --enable-libvorbis --enable-libvpx --enable-libwebp --enable-libx265
--enable-libxml2 --enable-libxvid --enable-libzimg --enable-libzmq --enable-
libzvbi --enable-lv2 --enable-omx --enable-openal --enable-opencl --enable-
opengl --enable-sdl2 --enable-pocketsphinx --enable-librsvg --enable-libmfx
--enable-libdc1394 --enable-libdrm --enable-libiec61883 --enable-chromaprint
--enable-frei0r --enable-libx264 --enable-shared
  libavutil      56. 70.100 / 56. 70.100
  libavcodec     58.134.100 / 58.134.100
  libavformat    58. 76.100 / 58. 76.100
  libavdevice    58. 13.100 / 58. 13.100
  libavfilter     7.110.100 /  7.110.100
  libswscale      5.  9.100 /  5.  9.100
  libswresample   3.  9.100 /  3.  9.100
  libpostproc    55.  9.100 / 55.  9.100
Guessed Channel Layout for Input Stream #0.0 : mono

Input #0, aiff, from 'SopSax.Vib.pp.C6Eb6.aiff':
  Duration: 00:00:16.07, start: 0.000000, bitrate: 705 kb/s
  Stream #0:0: Audio: pcm_s16be, 44100 Hz, mono, s16, 705 kb/s
Stream mapping:
  Stream #0:0 -> #0:0 (pcm_s16be (native) -> pcm_s16le (native))
Press [q] to stop, [?] for help
Output #0, wav, to 'SopSax.Vib.pp.C6Eb6.wav':
  Metadata:
    ISFT            : Lavf58.76.100
  Stream #0:0: Audio: pcm_s16le ([1][0][0][0] / 0x0001), 44100 Hz, mono, s16,
705 kb/s
    Metadata:
      encoder         : Lavc58.134.100 pcm_s16le
size=    1385kB time=00:00:16.06 bitrate= 705.9kbits/s speed=1.55e+03x
video:0kB audio:1384kB subtitle:0kB other streams:0kB global headers:0kB muxing
overhead: 0.005502%
```

Now, we can play the file directly from Colab. If you press the button, you will hear a soprano saxaphone (with vibrato) playing four notes (C, C#, D, Eb).

[ ]:
```
import IPython.display as ipd
ipd.Audio(wav_file)
```

[ ]: <IPython.lib.display.Audio object>

Next, use `librosa` command `librosa.load` to read the audio file with filename `audio_file` and get the samples `y` and sample rate `sr`.

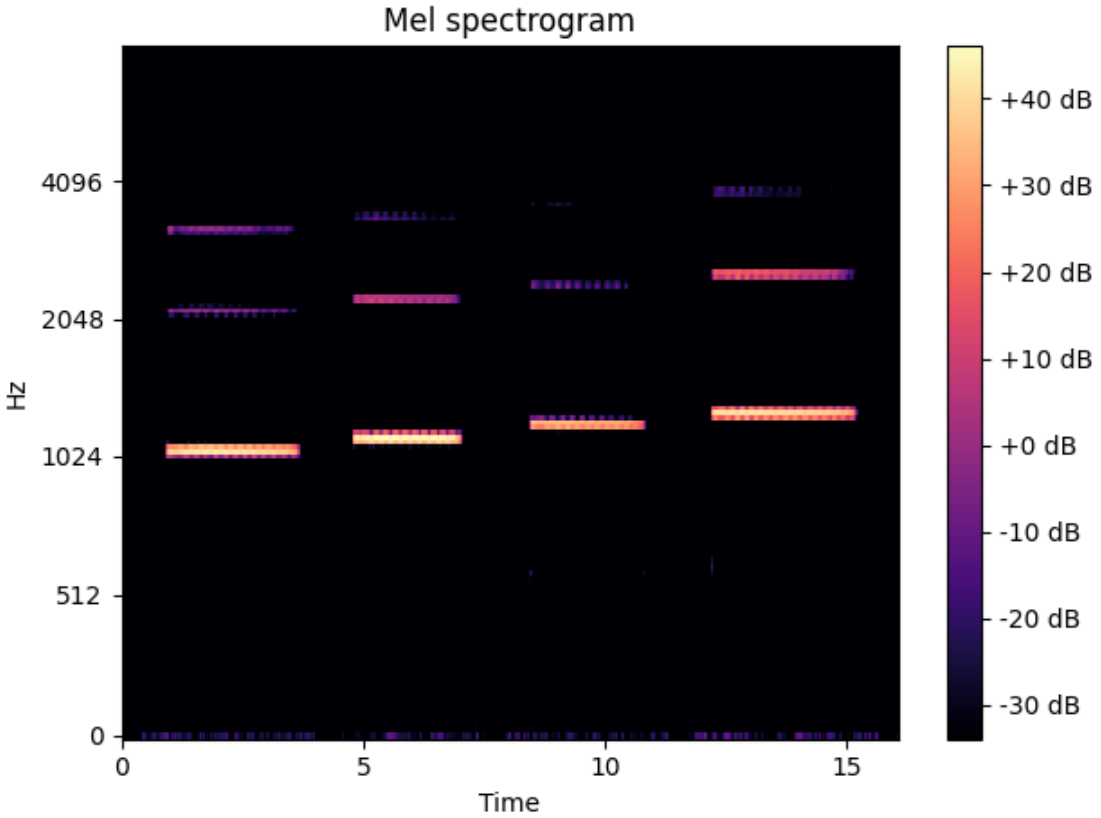
[ ]:
```
y, sr = librosa.load(aiff_file)
```

Feature engineering from audio files is an entire subject in its own right. A commonly used set of features are called the Mel Frequency Cepstral Coefficients (MFCCs). These are derived from the so-called mel spectrogram, which is something like a regular spectrogram, but the power and frequency are represented in log scale, which more naturally aligns with human perceptual processing.

You can run the code below to display the mel spectrogram from the audio sample.

You can easily see the four notes played in the audio track. You also see the 'harmonics' of each notes, which are other tones at integer multiples of the fundamental frequency of each note.

[ ]:
```
S = librosa.feature.melspectrogram(y=y, sr=sr, n_mels=128, fmax=8000)
librosa.display.specshow(librosa.amplitude_to_db(S),
                         y_axis='mel', fmax=8000, x_axis='time')
plt.colorbar(format='%+2.0f dB')
plt.title('Mel spectrogram')
plt.tight_layout()
```



1.2 Downloading the Data

Using the MFCC features described above, Prof. Juan Bello at NYU Steinhardt and his former PhD student Eric Humphrey have created a complete data set that can used for instrument classification. Essentially, they collected a number of data files from the website above. For each audio file, the segmented the track into notes and then extracted 120 MFCCs for each note. The goal is to recognize the instrument from the 120 MFCCs. The process of feature extraction is quite involved. So, we will just use their processed data.

To retrieve their data, visit

https://github.com/marl/dl4mir-tutorial/tree/master

and note the password listed on that page. Click on the link for "Instrument Dataset", enter the password, click on `instrument_dataset` to open the folder, and download it. (You can "direct download" straight from this site, you don't need a Dropbox account.) Depending on your laptop OS and on how you download the data, you may need to "unzip" or otherwise extract the four `.npy` files from an archive.

Then, upload the files to your Google Colab storage: click on the folder icon on the left to see your storage, if it isn't already open, and then click on "Upload".

Wait until *all* uploads have completed and the orange "circles" indicating uploads in progress are *gone*. (The training data especially will take some time to upload.)

Then, load the files with:

[ ]:
```
Xtr = np.load('uiowa_train_data.npy')
ytr = np.load('uiowa_train_labels.npy')
Xts = np.load('uiowa_test_data.npy')
yts = np.load('uiowa_test_labels.npy')
```

Examine the data you have just loaded in:

- How many training samples are there?
- How many test samples are there?
- What is the number of features for each sample?
- How many classes (i.e. instruments) are there?

Write some code to find these values and print them.

[ ]:
```
len(np.unique(ytr))
```

[ ]:
```
10
```

[ ]:
```
# TODO -  get basic details of the data
# compute these values from the data, don't hard-code them
n_tr    = Xtr.shape[0]
n_ts    = Xts.shape[0]
n_feat  = Xtr.shape[1]
```

```
n_class = len(np.unique(ytr))
```

[ ]:
```
# now print those details
print("Num training= %d" % n_tr)
print("Num test=     %d" % n_ts)
print("Num features= %d" % n_feat)
print("Num classes=  %d" % n_class)
```

```
Num training= 66247
Num test=     14904
Num features= 120
Num classes=  10
```

Then, standardize the training and test data, `Xtr` and `Xts`, by removing the mean of each feature and scaling to unit variance.

You can do this manually, or using `sklearn`'s StandardScaler. (For an example showing how to use a `StandardScaler`, you can refer to the notebook on regularization.)

Although you will scale both the training and test data, you should make sure that both are scaled according to the mean and variance statistics from the *training data only*.

Standardizing the input data can make the gradient descent work better, by making the loss function "easier" to descend.

[ ]:
```
# TODO - Standardize the training and test data
from sklearn.preprocessing import StandardScaler

scaler = StandardScaler()
Xtr_scale = scaler.fit_transform(Xtr)
Xts_scale = scaler.transform(Xts)
```

1.3 Building a Neural Network Classifier

Following the example in the demos you have seen, clear the keras session. Then, create a neural network `model` with:

- `nh=256` hidden units in a single dense hidden layer
- `sigmoid` activation at hidden units
- select the input and output shapes, and output activation, according to the problem requirements. Use the variables you defined earlier (`n_tr`, `n_ts`, `n_feat`, `n_class`) as applicable, rather than hard-coding numbers.

Print the model summary.

[ ]:
```
from tensorflow.keras.models import Model, Sequential
from tensorflow.keras.layers import Dense, Activation
from tensorflow.keras import optimizers
from tensorflow.keras import callbacks
from tensorflow.keras.optimizers import Adam
import tensorflow.keras.backend as K
```

[ ]:
```
# TODO - construct the model
nh = 256

# Initialize the model
model = Sequential()

# Add a dense hidden layer
model.add(Dense(nh, input_shape=(n_feat,), activation='sigmoid'))

# Add the output layer
model.add(Dense(n_class, activation='softmax'))
```

[ ]:
```
# show the model summary
model.summary()
```

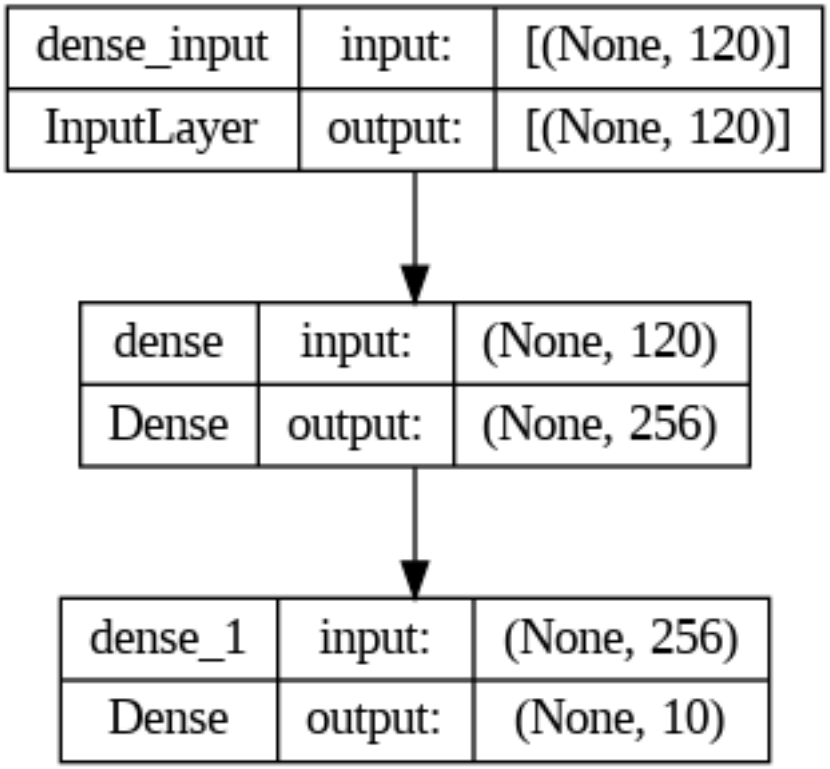
```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 dense (Dense)               (None, 256)               30976

 dense_1 (Dense)             (None, 10)                2570

=================================================================
Total params: 33546 (131.04 KB)
Trainable params: 33546 (131.04 KB)
Non-trainable params: 0 (0.00 Byte)
_________________________________________________________________
```

[ ]:
```
# you can also visualize the model with
tf.keras.utils.plot_model(model, show_shapes=True)
```

[ ]:



Create an optimizer and compile the model. Select the appropriate loss function for this multi-class classification problem, and use an accuracy metric. For the optimizer, use the Adam optimizer with a learning rate of 0.001

[ ]:
```
# TODO - create optimizer and compile the model
opt = Adam(learning_rate=0.001)
model.compile(optimizer=Adam(learning_rate=0.001),
              loss='sparse_categorical_crossentropy',
              metrics=['accuracy'])
```

Fit the model for 10 epochs using the scaled data for both training and validation, and save the training history in 'hist.

Use the `validation_data` option to pass the *test* data. (This is OK because we are not going to use this data as part of the training process, such as for early stopping - we're just going to compute the accuracy on the data so that we can see how training and test loss changes as the model is trained.)

Use a batch size of 128. Your final accuracy should be greater than 99%.

[ ]:
```
# TODO - fit model and save training history
hist = model.fit(Xtr_scale, ytr,
                 epochs=10,
                 batch_size=128,
```

```
                    validation_data=(Xts_scale, yts))
```

```
Epoch 1/10
518/518 [==============================] - 7s 5ms/step - loss: 0.4215 -
accuracy: 0.8831 - val_loss: 0.2266 - val_accuracy: 0.9383
Epoch 2/10
518/518 [==============================] - 3s 5ms/step - loss: 0.1259 -
accuracy: 0.9693 - val_loss: 0.1229 - val_accuracy: 0.9632
Epoch 3/10
518/518 [==============================] - 2s 4ms/step - loss: 0.0736 -
accuracy: 0.9827 - val_loss: 0.0746 - val_accuracy: 0.9828
Epoch 4/10
518/518 [==============================] - 2s 4ms/step - loss: 0.0517 -
accuracy: 0.9877 - val_loss: 0.0555 - val_accuracy: 0.9856
Epoch 5/10
518/518 [==============================] - 2s 4ms/step - loss: 0.0391 -
accuracy: 0.9903 - val_loss: 0.0584 - val_accuracy: 0.9807
Epoch 6/10
518/518 [==============================] - 2s 4ms/step - loss: 0.0315 -
accuracy: 0.9920 - val_loss: 0.0416 - val_accuracy: 0.9891
Epoch 7/10
518/518 [==============================] - 2s 3ms/step - loss: 0.0255 -
accuracy: 0.9935 - val_loss: 0.0360 - val_accuracy: 0.9899
Epoch 8/10
518/518 [==============================] - 2s 5ms/step - loss: 0.0213 -
accuracy: 0.9946 - val_loss: 0.0330 - val_accuracy: 0.9903
Epoch 9/10
518/518 [==============================] - 2s 5ms/step - loss: 0.0180 -
accuracy: 0.9955 - val_loss: 0.0286 - val_accuracy: 0.9914
Epoch 10/10
518/518 [==============================] - 2s 3ms/step - loss: 0.0156 -
accuracy: 0.9961 - val_loss: 0.0303 - val_accuracy: 0.9899
```

Plot the training and validation accuracy saved in `hist.history` dictionary, on the same plot. This gives one accuracy value per epoch. You should see that the validation accuracy saturates around 99%. After that it may "bounce around" a little due to the noise in the stochastic mini-batch gradient descent.

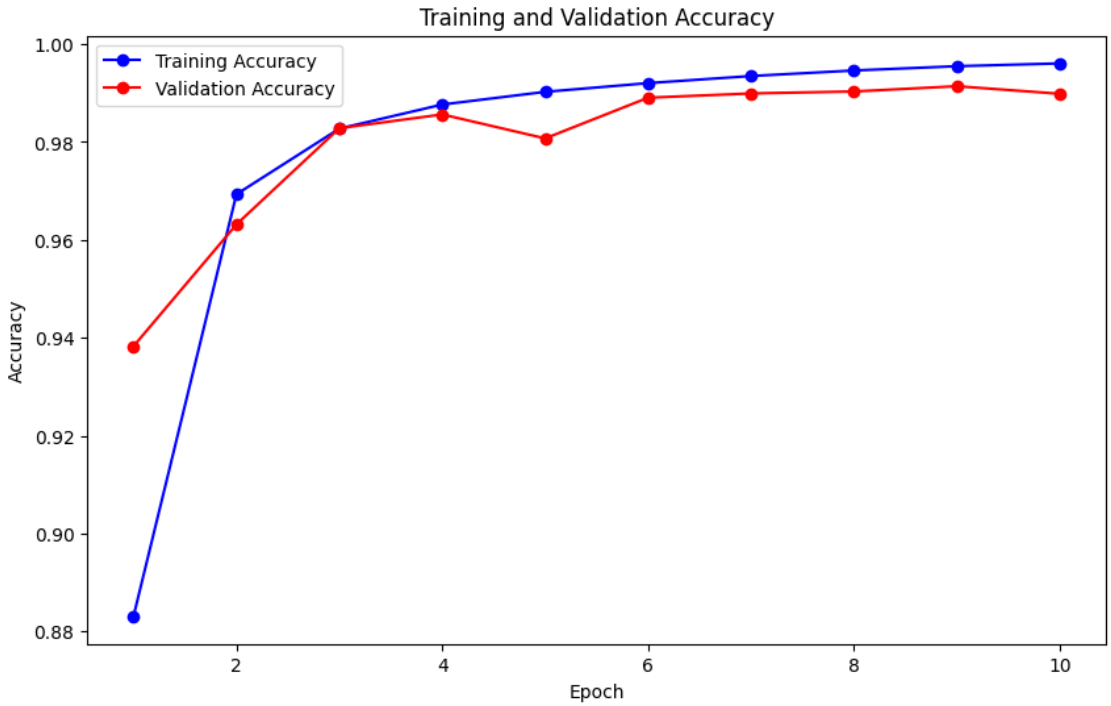
Make sure to label each axis, and each series (training vs. validation/test).

[ ]:
```
# TODO - plot the training and validation accuracy in one plot
train_acc = hist.history['accuracy']
val_acc = hist.history['val_accuracy']
epochs = range(1, len(train_acc) + 1)

# Plotting training and validation accuracy
plt.figure(figsize=(10, 6))
plt.plot(epochs, train_acc, 'bo-', label='Training Accuracy')
```

```
plt.plot(epochs, val_acc, 'ro-', label='Validation Accuracy')
plt.title('Training and Validation Accuracy')
plt.xlabel('Epoch')
plt.ylabel('Accuracy')
plt.legend()

plt.show()
```



Plot the training and validation loss values saved in the `hist.history` dictionary, on the same plot. You should see that the training loss is steadily decreasing. Use the `semilogy` plot so that the y-axis is log scale.

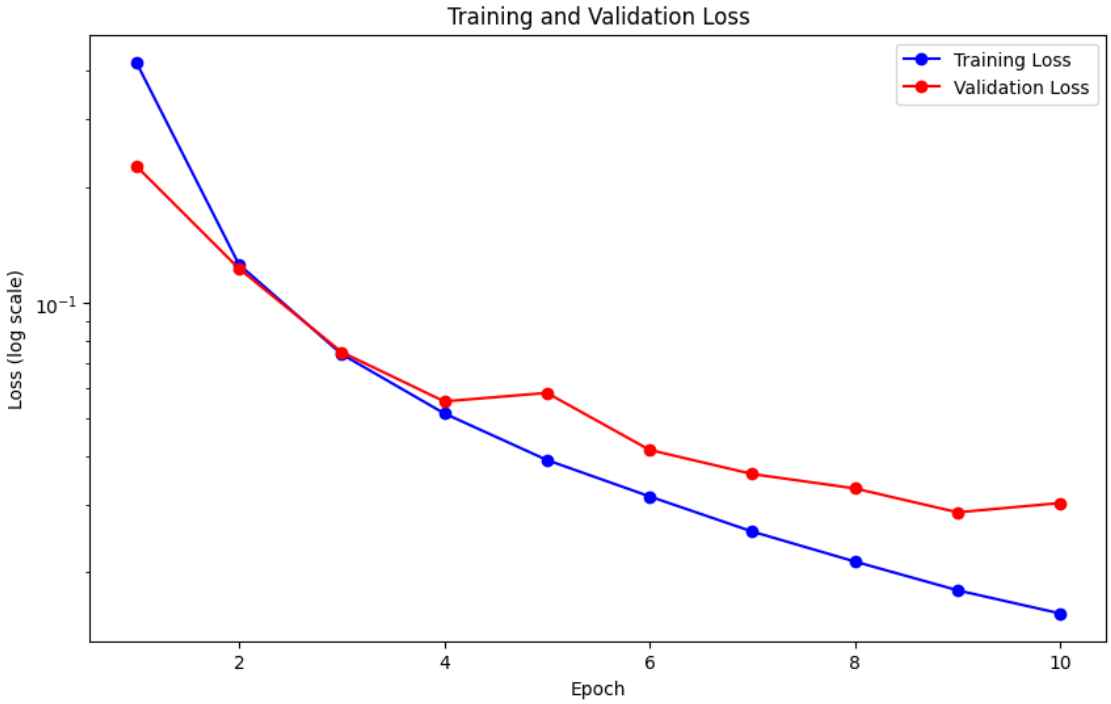
Make sure to label each axis, and each series (training vs. validation/test).

[ ]:
```
# TODO - plot the training and validation loss in one plot
train_loss = hist.history['loss']
val_loss = hist.history['val_loss']
epochs = range(1, len(train_loss) + 1)

# Plotting training and validation loss with a logarithmic scale for the y-axis
plt.figure(figsize=(10, 6))
plt.semilogy(epochs, train_loss, 'bo-', label='Training Loss')
plt.semilogy(epochs, val_loss, 'ro-', label='Validation Loss')
plt.title('Training and Validation Loss')
plt.xlabel('Epoch')
```

```
plt.ylabel('Loss (log scale)')
plt.legend()

plt.show()
```



1.4 Varying training hyperparameters

One challenge in training neural networks is the selection of the **training hyperparameters**, for example:

- learning rate
- learning rate decay schedule
- batch size
- optimizer-specific hyperparameters (for example, the `Adam` optimizer we have been using has `beta_1`, `beta_2`, and `epsilon` hyperparameters)

and this challenge is further complicated by the fact that all of these training hyperparameters interact with one another.

(Note: **training hyperparameters** are distinct from **model hyperparameters**, like the number of hidden units or layers.)

Sometimes, the choice of training hyperparameters affects whether or not the model will find an acceptable set of weights at all - i.e. whether the optimizer converges.

It's more often the case, though, that **for a given model**, we can arrive at a set of weights that have similar performance in many different ways, i.e. with different combinations of optimizer

hyperparameters. However, the *training cost** in both **time** and **energy** will be very much affected.

In this section, we will explore these further.

Repeat your model preparation and fitting code, but try four learning rates as shown in the vector `rates`. In each iteration of the loop:

- use `K.clear_session()` to free up memory from models that are no longer in scope. (Note that this does not affect models that are still "in scope"!)
- construct the network
- select the optimizer. Use the Adam optimizer with the learning rate specific to this iteration
- train the model for 20 epochs (make sure you are training a *new* model in each iteration, and not *continuing* the training of a model created already outside the loop)
- save the history of training and validation accuracy and loss for this model

[ ]:
```
rates = [0.1, 0.01,0.001,0.0001]

# To store the history of each model
histories = {}

for lr in rates:
    # Clearing the Keras session to free up memory
    K.clear_session()

    # Construct the network
    model = Sequential()
    model.add(Dense(nh, input_shape=(n_feat,), activation='sigmoid'))
    model.add(Dense(n_class, activation='softmax'))

    # Select the optimizer with the current learning rate
    opt = Adam(learning_rate=lr)

    # Compile the model
    model.compile(optimizer=opt, loss='sparse_categorical_crossentropy',␣
 ↪metrics=['accuracy'])

    # Train the model
    history = model.fit(Xtr_scale, ytr, epochs=20, batch_size=128,␣
 ↪validation_data=(Xts_scale, yts))

    # Save the history
    histories[lr] = history
```

```
Epoch 1/20
518/518 [==============================] - 3s 4ms/step - loss: 0.2621 -
accuracy: 0.9418 - val_loss: 0.1108 - val_accuracy: 0.9689
Epoch 2/20
518/518 [==============================] - 2s 4ms/step - loss: 0.1830 -
```

```
accuracy: 0.9593 - val_loss: 0.2739 - val_accuracy: 0.9395
Epoch 3/20
518/518 [==============================] - 3s 6ms/step - loss: 0.2156 -
accuracy: 0.9589 - val_loss: 0.2552 - val_accuracy: 0.9544
Epoch 4/20
518/518 [==============================] - 2s 4ms/step - loss: 0.2043 -
accuracy: 0.9656 - val_loss: 0.9193 - val_accuracy: 0.9071
Epoch 5/20
518/518 [==============================] - 2s 4ms/step - loss: 0.2002 -
accuracy: 0.9708 - val_loss: 0.6550 - val_accuracy: 0.9181
Epoch 6/20
518/518 [==============================] - 2s 4ms/step - loss: 0.1863 -
accuracy: 0.9736 - val_loss: 0.4630 - val_accuracy: 0.9456
Epoch 7/20
518/518 [==============================] - 2s 3ms/step - loss: 0.2343 -
accuracy: 0.9719 - val_loss: 0.4181 - val_accuracy: 0.9567
Epoch 8/20
518/518 [==============================] - 2s 4ms/step - loss: 0.2051 -
accuracy: 0.9751 - val_loss: 0.7628 - val_accuracy: 0.9460
Epoch 9/20
518/518 [==============================] - 2s 5ms/step - loss: 0.1891 -
accuracy: 0.9787 - val_loss: 0.3098 - val_accuracy: 0.9699
Epoch 10/20
518/518 [==============================] - 2s 5ms/step - loss: 0.2061 -
accuracy: 0.9773 - val_loss: 0.6285 - val_accuracy: 0.9459
Epoch 11/20
518/518 [==============================] - 2s 3ms/step - loss: 0.2013 -
accuracy: 0.9774 - val_loss: 0.5638 - val_accuracy: 0.9624
Epoch 12/20
518/518 [==============================] - 2s 4ms/step - loss: 0.2509 -
accuracy: 0.9699 - val_loss: 0.4867 - val_accuracy: 0.9658
Epoch 13/20
518/518 [==============================] - 2s 4ms/step - loss: 0.2248 -
accuracy: 0.9774 - val_loss: 0.3608 - val_accuracy: 0.9635
Epoch 14/20
518/518 [==============================] - 2s 3ms/step - loss: 0.2311 -
accuracy: 0.9745 - val_loss: 0.7746 - val_accuracy: 0.9197
Epoch 15/20
518/518 [==============================] - 2s 3ms/step - loss: 0.2138 -
accuracy: 0.9808 - val_loss: 0.5659 - val_accuracy: 0.9685
Epoch 16/20
518/518 [==============================] - 2s 4ms/step - loss: 0.1965 -
accuracy: 0.9813 - val_loss: 0.6424 - val_accuracy: 0.9679
Epoch 17/20
518/518 [==============================] - 2s 5ms/step - loss: 0.2097 -
accuracy: 0.9811 - val_loss: 0.6283 - val_accuracy: 0.9597
Epoch 18/20
518/518 [==============================] - 2s 4ms/step - loss: 0.2028 -
```

```
accuracy: 0.9801 - val_loss: 1.1549 - val_accuracy: 0.9358
Epoch 19/20
518/518 [==============================] - 2s 3ms/step - loss: 0.2652 -
accuracy: 0.9771 - val_loss: 0.9539 - val_accuracy: 0.9452
Epoch 20/20
518/518 [==============================] - 2s 3ms/step - loss: 0.2119 -
accuracy: 0.9809 - val_loss: 0.6661 - val_accuracy: 0.9617
Epoch 1/20
518/518 [==============================] - 3s 4ms/step - loss: 0.1119 -
accuracy: 0.9657 - val_loss: 0.0496 - val_accuracy: 0.9831
Epoch 2/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0315 -
accuracy: 0.9898 - val_loss: 0.0565 - val_accuracy: 0.9795
Epoch 3/20
518/518 [==============================] - 3s 6ms/step - loss: 0.0212 -
accuracy: 0.9932 - val_loss: 0.1426 - val_accuracy: 0.9579
Epoch 4/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0181 -
accuracy: 0.9941 - val_loss: 0.0348 - val_accuracy: 0.9879
Epoch 5/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0147 -
accuracy: 0.9953 - val_loss: 0.0324 - val_accuracy: 0.9896
Epoch 6/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0131 -
accuracy: 0.9954 - val_loss: 0.0386 - val_accuracy: 0.9881
Epoch 7/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0125 -
accuracy: 0.9959 - val_loss: 0.0574 - val_accuracy: 0.9830
Epoch 8/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0121 -
accuracy: 0.9962 - val_loss: 0.0453 - val_accuracy: 0.9856
Epoch 9/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0130 -
accuracy: 0.9958 - val_loss: 0.0257 - val_accuracy: 0.9917
Epoch 10/20
518/518 [==============================] - 2s 5ms/step - loss: 0.0105 -
accuracy: 0.9969 - val_loss: 0.0314 - val_accuracy: 0.9905
Epoch 11/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0078 -
accuracy: 0.9977 - val_loss: 0.0336 - val_accuracy: 0.9896
Epoch 12/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0084 -
accuracy: 0.9973 - val_loss: 0.0404 - val_accuracy: 0.9889
Epoch 13/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0081 -
accuracy: 0.9974 - val_loss: 0.0339 - val_accuracy: 0.9903
Epoch 14/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0104 -
```

```
accuracy: 0.9968 - val_loss: 0.0619 - val_accuracy: 0.9856
Epoch 15/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0099 -
accuracy: 0.9969 - val_loss: 0.0388 - val_accuracy: 0.9897
Epoch 16/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0084 -
accuracy: 0.9972 - val_loss: 0.0512 - val_accuracy: 0.9868
Epoch 17/20
518/518 [==============================] - 3s 5ms/step - loss: 0.0076 -
accuracy: 0.9975 - val_loss: 0.0561 - val_accuracy: 0.9855
Epoch 18/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0062 -
accuracy: 0.9981 - val_loss: 0.0775 - val_accuracy: 0.9815
Epoch 19/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0064 -
accuracy: 0.9983 - val_loss: 0.0371 - val_accuracy: 0.9915
Epoch 20/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0075 -
accuracy: 0.9977 - val_loss: 0.0719 - val_accuracy: 0.9842
Epoch 1/20
518/518 [==============================] - 2s 4ms/step - loss: 0.4077 -
accuracy: 0.8893 - val_loss: 0.2195 - val_accuracy: 0.9393
Epoch 2/20
518/518 [==============================] - 2s 3ms/step - loss: 0.1210 -
accuracy: 0.9709 - val_loss: 0.1124 - val_accuracy: 0.9721
Epoch 3/20
518/518 [==============================] - 3s 6ms/step - loss: 0.0718 -
accuracy: 0.9832 - val_loss: 0.0720 - val_accuracy: 0.9838
Epoch 4/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0504 -
accuracy: 0.9880 - val_loss: 0.0574 - val_accuracy: 0.9875
Epoch 5/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0389 -
accuracy: 0.9902 - val_loss: 0.0458 - val_accuracy: 0.9862
Epoch 6/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0311 -
accuracy: 0.9924 - val_loss: 0.0412 - val_accuracy: 0.9893
Epoch 7/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0257 -
accuracy: 0.9934 - val_loss: 0.0346 - val_accuracy: 0.9903
Epoch 8/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0214 -
accuracy: 0.9945 - val_loss: 0.0303 - val_accuracy: 0.9909
Epoch 9/20
518/518 [==============================] - 2s 5ms/step - loss: 0.0181 -
accuracy: 0.9955 - val_loss: 0.0298 - val_accuracy: 0.9915
Epoch 10/20
518/518 [==============================] - 3s 5ms/step - loss: 0.0160 -
```

```
accuracy: 0.9959 - val_loss: 0.0276 - val_accuracy: 0.9911
Epoch 11/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0137 -
accuracy: 0.9966 - val_loss: 0.0237 - val_accuracy: 0.9928
Epoch 12/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0127 -
accuracy: 0.9966 - val_loss: 0.0234 - val_accuracy: 0.9927
Epoch 13/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0109 -
accuracy: 0.9974 - val_loss: 0.0313 - val_accuracy: 0.9896
Epoch 14/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0099 -
accuracy: 0.9974 - val_loss: 0.0203 - val_accuracy: 0.9930
Epoch 15/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0095 -
accuracy: 0.9976 - val_loss: 0.0230 - val_accuracy: 0.9923
Epoch 16/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0082 -
accuracy: 0.9978 - val_loss: 0.0261 - val_accuracy: 0.9902
Epoch 17/20
518/518 [==============================] - 2s 5ms/step - loss: 0.0077 -
accuracy: 0.9981 - val_loss: 0.0224 - val_accuracy: 0.9922
Epoch 18/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0068 -
accuracy: 0.9984 - val_loss: 0.0225 - val_accuracy: 0.9926
Epoch 19/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0068 -
accuracy: 0.9982 - val_loss: 0.0242 - val_accuracy: 0.9905
Epoch 20/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0061 -
accuracy: 0.9982 - val_loss: 0.0231 - val_accuracy: 0.9915
Epoch 1/20
518/518 [==============================] - 3s 4ms/step - loss: 1.2706 -
accuracy: 0.6046 - val_loss: 0.9631 - val_accuracy: 0.6389
Epoch 2/20
518/518 [==============================] - 2s 3ms/step - loss: 0.6505 -
accuracy: 0.8103 - val_loss: 0.6626 - val_accuracy: 0.7785
Epoch 3/20
518/518 [==============================] - 3s 5ms/step - loss: 0.4544 -
accuracy: 0.8861 - val_loss: 0.5051 - val_accuracy: 0.8539
Epoch 4/20
518/518 [==============================] - 2s 5ms/step - loss: 0.3525 -
accuracy: 0.9193 - val_loss: 0.4126 - val_accuracy: 0.8829
Epoch 5/20
518/518 [==============================] - 2s 4ms/step - loss: 0.2888 -
accuracy: 0.9352 - val_loss: 0.3540 - val_accuracy: 0.9013
Epoch 6/20
518/518 [==============================] - 2s 4ms/step - loss: 0.2437 -
```

```
accuracy: 0.9459 - val_loss: 0.3033 - val_accuracy: 0.9148
Epoch 7/20
518/518 [==============================] - 2s 3ms/step - loss: 0.2094 -
accuracy: 0.9528 - val_loss: 0.2563 - val_accuracy: 0.9279
Epoch 8/20
518/518 [==============================] - 2s 3ms/step - loss: 0.1820 -
accuracy: 0.9581 - val_loss: 0.2209 - val_accuracy: 0.9426
Epoch 9/20
518/518 [==============================] - 2s 4ms/step - loss: 0.1596 -
accuracy: 0.9632 - val_loss: 0.2013 - val_accuracy: 0.9422
Epoch 10/20
518/518 [==============================] - 2s 4ms/step - loss: 0.1409 -
accuracy: 0.9668 - val_loss: 0.1743 - val_accuracy: 0.9526
Epoch 11/20
518/518 [==============================] - 2s 5ms/step - loss: 0.1252 -
accuracy: 0.9702 - val_loss: 0.1583 - val_accuracy: 0.9544
Epoch 12/20
518/518 [==============================] - 2s 3ms/step - loss: 0.1121 -
accuracy: 0.9735 - val_loss: 0.1407 - val_accuracy: 0.9610
Epoch 13/20
518/518 [==============================] - 2s 3ms/step - loss: 0.1010 -
accuracy: 0.9764 - val_loss: 0.1226 - val_accuracy: 0.9689
Epoch 14/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0916 -
accuracy: 0.9785 - val_loss: 0.1136 - val_accuracy: 0.9695
Epoch 15/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0836 -
accuracy: 0.9805 - val_loss: 0.1019 - val_accuracy: 0.9735
Epoch 16/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0769 -
accuracy: 0.9822 - val_loss: 0.0933 - val_accuracy: 0.9778
Epoch 17/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0709 -
accuracy: 0.9837 - val_loss: 0.0903 - val_accuracy: 0.9764
Epoch 18/20
518/518 [==============================] - 3s 5ms/step - loss: 0.0658 -
accuracy: 0.9848 - val_loss: 0.0806 - val_accuracy: 0.9818
Epoch 19/20
518/518 [==============================] - 2s 3ms/step - loss: 0.0614 -
accuracy: 0.9860 - val_loss: 0.0791 - val_accuracy: 0.9795
Epoch 20/20
518/518 [==============================] - 2s 4ms/step - loss: 0.0575 -
accuracy: 0.9866 - val_loss: 0.0717 - val_accuracy: 0.9831
```

Plot the training loss vs. the epoch number for all of the learning rates on one graph (use `semilogy` again). You should see that the lower learning rates are more stable, but converge slower, while with a learning rate that is too high, the gradient descent may fail to move towards weights that decrease the loss function.

Make sure to label each axis, and each series.

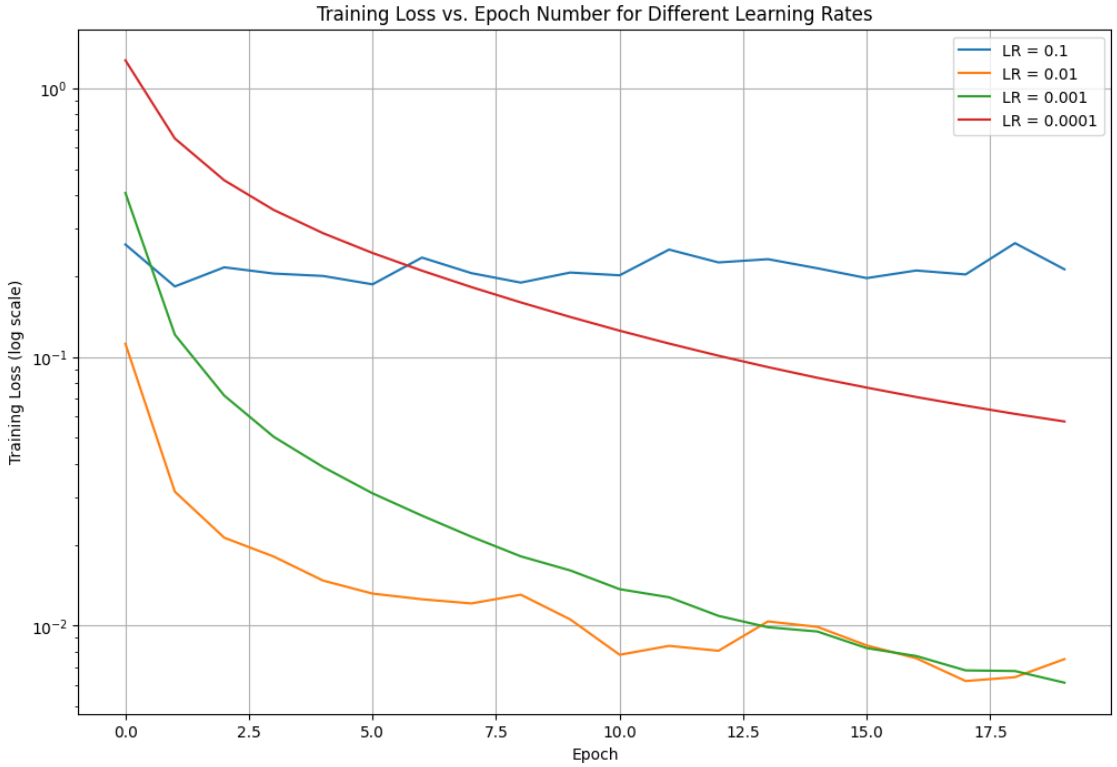
Comment on the results. Given that all other optimizer hyperparameters are fixed, what is the effect of varying learning rate on the training process?

A learning rate that is too high can lead to instability and prevent the model from converging to a good solution. A learning rate that is too low can lead to slow convergence, requiring more epochs and hence more computational resources and time. An appropriately chosen learning rate provides a balance between the speed of convergence and the stability of the training process.

[ ]:
```
# TODO - plot showing the training process for different learning rates
plt.figure(figsize=(12, 8))

for lr, history in histories.items():
    plt.semilogy(history.epoch, history.history['loss'], label=f'LR = {lr}')

plt.title('Training Loss vs. Epoch Number for Different Learning Rates')
plt.xlabel('Epoch')
plt.ylabel('Training Loss (log scale)')
plt.legend()
plt.grid(True)
plt.show()
```



In the previous example, we trained each model for a fixed number of epochs. Now, we'll explore

what happens when we vary the training hyperparameters, but train each model to the same validation **accuracy target**. We will consider:

- how much *time* it takes to achieve that accuracy target ("time to accuracy")
- how much *energy* it takes to achieve that accuracy target ("energy to accuracy")
- and the *test accuracy* for the model, given that it is trained to the specified validation accuracy target

Energy consumption To do this, first we will need some way to measure the energy used to train the model. We will use Zeus, a Python package developed by researchers at the University of Michigan, to measure the GPU energy consumption.

Note: if you are running this experiment in a CPU-only runtime, you should skip this section on energy comsumption. Continue with the " `TrainToAccuracy` callback" section.

First, install the package:

[ ]:
```
!pip install zeus-ml
```

```
Collecting zeus-ml
  Downloading zeus_ml-0.8.0-py3-none-any.whl (181 kB)
                             181.9/181.9

kB 3.9 MB/s eta 0:00:00
Requirement already satisfied: numpy in /usr/local/lib/python3.10/dist-
packages (from zeus-ml) (1.23.5)
Requirement already satisfied: pandas in /usr/local/lib/python3.10/dist-packages
(from zeus-ml) (1.5.3)
Requirement already satisfied: scikit-learn in /usr/local/lib/python3.10/dist-
packages (from zeus-ml) (1.2.2)
Collecting nvidia-ml-py (from zeus-ml)
  Downloading nvidia_ml_py-12.535.133-py3-none-any.whl (37 kB)
Requirement already satisfied: pydantic<2 in /usr/local/lib/python3.10/dist-
packages (from zeus-ml) (1.10.13)
Requirement already satisfied: rich in /usr/local/lib/python3.10/dist-packages
(from zeus-ml) (13.7.0)
Collecting tyro (from zeus-ml)
  Downloading tyro-0.5.18-py3-none-any.whl (100 kB)
                             100.8/100.8

kB 14.9 MB/s eta 0:00:00
Collecting fastapi[all]==0.87.0 (from zeus-ml)
  Downloading fastapi-0.87.0-py3-none-any.whl (55 kB)
                             55.5/55.5 kB
7.7 MB/s eta 0:00:00
Collecting httpx (from zeus-ml)
  Downloading httpx-0.25.2-py3-none-any.whl (74 kB)
                             75.0/75.0 kB
11.0 MB/s eta 0:00:00
Collecting aiofiles==22.1.0 (from zeus-ml)
```

```
  Downloading aiofiles-22.1.0-py3-none-any.whl (14 kB)
Collecting lowtime (from zeus-ml)
  Downloading lowtime-0.1.0-py3-none-any.whl (31 kB)
Collecting starlette==0.21.0 (from fastapi[all]==0.87.0->zeus-ml)
  Downloading starlette-0.21.0-py3-none-any.whl (64 kB)
                             64.0/64.0 kB
9.6 MB/s eta 0:00:00
Collecting email-validator>=1.1.1 (from fastapi[all]==0.87.0->zeus-ml)
  Downloading email_validator-2.1.0.post1-py3-none-any.whl (32 kB)
Requirement already satisfied: itsdangerous>=1.1.0 in
/usr/local/lib/python3.10/dist-packages (from fastapi[all]==0.87.0->zeus-ml)
(2.1.2)
Requirement already satisfied: jinja2>=2.11.2 in /usr/local/lib/python3.10/dist-
packages (from fastapi[all]==0.87.0->zeus-ml) (3.1.2)
Collecting orjson>=3.2.1 (from fastapi[all]==0.87.0->zeus-ml)
  Downloading
orjson-3.9.10-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (138
kB)
                             138.7/138.7

kB 18.9 MB/s eta 0:00:00
Collecting python-multipart>=0.0.5 (from fastapi[all]==0.87.0->zeus-ml)
  Downloading python_multipart-0.0.6-py3-none-any.whl (45 kB)
                             45.7/45.7 kB
7.3 MB/s eta 0:00:00
Requirement already satisfied: pyyaml>=5.3.1 in
/usr/local/lib/python3.10/dist-packages (from fastapi[all]==0.87.0->zeus-ml)
(6.0.1)
Collecting ujson!=4.0.2,!=4.1.0,!=4.2.0,!=4.3.0,!=5.0.0,!=5.1.0,>=4.0.1 (from
fastapi[all]==0.87.0->zeus-ml)
  Downloading
ujson-5.8.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (53 kB)
                             53.9/53.9 kB
8.5 MB/s eta 0:00:00
Collecting uvicorn[standard]>=0.12.0 (from fastapi[all]==0.87.0->zeus-ml)
  Downloading uvicorn-0.24.0.post1-py3-none-any.whl (59 kB)
                             59.7/59.7 kB
6.6 MB/s eta 0:00:00
Requirement already satisfied: anyio<5,>=3.4.0 in
/usr/local/lib/python3.10/dist-packages (from
starlette==0.21.0->fastapi[all]==0.87.0->zeus-ml) (3.7.1)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-
packages (from httpx->zeus-ml) (2023.7.22)
Collecting httpcore==1.* (from httpx->zeus-ml)
  Downloading httpcore-1.0.2-py3-none-any.whl (76 kB)
                             76.9/76.9 kB
11.1 MB/s eta 0:00:00
Requirement already satisfied: idna in /usr/local/lib/python3.10/dist-
```

```
packages (from httpx->zeus-ml) (3.4)
Requirement already satisfied: sniffio in /usr/local/lib/python3.10/dist-
packages (from httpx->zeus-ml) (1.3.0)
Collecting h11<0.15,>=0.13 (from httpcore==1.*->httpx->zeus-ml)
  Downloading h11-0.14.0-py3-none-any.whl (58 kB)
                           58.3/58.3 kB
9.5 MB/s eta 0:00:00
Requirement already satisfied: typing-extensions>=4.2.0 in
/usr/local/lib/python3.10/dist-packages (from pydantic<2->zeus-ml) (4.5.0)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-
packages (from lowtime->zeus-ml) (3.7.1)
Requirement already satisfied: attrs in /usr/local/lib/python3.10/dist-packages
(from lowtime->zeus-ml) (23.1.0)
Requirement already satisfied: networkx in /usr/local/lib/python3.10/dist-
packages (from lowtime->zeus-ml) (3.2.1)
Requirement already satisfied: python-dateutil>=2.8.1 in
/usr/local/lib/python3.10/dist-packages (from pandas->zeus-ml) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-
packages (from pandas->zeus-ml) (2023.3.post1)
Requirement already satisfied: markdown-it-py>=2.2.0 in
/usr/local/lib/python3.10/dist-packages (from rich->zeus-ml) (3.0.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in
/usr/local/lib/python3.10/dist-packages (from rich->zeus-ml) (2.16.1)
Requirement already satisfied: scipy>=1.3.2 in /usr/local/lib/python3.10/dist-
packages (from scikit-learn->zeus-ml) (1.11.3)
Requirement already satisfied: joblib>=1.1.1 in /usr/local/lib/python3.10/dist-
packages (from scikit-learn->zeus-ml) (1.3.2)
Requirement already satisfied: threadpoolctl>=2.0.0 in
/usr/local/lib/python3.10/dist-packages (from scikit-learn->zeus-ml) (3.2.0)
Collecting docstring-parser>=0.14.1 (from tyro->zeus-ml)
  Downloading docstring_parser-0.15-py3-none-any.whl (36 kB)
Collecting shtab>=1.5.6 (from tyro->zeus-ml)
  Downloading shtab-1.6.4-py3-none-any.whl (13 kB)
Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-
packages (from anyio<5,>=3.4.0->starlette==0.21.0->fastapi[all]==0.87.0->zeus-
ml) (1.1.3)
Collecting dnspython>=2.0.0 (from email-
validator>=1.1.1->fastapi[all]==0.87.0->zeus-ml)
  Downloading dnspython-2.4.2-py3-none-any.whl (300 kB)
                           300.4/300.4
kB 30.4 MB/s eta 0:00:00
Requirement already satisfied: MarkupSafe>=2.0 in
/usr/local/lib/python3.10/dist-packages (from
jinja2>=2.11.2->fastapi[all]==0.87.0->zeus-ml) (2.1.3)
Requirement already satisfied: mdurl~=0.1 in /usr/local/lib/python3.10/dist-
packages (from markdown-it-py>=2.2.0->rich->zeus-ml) (0.1.2)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-
```

```
packages (from python-dateutil>=2.8.1->pandas->zeus-ml) (1.16.0)
Requirement already satisfied: click>=7.0 in /usr/local/lib/python3.10/dist-
packages (from uvicorn[standard]>=0.12.0->fastapi[all]==0.87.0->zeus-ml) (8.1.7)
Collecting httptools>=0.5.0 (from
uvicorn[standard]>=0.12.0->fastapi[all]==0.87.0->zeus-ml)
  Downloading httptools-0.6.1-cp310-cp310-manylinux_2_5_x86_64.manylinux1_x86_64
.manylinux_2_17_x86_64.manylinux2014_x86_64.whl (341 kB)
                           341.4/341.4
kB 41.4 MB/s eta 0:00:00
Collecting python-dotenv>=0.13 (from
uvicorn[standard]>=0.12.0->fastapi[all]==0.87.0->zeus-ml)
  Downloading python_dotenv-1.0.0-py3-none-any.whl (19 kB)
Collecting uvloop!=0.15.0,!=0.15.1,>=0.14.0 (from
uvicorn[standard]>=0.12.0->fastapi[all]==0.87.0->zeus-ml)
  Downloading
uvloop-0.19.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (3.4
MB)
                           3.4/3.4 MB
65.9 MB/s eta 0:00:00
Collecting watchfiles>=0.13 (from
uvicorn[standard]>=0.12.0->fastapi[all]==0.87.0->zeus-ml)
  Downloading
watchfiles-0.21.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl
(1.3 MB)
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55.6 MB/s eta 0:00:00
Collecting websockets>=10.4 (from
uvicorn[standard]>=0.12.0->fastapi[all]==0.87.0->zeus-ml)
  Downloading websockets-12.0-cp310-cp310-manylinux_2_5_x86_64.manylinux1_x86_64
.manylinux_2_17_x86_64.manylinux2014_x86_64.whl (130 kB)
                           130.2/130.2
kB 17.7 MB/s eta 0:00:00
Requirement already satisfied: contourpy>=1.0.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->lowtime->zeus-ml)
(1.2.0)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-
packages (from matplotlib->lowtime->zeus-ml) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->lowtime->zeus-ml)
(4.44.3)
Requirement already satisfied: kiwisolver>=1.0.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->lowtime->zeus-ml)
(1.4.5)
Requirement already satisfied: packaging>=20.0 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->lowtime->zeus-ml)
(23.2)
```

```
Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.10/dist-
packages (from matplotlib->lowtime->zeus-ml) (9.4.0)
Requirement already satisfied: pyparsing>=2.3.1 in
/usr/local/lib/python3.10/dist-packages (from matplotlib->lowtime->zeus-ml)
(3.1.1)
Installing collected packages: nvidia-ml-py, websockets, uvloop, ujson, shtab,
python-multipart, python-dotenv, orjson, httptools, h11, docstring-parser,
dnspython, aiofiles, watchfiles, uvicorn, starlette, httpcore, email-validator,
tyro, lowtime, httpx, fastapi, zeus-ml
ERROR: pip's dependency resolver does not currently take into account all

the packages that are installed. This behaviour is the source of the following

dependency conflicts.

lida 0.0.10 requires kaleido, which is not installed.

Successfully installed aiofiles-22.1.0 dnspython-2.4.2 docstring-parser-0.15
email-validator-2.1.0.post1 fastapi-0.87.0 h11-0.14.0 httpcore-1.0.2
httptools-0.6.1 httpx-0.25.2 lowtime-0.1.0 nvidia-ml-py-12.535.133 orjson-3.9.10
python-dotenv-1.0.0 python-multipart-0.0.6 shtab-1.6.4 starlette-0.21.0
tyro-0.5.18 ujson-5.8.0 uvicorn-0.24.0.post1 uvloop-0.19.0 watchfiles-0.21.0
websockets-12.0 zeus-ml-0.8.0
```

Then, import it, and tell it to monitor your GPU:

[ ]:
```
# from zeus.monitor import ZeusMonitor

# monitor = ZeusMonitor(gpu_indices=[0])
```

When you want to measure GPU energy usage, you will:

- start a "monitoring window"
- do your GPU-intensive computation (e.g. call `model.fit`)
- stop the "monitoring window"

and then you can get the time and total energy used by the GPU in the monitoring window.

Try it now - this will just continue fitting whatever `model` is currently in scope from previous cells:

[ ]:
```
# monitor.begin_window("test")
# model.fit(Xtr_scale, ytr, epochs=5)
# measurement = monitor.end_window("test")
# print("Measured time (s)  :" , measurement.time)
# print("Measured energy (J):" , measurement.total_energy)
```

`TrainToAccuracy` callback Next, we need a way to train a model until we achieve our desired validation accuracy. We will write a callback function following these specifications:

- It will be called `TrainToAccuracy` and will accept two arguments: a `threshold` and a `patience` value.

- If the model's validation accuracy is higher than the `threshold` for `patience` epochs in a row, stop training.
- In the `on_epoch_end` function, which will be called at the end of every epoch during training, you should get the current validation accuracy using `currect_acc = logs.get("val_accuracy")`. Then, set `self.model.stop_training = True` if the condition above is met.
- The default values of `threshold` and `patience` are given below, but other values may be passed as arguments at runtime.

Then, when you call `model.fit()`, you will add the `TrainToAccuracy` callback as in

```
callbacks=[TrainToAccuracy(threshold=0.98, patience=5)]
```

[ ]:
```
# TODO - write a callback function
class TrainToAccuracy(callbacks.Callback):
    def __init__(self, threshold=0.9, patience=3):
        super(TrainToAccuracy, self).__init__()
        self.threshold = threshold  # The desired accuracy threshold
        self.patience = patience  # How many epochs to wait once hitting the␣
 ↪threshold
        self.wait = 0  # Counter for the number of epochs where threshold is met

    def on_epoch_end(self, epoch, logs=None):
        current_acc = logs.get("val_accuracy")
        if current_acc and current_acc > self.threshold:
            self.wait += 1
        else:
            self.wait = 0

        if self.wait >= self.patience:
            self.model.stop_training = True
            print(f"\nReached {self.threshold*100}% accuracy, so stopping␣
 ↪training after {epoch+1} epochs!")
```

Try it! run the following cell to test your `TrainToAccuracy` callback. (This will just continue fitting whatever `model` is currently in scope.)

[ ]:
```
model.fit(Xtr_scale, ytr, epochs=100, validation_split = 0.2,␣
 ↪callbacks=[TrainToAccuracy(threshold=0.95, patience=5)])
```

```
Epoch 1/100
1657/1657 [==============================] - 9s 5ms/step - loss: 0.0547 -
accuracy: 0.9866 - val_loss: 0.1792 - val_accuracy: 0.9258
Epoch 2/100
1657/1657 [==============================] - 11s 7ms/step - loss: 0.0486 -
accuracy: 0.9878 - val_loss: 0.1763 - val_accuracy: 0.9263
Epoch 3/100
1657/1657 [==============================] - 11s 7ms/step - loss: 0.0445 -
accuracy: 0.9889 - val_loss: 0.1729 - val_accuracy: 0.9275
```

```
Epoch 4/100
1657/1657 [==============================] - 6s 3ms/step - loss: 0.0411 -
accuracy: 0.9896 - val_loss: 0.1904 - val_accuracy: 0.9198
Epoch 5/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0381 -
accuracy: 0.9905 - val_loss: 0.1601 - val_accuracy: 0.9315
Epoch 6/100
1657/1657 [==============================] - 6s 4ms/step - loss: 0.0356 -
accuracy: 0.9910 - val_loss: 0.2129 - val_accuracy: 0.9113
Epoch 7/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0334 -
accuracy: 0.9915 - val_loss: 0.1372 - val_accuracy: 0.9407
Epoch 8/100
1657/1657 [==============================] - 6s 3ms/step - loss: 0.0314 -
accuracy: 0.9922 - val_loss: 0.1893 - val_accuracy: 0.9207
Epoch 9/100
1657/1657 [==============================] - 6s 4ms/step - loss: 0.0296 -
accuracy: 0.9926 - val_loss: 0.1246 - val_accuracy: 0.9444
Epoch 10/100
1657/1657 [==============================] - 6s 4ms/step - loss: 0.0280 -
accuracy: 0.9931 - val_loss: 0.1874 - val_accuracy: 0.9220
Epoch 11/100
1657/1657 [==============================] - 6s 3ms/step - loss: 0.0263 -
accuracy: 0.9932 - val_loss: 0.1297 - val_accuracy: 0.9427
Epoch 12/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0250 -
accuracy: 0.9934 - val_loss: 0.1312 - val_accuracy: 0.9420
Epoch 13/100
1657/1657 [==============================] - 6s 4ms/step - loss: 0.0239 -
accuracy: 0.9938 - val_loss: 0.1450 - val_accuracy: 0.9381
Epoch 14/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0226 -
accuracy: 0.9944 - val_loss: 0.1551 - val_accuracy: 0.9343
Epoch 15/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0216 -
accuracy: 0.9946 - val_loss: 0.1471 - val_accuracy: 0.9376
Epoch 16/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0207 -
accuracy: 0.9949 - val_loss: 0.1120 - val_accuracy: 0.9489
Epoch 17/100
1657/1657 [==============================] - 6s 4ms/step - loss: 0.0198 -
accuracy: 0.9950 - val_loss: 0.1479 - val_accuracy: 0.9372
Epoch 18/100
1657/1657 [==============================] - 6s 4ms/step - loss: 0.0190 -
accuracy: 0.9950 - val_loss: 0.1485 - val_accuracy: 0.9373
Epoch 19/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0182 -
accuracy: 0.9956 - val_loss: 0.0868 - val_accuracy: 0.9591
```

```
Epoch 20/100
1657/1657 [==============================] - 6s 3ms/step - loss: 0.0174 -
accuracy: 0.9958 - val_loss: 0.0623 - val_accuracy: 0.9731
Epoch 21/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0168 -
accuracy: 0.9960 - val_loss: 0.1412 - val_accuracy: 0.9398
Epoch 22/100
1657/1657 [==============================] - 6s 4ms/step - loss: 0.0163 -
accuracy: 0.9960 - val_loss: 0.1019 - val_accuracy: 0.9529
Epoch 23/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0157 -
accuracy: 0.9962 - val_loss: 0.1087 - val_accuracy: 0.9508
Epoch 24/100
1657/1657 [==============================] - 6s 3ms/step - loss: 0.0151 -
accuracy: 0.9965 - val_loss: 0.1513 - val_accuracy: 0.9376
Epoch 25/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0146 -
accuracy: 0.9965 - val_loss: 0.0943 - val_accuracy: 0.9564
Epoch 26/100
1657/1657 [==============================] - 6s 4ms/step - loss: 0.0141 -
accuracy: 0.9968 - val_loss: 0.1132 - val_accuracy: 0.9490
Epoch 27/100
1657/1657 [==============================] - 6s 4ms/step - loss: 0.0136 -
accuracy: 0.9968 - val_loss: 0.0805 - val_accuracy: 0.9632
Epoch 28/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0132 -
accuracy: 0.9968 - val_loss: 0.0645 - val_accuracy: 0.9714
Epoch 29/100
1657/1657 [==============================] - 6s 3ms/step - loss: 0.0128 -
accuracy: 0.9970 - val_loss: 0.0900 - val_accuracy: 0.9583
Epoch 30/100
1657/1657 [==============================] - 7s 4ms/step - loss: 0.0125 -
accuracy: 0.9971 - val_loss: 0.0881 - val_accuracy: 0.9593
Epoch 31/100
1642/1657 [============================>.] - ETA: 0s - loss: 0.0122 - accuracy:
0.9971
Reached 95.0% accuracy, so stopping training after 31 epochs!
1657/1657 [==============================] - 5s 3ms/step - loss: 0.0121 -
accuracy: 0.9971 - val_loss: 0.0980 - val_accuracy: 0.9554
```

[ ]: `<keras.src.callbacks.History at 0x7a11306233d0>`

Your model shouldn't *really* train for 100 epochs - it should stop training as soon as 95% validation accuracy is achieved for 5 epochs in a row! (Your "test" is not graded, you may change the `threshold` and `patience` values in this "test" call to `model.fit` in order to check your work.)

Note that since we are now using the validation set performance to *decide* when to stop training the model, we are no longer "allowed" to pass the test set as `validation_data`. The test set must

never be used to make decisions during the model training process - only for evaluation of the final model. Instead, we specify that 20% of the training data should be held out as a validation set, and that is the validation accuracy that is used to determine when to stop training.

1.4.1 See how TTA/ETA varies with learning rate, batch size

Now, you will repeat your model preparation and fitting code - with your new `TrainToAccuracy` callback - but in a loop. First, you will iterate over different learning rates.

In each iteration of each loop, you will prepare a model (with the appropriate training hyperparameters) and train it until:

- either it has achieved **0.95 accuracy for 3 epoches in a row** on a 20% validation subset of the training data,
- or, it has trained for 500 epochs

whichever comes FIRST.

For each model, you will record:

- the training hyperparameters (learning rate, batch size)
- the number of epochs of training needed to achieve the target validation accuracy
- the accuracy on the *test* data (not the validation data!). After fitting the model, use `model.evaluate` and pass the scaled *test* data to get the test loss and test accuracy
- **GPU runtime**: the GPU energy and time to train the model to the desired validation accuracy, as computed by a `zeus-ml` measurement window that starts just before `model.fit` and ends just after `model.fit`.
- **CPU runtime**: the time to train the model to the desired validation accuracy, as computed by the difference in `time.time()` just before `model.fit` and just after `model.fit`.

[ ]:
```
# TODO - iterate over learning rates and get TTA/ETA

# default learning rate and batch size -
lr = 0.001
batch_size = 128

metrics_vs_lr = []

# Iterating over different learning rates
for lr in [0.0001, 0.001, 0.01, 0.1, 1]:

    # Clearing the Keras session to free up memory
    K.clear_session()

    # Construct the model
    model = Sequential()
    model.add(Dense(nh, input_shape=(n_feat,), activation='sigmoid'))
    model.add(Dense(n_class, activation='softmax'))  # Assuming ytr.shape[1] is␣
 ↪the number of classes
```

```
    # Compile the model with the current learning rate
    model.compile(optimizer=Adam(learning_rate=lr),␣
↪loss='sparse_categorical_crossentropy', metrics=['accuracy'])

    # Start measurement

    start_time = time.time()

    # Fit the model
    history=model.fit(Xtr_scale, ytr, epochs=500, batch_size=batch_size,␣
↪validation_split=0.2, callbacks=[TrainToAccuracy(threshold=0.95,␣
↪patience=3)])

    # End measurement

    total_time = time.time() - start_time

    # Evaluate the model on test data
    test_loss, test_accuracy = model.evaluate(Xts_scale, yts)

    # Save metrics
    model_metrics = {
        'batch_size': 128,
        'learning_rate': lr,
        'epochs': len(history.history['accuracy']),
        'test_accuracy': test_accuracy,
        'train_time': total_time
    }

    metrics_vs_lr.append(model_metrics)
```

```
Epoch 1/500
415/415 [==============================] - 5s 9ms/step - loss: 1.3520 -
accuracy: 0.5902 - val_loss: 2.7122 - val_accuracy: 0.1045
Epoch 2/500
415/415 [==============================] - 2s 5ms/step - loss: 0.7070 -
accuracy: 0.7893 - val_loss: 2.0098 - val_accuracy: 0.3327
Epoch 3/500
415/415 [==============================] - 1s 3ms/step - loss: 0.5011 -
accuracy: 0.8720 - val_loss: 1.6746 - val_accuracy: 0.4512
Epoch 4/500
415/415 [==============================] - 1s 3ms/step - loss: 0.3920 -
accuracy: 0.9122 - val_loss: 1.4119 - val_accuracy: 0.5146
Epoch 5/500
415/415 [==============================] - 2s 4ms/step - loss: 0.3244 -
accuracy: 0.9301 - val_loss: 1.2697 - val_accuracy: 0.5579
Epoch 6/500
```

```
415/415 [==============================] - 2s 4ms/step - loss: 0.2775 -
accuracy: 0.9413 - val_loss: 1.1012 - val_accuracy: 0.6005
Epoch 7/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2420 -
accuracy: 0.9489 - val_loss: 0.9966 - val_accuracy: 0.6354
Epoch 8/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2138 -
accuracy: 0.9542 - val_loss: 0.9348 - val_accuracy: 0.6563
Epoch 9/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1907 -
accuracy: 0.9586 - val_loss: 0.8591 - val_accuracy: 0.6826
Epoch 10/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1711 -
accuracy: 0.9620 - val_loss: 0.8772 - val_accuracy: 0.6784
Epoch 11/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1545 -
accuracy: 0.9655 - val_loss: 0.8030 - val_accuracy: 0.7016
Epoch 12/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1400 -
accuracy: 0.9688 - val_loss: 0.7164 - val_accuracy: 0.7287
Epoch 13/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1274 -
accuracy: 0.9709 - val_loss: 0.7146 - val_accuracy: 0.7325
Epoch 14/500
415/415 [==============================] - 1s 3ms/step - loss: 0.1165 -
accuracy: 0.9733 - val_loss: 0.7123 - val_accuracy: 0.7353
Epoch 15/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1070 -
accuracy: 0.9755 - val_loss: 0.6723 - val_accuracy: 0.7461
Epoch 16/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0987 -
accuracy: 0.9775 - val_loss: 0.6551 - val_accuracy: 0.7529
Epoch 17/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0913 -
accuracy: 0.9794 - val_loss: 0.6772 - val_accuracy: 0.7490
Epoch 18/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0850 -
accuracy: 0.9806 - val_loss: 0.5996 - val_accuracy: 0.7688
Epoch 19/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0794 -
accuracy: 0.9818 - val_loss: 0.6366 - val_accuracy: 0.7616
Epoch 20/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0744 -
accuracy: 0.9828 - val_loss: 0.5952 - val_accuracy: 0.7734
Epoch 21/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0699 -
accuracy: 0.9838 - val_loss: 0.5691 - val_accuracy: 0.7812
Epoch 22/500
```

```
415/415 [==============================] - 1s 3ms/step - loss: 0.0660 -
accuracy: 0.9846 - val_loss: 0.5103 - val_accuracy: 0.7971
Epoch 23/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0624 -
accuracy: 0.9852 - val_loss: 0.5001 - val_accuracy: 0.8013
Epoch 24/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0592 -
accuracy: 0.9861 - val_loss: 0.5491 - val_accuracy: 0.7912
Epoch 25/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0563 -
accuracy: 0.9866 - val_loss: 0.4965 - val_accuracy: 0.8044
Epoch 26/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0537 -
accuracy: 0.9873 - val_loss: 0.5046 - val_accuracy: 0.8030
Epoch 27/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0513 -
accuracy: 0.9876 - val_loss: 0.4903 - val_accuracy: 0.8082
Epoch 28/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0491 -
accuracy: 0.9882 - val_loss: 0.5337 - val_accuracy: 0.7988
Epoch 29/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0470 -
accuracy: 0.9885 - val_loss: 0.4638 - val_accuracy: 0.8181
Epoch 30/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0452 -
accuracy: 0.9889 - val_loss: 0.5079 - val_accuracy: 0.8080
Epoch 31/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0433 -
accuracy: 0.9893 - val_loss: 0.4838 - val_accuracy: 0.8151
Epoch 32/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0418 -
accuracy: 0.9895 - val_loss: 0.4669 - val_accuracy: 0.8193
Epoch 33/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0403 -
accuracy: 0.9899 - val_loss: 0.4081 - val_accuracy: 0.8375
Epoch 34/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0389 -
accuracy: 0.9904 - val_loss: 0.3924 - val_accuracy: 0.8413
Epoch 35/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0376 -
accuracy: 0.9905 - val_loss: 0.4087 - val_accuracy: 0.8389
Epoch 36/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0363 -
accuracy: 0.9909 - val_loss: 0.4998 - val_accuracy: 0.8147
Epoch 37/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0352 -
accuracy: 0.9910 - val_loss: 0.3603 - val_accuracy: 0.8534
Epoch 38/500
```

```
415/415 [==============================] - 2s 4ms/step - loss: 0.0340 -
accuracy: 0.9914 - val_loss: 0.4509 - val_accuracy: 0.8302
Epoch 39/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0330 -
accuracy: 0.9916 - val_loss: 0.3919 - val_accuracy: 0.8445
Epoch 40/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0320 -
accuracy: 0.9921 - val_loss: 0.4411 - val_accuracy: 0.8332
Epoch 41/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0310 -
accuracy: 0.9922 - val_loss: 0.3497 - val_accuracy: 0.8586
Epoch 42/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0302 -
accuracy: 0.9922 - val_loss: 0.4031 - val_accuracy: 0.8436
Epoch 43/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0294 -
accuracy: 0.9926 - val_loss: 0.3766 - val_accuracy: 0.8520
Epoch 44/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0285 -
accuracy: 0.9928 - val_loss: 0.3395 - val_accuracy: 0.8632
Epoch 45/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0277 -
accuracy: 0.9931 - val_loss: 0.3895 - val_accuracy: 0.8491
Epoch 46/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0270 -
accuracy: 0.9932 - val_loss: 0.3538 - val_accuracy: 0.8606
Epoch 47/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0263 -
accuracy: 0.9932 - val_loss: 0.3252 - val_accuracy: 0.8693
Epoch 48/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0256 -
accuracy: 0.9936 - val_loss: 0.3341 - val_accuracy: 0.8669
Epoch 49/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0250 -
accuracy: 0.9937 - val_loss: 0.3515 - val_accuracy: 0.8629
Epoch 50/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0242 -
accuracy: 0.9938 - val_loss: 0.3975 - val_accuracy: 0.8502
Epoch 51/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0237 -
accuracy: 0.9940 - val_loss: 0.2919 - val_accuracy: 0.8808
Epoch 52/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0231 -
accuracy: 0.9944 - val_loss: 0.3347 - val_accuracy: 0.8685
Epoch 53/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0226 -
accuracy: 0.9944 - val_loss: 0.3487 - val_accuracy: 0.8648
Epoch 54/500
```

```
415/415 [==============================] - 2s 5ms/step - loss: 0.0220 -
accuracy: 0.9945 - val_loss: 0.2835 - val_accuracy: 0.8833
Epoch 55/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0214 -
accuracy: 0.9948 - val_loss: 0.3177 - val_accuracy: 0.8744
Epoch 56/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0211 -
accuracy: 0.9948 - val_loss: 0.3209 - val_accuracy: 0.8741
Epoch 57/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0206 -
accuracy: 0.9950 - val_loss: 0.3061 - val_accuracy: 0.8786
Epoch 58/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0202 -
accuracy: 0.9951 - val_loss: 0.2966 - val_accuracy: 0.8818
Epoch 59/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0197 -
accuracy: 0.9952 - val_loss: 0.2949 - val_accuracy: 0.8820
Epoch 60/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0193 -
accuracy: 0.9953 - val_loss: 0.2870 - val_accuracy: 0.8846
Epoch 61/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0189 -
accuracy: 0.9953 - val_loss: 0.3045 - val_accuracy: 0.8802
Epoch 62/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0185 -
accuracy: 0.9956 - val_loss: 0.2874 - val_accuracy: 0.8850
Epoch 63/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0182 -
accuracy: 0.9955 - val_loss: 0.2567 - val_accuracy: 0.8954
Epoch 64/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0178 -
accuracy: 0.9958 - val_loss: 0.2994 - val_accuracy: 0.8823
Epoch 65/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0174 -
accuracy: 0.9959 - val_loss: 0.2727 - val_accuracy: 0.8918
Epoch 66/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0171 -
accuracy: 0.9960 - val_loss: 0.2895 - val_accuracy: 0.8854
Epoch 67/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0168 -
accuracy: 0.9962 - val_loss: 0.2338 - val_accuracy: 0.9034
Epoch 68/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0165 -
accuracy: 0.9962 - val_loss: 0.2897 - val_accuracy: 0.8863
Epoch 69/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0162 -
accuracy: 0.9962 - val_loss: 0.2421 - val_accuracy: 0.9014
Epoch 70/500
```

```
415/415 [==============================] - 2s 4ms/step - loss: 0.0159 -
accuracy: 0.9964 - val_loss: 0.2349 - val_accuracy: 0.9038
Epoch 71/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0156 -
accuracy: 0.9965 - val_loss: 0.2500 - val_accuracy: 0.8995
Epoch 72/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0154 -
accuracy: 0.9964 - val_loss: 0.2277 - val_accuracy: 0.9063
Epoch 73/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0150 -
accuracy: 0.9966 - val_loss: 0.2400 - val_accuracy: 0.9021
Epoch 74/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0148 -
accuracy: 0.9967 - val_loss: 0.2234 - val_accuracy: 0.9088
Epoch 75/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0145 -
accuracy: 0.9967 - val_loss: 0.2561 - val_accuracy: 0.8990
Epoch 76/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0143 -
accuracy: 0.9968 - val_loss: 0.2244 - val_accuracy: 0.9086
Epoch 77/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0141 -
accuracy: 0.9968 - val_loss: 0.2051 - val_accuracy: 0.9146
Epoch 78/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0138 -
accuracy: 0.9968 - val_loss: 0.2282 - val_accuracy: 0.9076
Epoch 79/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0136 -
accuracy: 0.9969 - val_loss: 0.2605 - val_accuracy: 0.8983
Epoch 80/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0134 -
accuracy: 0.9970 - val_loss: 0.2475 - val_accuracy: 0.9016
Epoch 81/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0132 -
accuracy: 0.9970 - val_loss: 0.2190 - val_accuracy: 0.9104
Epoch 82/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0130 -
accuracy: 0.9971 - val_loss: 0.1962 - val_accuracy: 0.9182
Epoch 83/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0127 -
accuracy: 0.9972 - val_loss: 0.2105 - val_accuracy: 0.9140
Epoch 84/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0126 -
accuracy: 0.9973 - val_loss: 0.2005 - val_accuracy: 0.9177
Epoch 85/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0123 -
accuracy: 0.9972 - val_loss: 0.1863 - val_accuracy: 0.9223
Epoch 86/500
```

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415/415 [==============================] - 2s 4ms/step - loss: 0.0122 -
accuracy: 0.9972 - val_loss: 0.1914 - val_accuracy: 0.9202
Epoch 87/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0120 -
accuracy: 0.9974 - val_loss: 0.2212 - val_accuracy: 0.9115
Epoch 88/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0118 -
accuracy: 0.9972 - val_loss: 0.2008 - val_accuracy: 0.9180
Epoch 89/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0116 -
accuracy: 0.9974 - val_loss: 0.1777 - val_accuracy: 0.9258
Epoch 90/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0114 -
accuracy: 0.9974 - val_loss: 0.1633 - val_accuracy: 0.9298
Epoch 91/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0113 -
accuracy: 0.9975 - val_loss: 0.1760 - val_accuracy: 0.9265
Epoch 92/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0112 -
accuracy: 0.9975 - val_loss: 0.1980 - val_accuracy: 0.9195
Epoch 93/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0111 -
accuracy: 0.9975 - val_loss: 0.2102 - val_accuracy: 0.9162
Epoch 94/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0109 -
accuracy: 0.9975 - val_loss: 0.2369 - val_accuracy: 0.9075
Epoch 95/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0107 -
accuracy: 0.9977 - val_loss: 0.1451 - val_accuracy: 0.9358
Epoch 96/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0106 -
accuracy: 0.9976 - val_loss: 0.2079 - val_accuracy: 0.9173
Epoch 97/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0104 -
accuracy: 0.9977 - val_loss: 0.2001 - val_accuracy: 0.9193
Epoch 98/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0103 -
accuracy: 0.9976 - val_loss: 0.2138 - val_accuracy: 0.9161
Epoch 99/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0101 -
accuracy: 0.9978 - val_loss: 0.2360 - val_accuracy: 0.9085
Epoch 100/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0100 -
accuracy: 0.9977 - val_loss: 0.1592 - val_accuracy: 0.9321
Epoch 101/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0099 -
accuracy: 0.9979 - val_loss: 0.2014 - val_accuracy: 0.9194
Epoch 102/500
```

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415/415 [==============================] - 1s 3ms/step - loss: 0.0098 -
accuracy: 0.9978 - val_loss: 0.1973 - val_accuracy: 0.9200
Epoch 103/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0096 -
accuracy: 0.9979 - val_loss: 0.1478 - val_accuracy: 0.9352
Epoch 104/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0095 -
accuracy: 0.9980 - val_loss: 0.1598 - val_accuracy: 0.9322
Epoch 105/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0094 -
accuracy: 0.9978 - val_loss: 0.1649 - val_accuracy: 0.9306
Epoch 106/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0093 -
accuracy: 0.9980 - val_loss: 0.2043 - val_accuracy: 0.9188
Epoch 107/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0091 -
accuracy: 0.9980 - val_loss: 0.1929 - val_accuracy: 0.9220
Epoch 108/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0091 -
accuracy: 0.9980 - val_loss: 0.1928 - val_accuracy: 0.9226
Epoch 109/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0090 -
accuracy: 0.9981 - val_loss: 0.1734 - val_accuracy: 0.9281
Epoch 110/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0088 -
accuracy: 0.9981 - val_loss: 0.1550 - val_accuracy: 0.9335
Epoch 111/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0087 -
accuracy: 0.9981 - val_loss: 0.1881 - val_accuracy: 0.9245
Epoch 112/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0087 -
accuracy: 0.9982 - val_loss: 0.2198 - val_accuracy: 0.9154
Epoch 113/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0085 -
accuracy: 0.9981 - val_loss: 0.1771 - val_accuracy: 0.9269
Epoch 114/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0084 -
accuracy: 0.9982 - val_loss: 0.1780 - val_accuracy: 0.9268
Epoch 115/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0084 -
accuracy: 0.9982 - val_loss: 0.1788 - val_accuracy: 0.9268
Epoch 116/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0082 -
accuracy: 0.9983 - val_loss: 0.1855 - val_accuracy: 0.9257
Epoch 117/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0082 -
accuracy: 0.9983 - val_loss: 0.1694 - val_accuracy: 0.9300
Epoch 118/500
```

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415/415 [==============================] - 2s 4ms/step - loss: 0.0081 -
accuracy: 0.9982 - val_loss: 0.1665 - val_accuracy: 0.9309
Epoch 119/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0080 -
accuracy: 0.9983 - val_loss: 0.1877 - val_accuracy: 0.9251
Epoch 120/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0079 -
accuracy: 0.9983 - val_loss: 0.1502 - val_accuracy: 0.9362
Epoch 121/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0078 -
accuracy: 0.9984 - val_loss: 0.1518 - val_accuracy: 0.9358
Epoch 122/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0077 -
accuracy: 0.9984 - val_loss: 0.1361 - val_accuracy: 0.9408
Epoch 123/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0077 -
accuracy: 0.9984 - val_loss: 0.1590 - val_accuracy: 0.9335
Epoch 124/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0076 -
accuracy: 0.9985 - val_loss: 0.1289 - val_accuracy: 0.9439
Epoch 125/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0075 -
accuracy: 0.9983 - val_loss: 0.1479 - val_accuracy: 0.9373
Epoch 126/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0074 -
accuracy: 0.9985 - val_loss: 0.1533 - val_accuracy: 0.9358
Epoch 127/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0073 -
accuracy: 0.9985 - val_loss: 0.1924 - val_accuracy: 0.9245
Epoch 128/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0073 -
accuracy: 0.9985 - val_loss: 0.1587 - val_accuracy: 0.9341
Epoch 129/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0072 -
accuracy: 0.9985 - val_loss: 0.1729 - val_accuracy: 0.9300
Epoch 130/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0071 -
accuracy: 0.9985 - val_loss: 0.1451 - val_accuracy: 0.9384
Epoch 131/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0070 -
accuracy: 0.9985 - val_loss: 0.1785 - val_accuracy: 0.9280
Epoch 132/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0070 -
accuracy: 0.9985 - val_loss: 0.1686 - val_accuracy: 0.9312
Epoch 133/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0069 -
accuracy: 0.9985 - val_loss: 0.1328 - val_accuracy: 0.9432
Epoch 134/500
```

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415/415 [==============================] - 2s 5ms/step - loss: 0.0068 -
accuracy: 0.9986 - val_loss: 0.1531 - val_accuracy: 0.9365
Epoch 135/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0067 -
accuracy: 0.9986 - val_loss: 0.1716 - val_accuracy: 0.9302
Epoch 136/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0067 -
accuracy: 0.9986 - val_loss: 0.1507 - val_accuracy: 0.9371
Epoch 137/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0066 -
accuracy: 0.9986 - val_loss: 0.1408 - val_accuracy: 0.9403
Epoch 138/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0065 -
accuracy: 0.9985 - val_loss: 0.1652 - val_accuracy: 0.9328
Epoch 139/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0065 -
accuracy: 0.9987 - val_loss: 0.1553 - val_accuracy: 0.9358
Epoch 140/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0064 -
accuracy: 0.9987 - val_loss: 0.1423 - val_accuracy: 0.9400
Epoch 141/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0063 -
accuracy: 0.9987 - val_loss: 0.1341 - val_accuracy: 0.9431
Epoch 142/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0063 -
accuracy: 0.9987 - val_loss: 0.1782 - val_accuracy: 0.9290
Epoch 143/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0062 -
accuracy: 0.9986 - val_loss: 0.1339 - val_accuracy: 0.9434
Epoch 144/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0062 -
accuracy: 0.9987 - val_loss: 0.1304 - val_accuracy: 0.9449
Epoch 145/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0061 -
accuracy: 0.9987 - val_loss: 0.1675 - val_accuracy: 0.9321
Epoch 146/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0061 -
accuracy: 0.9987 - val_loss: 0.1579 - val_accuracy: 0.9355
Epoch 147/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0060 -
accuracy: 0.9987 - val_loss: 0.1564 - val_accuracy: 0.9356
Epoch 148/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0060 -
accuracy: 0.9987 - val_loss: 0.1741 - val_accuracy: 0.9303
Epoch 149/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0059 -
accuracy: 0.9986 - val_loss: 0.1779 - val_accuracy: 0.9294
Epoch 150/500
```

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415/415 [==============================] - 2s 5ms/step - loss: 0.0058 -
accuracy: 0.9988 - val_loss: 0.1155 - val_accuracy: 0.9515
Epoch 151/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0058 -
accuracy: 0.9988 - val_loss: 0.1353 - val_accuracy: 0.9436
Epoch 152/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0057 -
accuracy: 0.9988 - val_loss: 0.1370 - val_accuracy: 0.9427
Epoch 153/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0057 -
accuracy: 0.9988 - val_loss: 0.1453 - val_accuracy: 0.9393
Epoch 154/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0056 -
accuracy: 0.9988 - val_loss: 0.1844 - val_accuracy: 0.9275
Epoch 155/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0056 -
accuracy: 0.9988 - val_loss: 0.1698 - val_accuracy: 0.9326
Epoch 156/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0055 -
accuracy: 0.9988 - val_loss: 0.1491 - val_accuracy: 0.9386
Epoch 157/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0054 -
accuracy: 0.9989 - val_loss: 0.1407 - val_accuracy: 0.9414
Epoch 158/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0054 -
accuracy: 0.9988 - val_loss: 0.1565 - val_accuracy: 0.9361
Epoch 159/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0054 -
accuracy: 0.9988 - val_loss: 0.1639 - val_accuracy: 0.9339
Epoch 160/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0053 -
accuracy: 0.9988 - val_loss: 0.1347 - val_accuracy: 0.9445
Epoch 161/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0053 -
accuracy: 0.9988 - val_loss: 0.1501 - val_accuracy: 0.9385
Epoch 162/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0052 -
accuracy: 0.9988 - val_loss: 0.1628 - val_accuracy: 0.9342
Epoch 163/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0051 -
accuracy: 0.9988 - val_loss: 0.1675 - val_accuracy: 0.9333
Epoch 164/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0051 -
accuracy: 0.9989 - val_loss: 0.1263 - val_accuracy: 0.9477
Epoch 165/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0051 -
accuracy: 0.9989 - val_loss: 0.1462 - val_accuracy: 0.9398
Epoch 166/500
```

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415/415 [==============================] - 1s 3ms/step - loss: 0.0050 -
accuracy: 0.9988 - val_loss: 0.1669 - val_accuracy: 0.9333
Epoch 167/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0050 -
accuracy: 0.9989 - val_loss: 0.1222 - val_accuracy: 0.9497
Epoch 168/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0049 -
accuracy: 0.9990 - val_loss: 0.1268 - val_accuracy: 0.9482
Epoch 169/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0049 -
accuracy: 0.9989 - val_loss: 0.1204 - val_accuracy: 0.9511
Epoch 170/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0049 -
accuracy: 0.9989 - val_loss: 0.1576 - val_accuracy: 0.9369
Epoch 171/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0048 -
accuracy: 0.9990 - val_loss: 0.1418 - val_accuracy: 0.9420
Epoch 172/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0047 -
accuracy: 0.9990 - val_loss: 0.1694 - val_accuracy: 0.9328
Epoch 173/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0047 -
accuracy: 0.9989 - val_loss: 0.1135 - val_accuracy: 0.9542
Epoch 174/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0047 -
accuracy: 0.9990 - val_loss: 0.1212 - val_accuracy: 0.9512
Epoch 175/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0046 -
accuracy: 0.9990 - val_loss: 0.1419 - val_accuracy: 0.9420
Epoch 176/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0046 -
accuracy: 0.9989 - val_loss: 0.1201 - val_accuracy: 0.9516
Epoch 177/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0045 -
accuracy: 0.9989 - val_loss: 0.1475 - val_accuracy: 0.9401
Epoch 178/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0045 -
accuracy: 0.9990 - val_loss: 0.1302 - val_accuracy: 0.9470
Epoch 179/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0044 -
accuracy: 0.9990 - val_loss: 0.1474 - val_accuracy: 0.9400
Epoch 180/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0044 -
accuracy: 0.9990 - val_loss: 0.1476 - val_accuracy: 0.9401
Epoch 181/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0044 -
accuracy: 0.9991 - val_loss: 0.1296 - val_accuracy: 0.9472
Epoch 182/500
```

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415/415 [==============================] - 2s 4ms/step - loss: 0.0043 -
accuracy: 0.9992 - val_loss: 0.1266 - val_accuracy: 0.9491
Epoch 183/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0043 -
accuracy: 0.9990 - val_loss: 0.1496 - val_accuracy: 0.9392
Epoch 184/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0043 -
accuracy: 0.9992 - val_loss: 0.1539 - val_accuracy: 0.9385
Epoch 185/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0042 -
accuracy: 0.9991 - val_loss: 0.1205 - val_accuracy: 0.9520
Epoch 186/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0042 -
accuracy: 0.9992 - val_loss: 0.1542 - val_accuracy: 0.9383
Epoch 187/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0042 -
accuracy: 0.9992 - val_loss: 0.1363 - val_accuracy: 0.9455
Epoch 188/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0041 -
accuracy: 0.9991 - val_loss: 0.1400 - val_accuracy: 0.9437
Epoch 189/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0041 -
accuracy: 0.9991 - val_loss: 0.1501 - val_accuracy: 0.9398
Epoch 190/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0041 -
accuracy: 0.9992 - val_loss: 0.1185 - val_accuracy: 0.9528
Epoch 191/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0040 -
accuracy: 0.9993 - val_loss: 0.1189 - val_accuracy: 0.9528
Epoch 192/500
406/415 [============================>.] - ETA: 0s - loss: 0.0040 - accuracy:
0.9992
Reached 95.0% accuracy, so stopping training after 192 epochs!
415/415 [==============================] - 1s 4ms/step - loss: 0.0040 -
accuracy: 0.9992 - val_loss: 0.1200 - val_accuracy: 0.9525
466/466 [==============================] - 2s 3ms/step - loss: 0.0689 -
accuracy: 0.9709
Epoch 1/500
415/415 [==============================] - 2s 4ms/step - loss: 0.4696 -
accuracy: 0.8709 - val_loss: 1.1138 - val_accuracy: 0.6143
Epoch 2/500
415/415 [==============================] - 1s 4ms/step - loss: 0.1464 -
accuracy: 0.9668 - val_loss: 0.7521 - val_accuracy: 0.7315
Epoch 3/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0891 -
accuracy: 0.9793 - val_loss: 0.5903 - val_accuracy: 0.7740
Epoch 4/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0645 -
```

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accuracy: 0.9848 - val_loss: 0.5193 - val_accuracy: 0.8059
Epoch 5/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0497 -
accuracy: 0.9879 - val_loss: 0.4698 - val_accuracy: 0.8202
Epoch 6/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0406 -
accuracy: 0.9901 - val_loss: 0.3242 - val_accuracy: 0.8656
Epoch 7/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0336 -
accuracy: 0.9917 - val_loss: 0.3835 - val_accuracy: 0.8515
Epoch 8/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0284 -
accuracy: 0.9929 - val_loss: 0.4349 - val_accuracy: 0.8435
Epoch 9/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0243 -
accuracy: 0.9943 - val_loss: 0.4738 - val_accuracy: 0.8383
Epoch 10/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0211 -
accuracy: 0.9948 - val_loss: 0.4720 - val_accuracy: 0.8408
Epoch 11/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0187 -
accuracy: 0.9955 - val_loss: 0.1886 - val_accuracy: 0.9244
Epoch 12/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0169 -
accuracy: 0.9958 - val_loss: 0.3035 - val_accuracy: 0.8897
Epoch 13/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0150 -
accuracy: 0.9962 - val_loss: 0.1645 - val_accuracy: 0.9343
Epoch 14/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0138 -
accuracy: 0.9964 - val_loss: 0.3530 - val_accuracy: 0.8825
Epoch 15/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0140 -
accuracy: 0.9964 - val_loss: 0.2965 - val_accuracy: 0.8983
Epoch 16/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0112 -
accuracy: 0.9974 - val_loss: 0.2526 - val_accuracy: 0.9105
Epoch 17/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0102 -
accuracy: 0.9976 - val_loss: 0.1910 - val_accuracy: 0.9285
Epoch 18/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0097 -
accuracy: 0.9977 - val_loss: 0.1169 - val_accuracy: 0.9581
Epoch 19/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0089 -
accuracy: 0.9979 - val_loss: 0.4201 - val_accuracy: 0.8688
Epoch 20/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0084 -
```

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accuracy: 0.9978 - val_loss: 0.2104 - val_accuracy: 0.9228
Epoch 21/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0079 -
accuracy: 0.9981 - val_loss: 0.1951 - val_accuracy: 0.9295
Epoch 22/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0072 -
accuracy: 0.9980 - val_loss: 0.3645 - val_accuracy: 0.8862
Epoch 23/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0069 -
accuracy: 0.9983 - val_loss: 0.2015 - val_accuracy: 0.9266
Epoch 24/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0065 -
accuracy: 0.9985 - val_loss: 0.3444 - val_accuracy: 0.8956
Epoch 25/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0058 -
accuracy: 0.9986 - val_loss: 0.2329 - val_accuracy: 0.9181
Epoch 26/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0057 -
accuracy: 0.9985 - val_loss: 0.2283 - val_accuracy: 0.9210
Epoch 27/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0053 -
accuracy: 0.9988 - val_loss: 0.2558 - val_accuracy: 0.9136
Epoch 28/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0050 -
accuracy: 0.9987 - val_loss: 0.1555 - val_accuracy: 0.9518
Epoch 29/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0046 -
accuracy: 0.9989 - val_loss: 0.2603 - val_accuracy: 0.9147
Epoch 30/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0048 -
accuracy: 0.9988 - val_loss: 0.3464 - val_accuracy: 0.8949
Epoch 31/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0042 -
accuracy: 0.9990 - val_loss: 0.2668 - val_accuracy: 0.9131
Epoch 32/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0044 -
accuracy: 0.9989 - val_loss: 0.3428 - val_accuracy: 0.8968
Epoch 33/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0037 -
accuracy: 0.9992 - val_loss: 0.1456 - val_accuracy: 0.9531
Epoch 34/500
415/415 [==============================] - 2s 6ms/step - loss: 0.0036 -
accuracy: 0.9992 - val_loss: 0.2666 - val_accuracy: 0.9144
Epoch 35/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0036 -
accuracy: 0.9992 - val_loss: 0.3657 - val_accuracy: 0.8938
Epoch 36/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0032 -
```

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accuracy: 0.9992 - val_loss: 0.1879 - val_accuracy: 0.9430
Epoch 37/500
415/415 [==============================] - 1s 3ms/step - loss: 0.0030 -
accuracy: 0.9994 - val_loss: 0.2541 - val_accuracy: 0.9195
Epoch 38/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0030 -
accuracy: 0.9993 - val_loss: 0.1932 - val_accuracy: 0.9381
Epoch 39/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0029 -
accuracy: 0.9993 - val_loss: 0.2870 - val_accuracy: 0.9148
Epoch 40/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0028 -
accuracy: 0.9994 - val_loss: 0.2241 - val_accuracy: 0.9308
Epoch 41/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0028 -
accuracy: 0.9993 - val_loss: 0.1984 - val_accuracy: 0.9373
Epoch 42/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0029 -
accuracy: 0.9991 - val_loss: 0.2165 - val_accuracy: 0.9316
Epoch 43/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0024 -
accuracy: 0.9994 - val_loss: 0.2721 - val_accuracy: 0.9180
Epoch 44/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0023 -
accuracy: 0.9994 - val_loss: 0.2514 - val_accuracy: 0.9213
Epoch 45/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0020 -
accuracy: 0.9995 - val_loss: 0.2770 - val_accuracy: 0.9162
Epoch 46/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0027 -
accuracy: 0.9993 - val_loss: 0.2961 - val_accuracy: 0.9118
Epoch 47/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0019 -
accuracy: 0.9995 - val_loss: 0.3277 - val_accuracy: 0.9054
Epoch 48/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0019 -
accuracy: 0.9996 - val_loss: 0.2850 - val_accuracy: 0.9183
Epoch 49/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0018 -
accuracy: 0.9996 - val_loss: 0.2863 - val_accuracy: 0.9168
Epoch 50/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0019 -
accuracy: 0.9995 - val_loss: 0.1910 - val_accuracy: 0.9430
Epoch 51/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0017 -
accuracy: 0.9996 - val_loss: 0.2395 - val_accuracy: 0.9324
Epoch 52/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0017 -
```

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accuracy: 0.9996 - val_loss: 0.3307 - val_accuracy: 0.9059
Epoch 53/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0019 -
accuracy: 0.9994 - val_loss: 0.2162 - val_accuracy: 0.9338
Epoch 54/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0015 -
accuracy: 0.9996 - val_loss: 0.1852 - val_accuracy: 0.9470
Epoch 55/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0017 -
accuracy: 0.9996 - val_loss: 0.2556 - val_accuracy: 0.9242
Epoch 56/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0018 -
accuracy: 0.9996 - val_loss: 0.1976 - val_accuracy: 0.9424
Epoch 57/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.3814 - val_accuracy: 0.8972
Epoch 58/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0013 -
accuracy: 0.9996 - val_loss: 0.2247 - val_accuracy: 0.9313
Epoch 59/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0014 -
accuracy: 0.9997 - val_loss: 0.2029 - val_accuracy: 0.9386
Epoch 60/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0014 -
accuracy: 0.9996 - val_loss: 0.1593 - val_accuracy: 0.9552
Epoch 61/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0013 -
accuracy: 0.9996 - val_loss: 0.3412 - val_accuracy: 0.9048
Epoch 62/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.3253 - val_accuracy: 0.9090
Epoch 63/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0010 -
accuracy: 0.9998 - val_loss: 0.1720 - val_accuracy: 0.9492
Epoch 64/500
415/415 [==============================] - 2s 4ms/step - loss: 9.9198e-04 -
accuracy: 0.9998 - val_loss: 0.2292 - val_accuracy: 0.9309
Epoch 65/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0011 -
accuracy: 0.9998 - val_loss: 0.1734 - val_accuracy: 0.9491
Epoch 66/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0012 -
accuracy: 0.9997 - val_loss: 0.2748 - val_accuracy: 0.9198
Epoch 67/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0012 -
accuracy: 0.9997 - val_loss: 0.1423 - val_accuracy: 0.9573
Epoch 68/500
415/415 [==============================] - 2s 4ms/step - loss: 9.7932e-04 -
```

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accuracy: 0.9998 - val_loss: 0.3278 - val_accuracy: 0.9100
Epoch 69/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0012 -
accuracy: 0.9996 - val_loss: 0.2399 - val_accuracy: 0.9288
Epoch 70/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0013 -
accuracy: 0.9995 - val_loss: 0.1974 - val_accuracy: 0.9403
Epoch 71/500
415/415 [==============================] - 2s 4ms/step - loss: 8.1292e-04 -
accuracy: 0.9998 - val_loss: 0.2391 - val_accuracy: 0.9295
Epoch 72/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0011 -
accuracy: 0.9997 - val_loss: 0.3853 - val_accuracy: 0.8998
Epoch 73/500
415/415 [==============================] - 2s 4ms/step - loss: 8.3555e-04 -
accuracy: 0.9999 - val_loss: 0.2134 - val_accuracy: 0.9352
Epoch 74/500
415/415 [==============================] - 1s 4ms/step - loss: 8.2848e-04 -
accuracy: 0.9998 - val_loss: 0.2271 - val_accuracy: 0.9313
Epoch 75/500
415/415 [==============================] - 1s 4ms/step - loss: 8.0180e-04 -
accuracy: 0.9998 - val_loss: 0.1470 - val_accuracy: 0.9559
Epoch 76/500
415/415 [==============================] - 2s 4ms/step - loss: 6.6812e-04 -
accuracy: 0.9998 - val_loss: 0.2326 - val_accuracy: 0.9295
Epoch 77/500
415/415 [==============================] - 2s 5ms/step - loss: 6.4129e-04 -
accuracy: 0.9999 - val_loss: 0.1972 - val_accuracy: 0.9386
Epoch 78/500
415/415 [==============================] - 2s 5ms/step - loss: 8.1426e-04 -
accuracy: 0.9998 - val_loss: 0.1556 - val_accuracy: 0.9503
Epoch 79/500
415/415 [==============================] - 2s 5ms/step - loss: 6.3404e-04 -
accuracy: 0.9998 - val_loss: 0.1639 - val_accuracy: 0.9495
Epoch 80/500
415/415 [==============================] - 2s 4ms/step - loss: 4.9288e-04 -
accuracy: 0.9999 - val_loss: 0.1627 - val_accuracy: 0.9498
Epoch 81/500
415/415 [==============================] - 2s 4ms/step - loss: 8.1691e-04 -
accuracy: 0.9998 - val_loss: 0.1778 - val_accuracy: 0.9446
Epoch 82/500
415/415 [==============================] - 2s 4ms/step - loss: 9.3833e-04 -
accuracy: 0.9997 - val_loss: 0.1719 - val_accuracy: 0.9482
Epoch 83/500
415/415 [==============================] - 2s 4ms/step - loss: 5.3284e-04 -
accuracy: 0.9999 - val_loss: 0.1269 - val_accuracy: 0.9617
Epoch 84/500
415/415 [==============================] - 2s 4ms/step - loss: 6.1049e-04 -
```

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accuracy: 0.9998 - val_loss: 0.1907 - val_accuracy: 0.9432
Epoch 85/500
415/415 [==============================] - 2s 4ms/step - loss: 6.2849e-04 -
accuracy: 0.9998 - val_loss: 0.1790 - val_accuracy: 0.9463
Epoch 86/500
415/415 [==============================] - 2s 5ms/step - loss: 5.1170e-04 -
accuracy: 0.9998 - val_loss: 0.1832 - val_accuracy: 0.9442
Epoch 87/500
415/415 [==============================] - 2s 5ms/step - loss: 4.5377e-04 -
accuracy: 0.9998 - val_loss: 0.1391 - val_accuracy: 0.9598
Epoch 88/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0010 -
accuracy: 0.9996 - val_loss: 0.1770 - val_accuracy: 0.9458
Epoch 89/500
415/415 [==============================] - 2s 4ms/step - loss: 5.4660e-04 -
accuracy: 0.9999 - val_loss: 0.1634 - val_accuracy: 0.9499
Epoch 90/500
415/415 [==============================] - 2s 4ms/step - loss: 5.4067e-04 -
accuracy: 0.9998 - val_loss: 0.2021 - val_accuracy: 0.9395
Epoch 91/500
415/415 [==============================] - 2s 4ms/step - loss: 4.2883e-04 -
accuracy: 1.0000 - val_loss: 0.2616 - val_accuracy: 0.9228
Epoch 92/500
415/415 [==============================] - 2s 4ms/step - loss: 5.2277e-04 -
accuracy: 0.9998 - val_loss: 0.1464 - val_accuracy: 0.9543
Epoch 93/500
415/415 [==============================] - 1s 4ms/step - loss: 3.8295e-04 -
accuracy: 0.9999 - val_loss: 0.1855 - val_accuracy: 0.9435
Epoch 94/500
415/415 [==============================] - 2s 5ms/step - loss: 6.7069e-04 -
accuracy: 0.9998 - val_loss: 0.2837 - val_accuracy: 0.9191
Epoch 95/500
415/415 [==============================] - 2s 5ms/step - loss: 9.4178e-04 -
accuracy: 0.9997 - val_loss: 0.2516 - val_accuracy: 0.9272
Epoch 96/500
415/415 [==============================] - 2s 5ms/step - loss: 7.8549e-04 -
accuracy: 0.9996 - val_loss: 0.0967 - val_accuracy: 0.9688
Epoch 97/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8296e-04 -
accuracy: 0.9999 - val_loss: 0.1773 - val_accuracy: 0.9453
Epoch 98/500
415/415 [==============================] - 1s 4ms/step - loss: 3.9743e-04 -
accuracy: 1.0000 - val_loss: 0.1445 - val_accuracy: 0.9550
Epoch 99/500
415/415 [==============================] - 2s 4ms/step - loss: 5.5789e-04 -
accuracy: 0.9999 - val_loss: 0.1048 - val_accuracy: 0.9671
Epoch 100/500
414/415 [============================>.] - ETA: 0s - loss: 5.6785e-04 -
```

```
accuracy: 0.9998
Reached 95.0% accuracy, so stopping training after 100 epochs!
415/415 [==============================] - 2s 4ms/step - loss: 5.6780e-04 -
accuracy: 0.9998 - val_loss: 0.1440 - val_accuracy: 0.9546
466/466 [==============================] - 1s 3ms/step - loss: 0.0816 -
accuracy: 0.9780
Epoch 1/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1435 -
accuracy: 0.9581 - val_loss: 0.8769 - val_accuracy: 0.7522
Epoch 2/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0346 -
accuracy: 0.9892 - val_loss: 0.9359 - val_accuracy: 0.7685
Epoch 3/500
415/415 [==============================] - 2s 6ms/step - loss: 0.0245 -
accuracy: 0.9922 - val_loss: 0.1699 - val_accuracy: 0.9326
Epoch 4/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0173 -
accuracy: 0.9946 - val_loss: 0.2959 - val_accuracy: 0.9029
Epoch 5/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0159 -
accuracy: 0.9951 - val_loss: 2.0658 - val_accuracy: 0.6891
Epoch 6/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0151 -
accuracy: 0.9953 - val_loss: 0.0665 - val_accuracy: 0.9785
Epoch 7/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0129 -
accuracy: 0.9961 - val_loss: 0.5953 - val_accuracy: 0.8682
Epoch 8/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0130 -
accuracy: 0.9958 - val_loss: 0.2263 - val_accuracy: 0.9205
Epoch 9/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0182 -
accuracy: 0.9953 - val_loss: 0.3095 - val_accuracy: 0.9033
Epoch 10/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0086 -
accuracy: 0.9976 - val_loss: 0.0330 - val_accuracy: 0.9872
Epoch 11/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0111 -
accuracy: 0.9964 - val_loss: 0.2015 - val_accuracy: 0.9323
Epoch 12/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0084 -
accuracy: 0.9975 - val_loss: 0.3853 - val_accuracy: 0.9071
Epoch 13/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0078 -
accuracy: 0.9975 - val_loss: 0.5147 - val_accuracy: 0.8708
Epoch 14/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0075 -
accuracy: 0.9979 - val_loss: 0.3678 - val_accuracy: 0.8977
```

```
Epoch 15/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0082 -
accuracy: 0.9977 - val_loss: 0.1715 - val_accuracy: 0.9514
Epoch 16/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0101 -
accuracy: 0.9970 - val_loss: 1.1675 - val_accuracy: 0.8137
Epoch 17/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0084 -
accuracy: 0.9973 - val_loss: 0.3253 - val_accuracy: 0.9223
Epoch 18/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0087 -
accuracy: 0.9974 - val_loss: 0.3976 - val_accuracy: 0.9086
Epoch 19/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0096 -
accuracy: 0.9973 - val_loss: 1.0957 - val_accuracy: 0.8705
Epoch 20/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0076 -
accuracy: 0.9975 - val_loss: 1.3380 - val_accuracy: 0.7969
Epoch 21/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0062 -
accuracy: 0.9983 - val_loss: 0.7831 - val_accuracy: 0.8675
Epoch 22/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0067 -
accuracy: 0.9981 - val_loss: 1.8651 - val_accuracy: 0.7800
Epoch 23/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0064 -
accuracy: 0.9982 - val_loss: 1.6778 - val_accuracy: 0.7907
Epoch 24/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0046 -
accuracy: 0.9986 - val_loss: 0.6187 - val_accuracy: 0.9249
Epoch 25/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0074 -
accuracy: 0.9979 - val_loss: 0.4417 - val_accuracy: 0.9240
Epoch 26/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0080 -
accuracy: 0.9973 - val_loss: 0.1252 - val_accuracy: 0.9623
Epoch 27/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0056 -
accuracy: 0.9983 - val_loss: 0.0018 - val_accuracy: 0.9996
Epoch 28/500
415/415 [==============================] - ETA: 0s - loss: 0.0070 - accuracy:
0.9981
Reached 95.0% accuracy, so stopping training after 28 epochs!
415/415 [==============================] - 2s 5ms/step - loss: 0.0070 -
accuracy: 0.9981 - val_loss: 0.0876 - val_accuracy: 0.9700
466/466 [==============================] - 1s 3ms/step - loss: 0.0807 -
accuracy: 0.9787
Epoch 1/500
```

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415/415 [==============================] - 2s 4ms/step - loss: 0.2930 -
accuracy: 0.9457 - val_loss: 1.9098 - val_accuracy: 0.6713
Epoch 2/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1652 -
accuracy: 0.9598 - val_loss: 7.0138 - val_accuracy: 0.5944
Epoch 3/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1941 -
accuracy: 0.9602 - val_loss: 2.7257 - val_accuracy: 0.7008
Epoch 4/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1774 -
accuracy: 0.9660 - val_loss: 1.5400 - val_accuracy: 0.8400
Epoch 5/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1852 -
accuracy: 0.9685 - val_loss: 2.0654 - val_accuracy: 0.7949
Epoch 6/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1989 -
accuracy: 0.9699 - val_loss: 7.3960 - val_accuracy: 0.6057
Epoch 7/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2156 -
accuracy: 0.9682 - val_loss: 4.8453 - val_accuracy: 0.6943
Epoch 8/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2212 -
accuracy: 0.9701 - val_loss: 0.7927 - val_accuracy: 0.9202
Epoch 9/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1898 -
accuracy: 0.9739 - val_loss: 1.4953 - val_accuracy: 0.8771
Epoch 10/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2251 -
accuracy: 0.9730 - val_loss: 1.8700 - val_accuracy: 0.8749
Epoch 11/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2306 -
accuracy: 0.9736 - val_loss: 0.7487 - val_accuracy: 0.9075
Epoch 12/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1802 -
accuracy: 0.9771 - val_loss: 4.3418 - val_accuracy: 0.7823
Epoch 13/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2034 -
accuracy: 0.9768 - val_loss: 7.8506 - val_accuracy: 0.7268
Epoch 14/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2215 -
accuracy: 0.9758 - val_loss: 4.7580 - val_accuracy: 0.8041
Epoch 15/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1905 -
accuracy: 0.9782 - val_loss: 1.5322 - val_accuracy: 0.8708
Epoch 16/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2109 -
accuracy: 0.9775 - val_loss: 5.7431 - val_accuracy: 0.7008
Epoch 17/500
```

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415/415 [==============================] - 2s 4ms/step - loss: 0.2282 -
accuracy: 0.9765 - val_loss: 0.5612 - val_accuracy: 0.9246
Epoch 18/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2366 -
accuracy: 0.9762 - val_loss: 2.2516 - val_accuracy: 0.8859
Epoch 19/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2387 -
accuracy: 0.9769 - val_loss: 4.7210 - val_accuracy: 0.8466
Epoch 20/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2133 -
accuracy: 0.9799 - val_loss: 9.6926 - val_accuracy: 0.6405
Epoch 21/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2128 -
accuracy: 0.9779 - val_loss: 4.3451 - val_accuracy: 0.7740
Epoch 22/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2262 -
accuracy: 0.9786 - val_loss: 0.5372 - val_accuracy: 0.9596
Epoch 23/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1930 -
accuracy: 0.9807 - val_loss: 3.7613 - val_accuracy: 0.7782
Epoch 24/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2155 -
accuracy: 0.9818 - val_loss: 9.3736 - val_accuracy: 0.7428
Epoch 25/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1856 -
accuracy: 0.9835 - val_loss: 2.8383 - val_accuracy: 0.8623
Epoch 26/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1968 -
accuracy: 0.9822 - val_loss: 2.3405 - val_accuracy: 0.8464
Epoch 27/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1979 -
accuracy: 0.9827 - val_loss: 4.0454 - val_accuracy: 0.8556
Epoch 28/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2332 -
accuracy: 0.9805 - val_loss: 4.5607 - val_accuracy: 0.7976
Epoch 29/500
415/415 [==============================] - 2s 6ms/step - loss: 0.2175 -
accuracy: 0.9829 - val_loss: 19.0286 - val_accuracy: 0.5952
Epoch 30/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2054 -
accuracy: 0.9831 - val_loss: 1.6520 - val_accuracy: 0.8857
Epoch 31/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2146 -
accuracy: 0.9842 - val_loss: 8.1324 - val_accuracy: 0.7755
Epoch 32/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2164 -
accuracy: 0.9836 - val_loss: 15.2570 - val_accuracy: 0.6334
Epoch 33/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.2074 -
accuracy: 0.9830 - val_loss: 8.6173 - val_accuracy: 0.6628
Epoch 34/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2417 -
accuracy: 0.9826 - val_loss: 12.3303 - val_accuracy: 0.7356
Epoch 35/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2049 -
accuracy: 0.9841 - val_loss: 0.8353 - val_accuracy: 0.9281
Epoch 36/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1901 -
accuracy: 0.9850 - val_loss: 2.6684 - val_accuracy: 0.8734
Epoch 37/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1875 -
accuracy: 0.9841 - val_loss: 7.8472 - val_accuracy: 0.7177
Epoch 38/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1863 -
accuracy: 0.9853 - val_loss: 12.4212 - val_accuracy: 0.6828
Epoch 39/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2177 -
accuracy: 0.9820 - val_loss: 3.9662 - val_accuracy: 0.8466
Epoch 40/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2718 -
accuracy: 0.9823 - val_loss: 8.5859 - val_accuracy: 0.7107
Epoch 41/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2255 -
accuracy: 0.9850 - val_loss: 1.7344 - val_accuracy: 0.9031
Epoch 42/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2107 -
accuracy: 0.9852 - val_loss: 4.2773 - val_accuracy: 0.8298
Epoch 43/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2535 -
accuracy: 0.9832 - val_loss: 3.3196 - val_accuracy: 0.8420
Epoch 44/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2226 -
accuracy: 0.9851 - val_loss: 0.8943 - val_accuracy: 0.9359
Epoch 45/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1921 -
accuracy: 0.9859 - val_loss: 5.2663 - val_accuracy: 0.7876
Epoch 46/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1980 -
accuracy: 0.9873 - val_loss: 11.9757 - val_accuracy: 0.6881
Epoch 47/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1923 -
accuracy: 0.9868 - val_loss: 5.9254 - val_accuracy: 0.8208
Epoch 48/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2160 -
accuracy: 0.9853 - val_loss: 18.8914 - val_accuracy: 0.5984
Epoch 49/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.2213 -
accuracy: 0.9849 - val_loss: 15.8648 - val_accuracy: 0.7636
Epoch 50/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2204 -
accuracy: 0.9865 - val_loss: 4.4529 - val_accuracy: 0.8727
Epoch 51/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2010 -
accuracy: 0.9868 - val_loss: 3.8236 - val_accuracy: 0.8515
Epoch 52/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2217 -
accuracy: 0.9863 - val_loss: 7.2482 - val_accuracy: 0.7512
Epoch 53/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2110 -
accuracy: 0.9862 - val_loss: 7.7818 - val_accuracy: 0.8580
Epoch 54/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2109 -
accuracy: 0.9856 - val_loss: 5.3499 - val_accuracy: 0.7940
Epoch 55/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2226 -
accuracy: 0.9847 - val_loss: 10.9095 - val_accuracy: 0.7163
Epoch 56/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2360 -
accuracy: 0.9826 - val_loss: 16.0941 - val_accuracy: 0.7196
Epoch 57/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2625 -
accuracy: 0.9832 - val_loss: 24.5914 - val_accuracy: 0.7350
Epoch 58/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1927 -
accuracy: 0.9877 - val_loss: 4.5292 - val_accuracy: 0.8368
Epoch 59/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1761 -
accuracy: 0.9866 - val_loss: 22.4048 - val_accuracy: 0.5853
Epoch 60/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2538 -
accuracy: 0.9853 - val_loss: 6.9099 - val_accuracy: 0.7998
Epoch 61/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2107 -
accuracy: 0.9867 - val_loss: 8.3465 - val_accuracy: 0.7346
Epoch 62/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2150 -
accuracy: 0.9864 - val_loss: 4.8508 - val_accuracy: 0.8402
Epoch 63/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2538 -
accuracy: 0.9849 - val_loss: 3.9577 - val_accuracy: 0.8378
Epoch 64/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1896 -
accuracy: 0.9878 - val_loss: 1.2430 - val_accuracy: 0.9104
Epoch 65/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.2150 -
accuracy: 0.9871 - val_loss: 13.8790 - val_accuracy: 0.7011
Epoch 66/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2460 -
accuracy: 0.9850 - val_loss: 13.9440 - val_accuracy: 0.7718
Epoch 67/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2146 -
accuracy: 0.9869 - val_loss: 8.8717 - val_accuracy: 0.8012
Epoch 68/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1857 -
accuracy: 0.9871 - val_loss: 16.5860 - val_accuracy: 0.7026
Epoch 69/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2985 -
accuracy: 0.9845 - val_loss: 8.7265 - val_accuracy: 0.7953
Epoch 70/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2186 -
accuracy: 0.9867 - val_loss: 17.8571 - val_accuracy: 0.6708
Epoch 71/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2011 -
accuracy: 0.9882 - val_loss: 10.5670 - val_accuracy: 0.7719
Epoch 72/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1744 -
accuracy: 0.9890 - val_loss: 4.6713 - val_accuracy: 0.8245
Epoch 73/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1908 -
accuracy: 0.9880 - val_loss: 7.7263 - val_accuracy: 0.7773
Epoch 74/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2115 -
accuracy: 0.9881 - val_loss: 17.3672 - val_accuracy: 0.6912
Epoch 75/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2012 -
accuracy: 0.9871 - val_loss: 9.3852 - val_accuracy: 0.7675
Epoch 76/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2570 -
accuracy: 0.9866 - val_loss: 2.0713 - val_accuracy: 0.9131
Epoch 77/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1990 -
accuracy: 0.9882 - val_loss: 11.1419 - val_accuracy: 0.7740
Epoch 78/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1806 -
accuracy: 0.9885 - val_loss: 13.2976 - val_accuracy: 0.7346
Epoch 79/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1523 -
accuracy: 0.9906 - val_loss: 14.8513 - val_accuracy: 0.7428
Epoch 80/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2223 -
accuracy: 0.9877 - val_loss: 11.3590 - val_accuracy: 0.7651
Epoch 81/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1921 -
accuracy: 0.9889 - val_loss: 3.6836 - val_accuracy: 0.8894
Epoch 82/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2265 -
accuracy: 0.9875 - val_loss: 10.1520 - val_accuracy: 0.7754
Epoch 83/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2051 -
accuracy: 0.9875 - val_loss: 14.8111 - val_accuracy: 0.7454
Epoch 84/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1846 -
accuracy: 0.9897 - val_loss: 10.9172 - val_accuracy: 0.7365
Epoch 85/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1959 -
accuracy: 0.9885 - val_loss: 7.4727 - val_accuracy: 0.8521
Epoch 86/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2134 -
accuracy: 0.9880 - val_loss: 6.4657 - val_accuracy: 0.8400
Epoch 87/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2599 -
accuracy: 0.9856 - val_loss: 7.1753 - val_accuracy: 0.8290
Epoch 88/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2176 -
accuracy: 0.9866 - val_loss: 7.2570 - val_accuracy: 0.8294
Epoch 89/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1886 -
accuracy: 0.9895 - val_loss: 3.9322 - val_accuracy: 0.8569
Epoch 90/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2340 -
accuracy: 0.9888 - val_loss: 4.4370 - val_accuracy: 0.8687
Epoch 91/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2021 -
accuracy: 0.9886 - val_loss: 5.4414 - val_accuracy: 0.8578
Epoch 92/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1851 -
accuracy: 0.9890 - val_loss: 4.5608 - val_accuracy: 0.8439
Epoch 93/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1893 -
accuracy: 0.9899 - val_loss: 4.4765 - val_accuracy: 0.8780
Epoch 94/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2237 -
accuracy: 0.9870 - val_loss: 0.7411 - val_accuracy: 0.9446
Epoch 95/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2530 -
accuracy: 0.9860 - val_loss: 5.5906 - val_accuracy: 0.7843
Epoch 96/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2359 -
accuracy: 0.9872 - val_loss: 7.4657 - val_accuracy: 0.8473
Epoch 97/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1497 -
accuracy: 0.9914 - val_loss: 13.1560 - val_accuracy: 0.7678
Epoch 98/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1684 -
accuracy: 0.9900 - val_loss: 5.8139 - val_accuracy: 0.8451
Epoch 99/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2050 -
accuracy: 0.9896 - val_loss: 6.8971 - val_accuracy: 0.8355
Epoch 100/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2084 -
accuracy: 0.9884 - val_loss: 0.6577 - val_accuracy: 0.9582
Epoch 101/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2907 -
accuracy: 0.9863 - val_loss: 20.6399 - val_accuracy: 0.7177
Epoch 102/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1738 -
accuracy: 0.9901 - val_loss: 8.7153 - val_accuracy: 0.8161
Epoch 103/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1950 -
accuracy: 0.9894 - val_loss: 5.7485 - val_accuracy: 0.8419
Epoch 104/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1813 -
accuracy: 0.9903 - val_loss: 9.3745 - val_accuracy: 0.8441
Epoch 105/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1670 -
accuracy: 0.9900 - val_loss: 14.7021 - val_accuracy: 0.7707
Epoch 106/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1446 -
accuracy: 0.9917 - val_loss: 5.5650 - val_accuracy: 0.8464
Epoch 107/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1763 -
accuracy: 0.9905 - val_loss: 3.3252 - val_accuracy: 0.8651
Epoch 108/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1815 -
accuracy: 0.9913 - val_loss: 12.3790 - val_accuracy: 0.7281
Epoch 109/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2233 -
accuracy: 0.9895 - val_loss: 3.8376 - val_accuracy: 0.8478
Epoch 110/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1724 -
accuracy: 0.9905 - val_loss: 6.5878 - val_accuracy: 0.8145
Epoch 111/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1921 -
accuracy: 0.9905 - val_loss: 6.7131 - val_accuracy: 0.8342
Epoch 112/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1739 -
accuracy: 0.9914 - val_loss: 3.8462 - val_accuracy: 0.8747
Epoch 113/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1560 -
accuracy: 0.9912 - val_loss: 4.7042 - val_accuracy: 0.8508
Epoch 114/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1725 -
accuracy: 0.9914 - val_loss: 26.7619 - val_accuracy: 0.6894
Epoch 115/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1863 -
accuracy: 0.9908 - val_loss: 9.3404 - val_accuracy: 0.7820
Epoch 116/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2031 -
accuracy: 0.9893 - val_loss: 7.4627 - val_accuracy: 0.8487
Epoch 117/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1709 -
accuracy: 0.9910 - val_loss: 4.0960 - val_accuracy: 0.8946
Epoch 118/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1641 -
accuracy: 0.9921 - val_loss: 29.5203 - val_accuracy: 0.6292
Epoch 119/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1957 -
accuracy: 0.9896 - val_loss: 2.9852 - val_accuracy: 0.9177
Epoch 120/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2127 -
accuracy: 0.9905 - val_loss: 6.9457 - val_accuracy: 0.8774
Epoch 121/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2067 -
accuracy: 0.9895 - val_loss: 12.0935 - val_accuracy: 0.7946
Epoch 122/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1965 -
accuracy: 0.9884 - val_loss: 17.1049 - val_accuracy: 0.7300
Epoch 123/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2176 -
accuracy: 0.9888 - val_loss: 40.7161 - val_accuracy: 0.6743
Epoch 124/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1654 -
accuracy: 0.9922 - val_loss: 11.8144 - val_accuracy: 0.7902
Epoch 125/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1613 -
accuracy: 0.9917 - val_loss: 6.7391 - val_accuracy: 0.8565
Epoch 126/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1845 -
accuracy: 0.9901 - val_loss: 15.6362 - val_accuracy: 0.7737
Epoch 127/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1585 -
accuracy: 0.9913 - val_loss: 13.1395 - val_accuracy: 0.7608
Epoch 128/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1629 -
accuracy: 0.9913 - val_loss: 1.9630 - val_accuracy: 0.9017
Epoch 129/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1713 -
accuracy: 0.9915 - val_loss: 7.4464 - val_accuracy: 0.8118
Epoch 130/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1734 -
accuracy: 0.9908 - val_loss: 13.7686 - val_accuracy: 0.7289
Epoch 131/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1752 -
accuracy: 0.9912 - val_loss: 8.0021 - val_accuracy: 0.8506
Epoch 132/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2230 -
accuracy: 0.9887 - val_loss: 5.7400 - val_accuracy: 0.8545
Epoch 133/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2002 -
accuracy: 0.9893 - val_loss: 3.6679 - val_accuracy: 0.8817
Epoch 134/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1938 -
accuracy: 0.9907 - val_loss: 4.6169 - val_accuracy: 0.8545
Epoch 135/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1669 -
accuracy: 0.9910 - val_loss: 9.8778 - val_accuracy: 0.8269
Epoch 136/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1641 -
accuracy: 0.9913 - val_loss: 17.2948 - val_accuracy: 0.7067
Epoch 137/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1709 -
accuracy: 0.9905 - val_loss: 7.8776 - val_accuracy: 0.7963
Epoch 138/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1737 -
accuracy: 0.9913 - val_loss: 14.7586 - val_accuracy: 0.7609
Epoch 139/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2080 -
accuracy: 0.9903 - val_loss: 15.1394 - val_accuracy: 0.7127
Epoch 140/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1806 -
accuracy: 0.9913 - val_loss: 11.6187 - val_accuracy: 0.8019
Epoch 141/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1673 -
accuracy: 0.9914 - val_loss: 3.8779 - val_accuracy: 0.8806
Epoch 142/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1834 -
accuracy: 0.9916 - val_loss: 19.5991 - val_accuracy: 0.7303
Epoch 143/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1470 -
accuracy: 0.9929 - val_loss: 3.1814 - val_accuracy: 0.8999
Epoch 144/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1366 -
accuracy: 0.9932 - val_loss: 2.9808 - val_accuracy: 0.8907
Epoch 145/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1997 -
accuracy: 0.9902 - val_loss: 3.3052 - val_accuracy: 0.8903
Epoch 146/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2068 -
accuracy: 0.9891 - val_loss: 4.6579 - val_accuracy: 0.8374
Epoch 147/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1734 -
accuracy: 0.9918 - val_loss: 5.1664 - val_accuracy: 0.8453
Epoch 148/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1790 -
accuracy: 0.9908 - val_loss: 9.0682 - val_accuracy: 0.8194
Epoch 149/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1973 -
accuracy: 0.9914 - val_loss: 1.5986 - val_accuracy: 0.9548
Epoch 150/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2166 -
accuracy: 0.9887 - val_loss: 3.9080 - val_accuracy: 0.8917
Epoch 151/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2135 -
accuracy: 0.9892 - val_loss: 1.3616 - val_accuracy: 0.9281
Epoch 152/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1570 -
accuracy: 0.9922 - val_loss: 2.9872 - val_accuracy: 0.8977
Epoch 153/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1823 -
accuracy: 0.9902 - val_loss: 12.1114 - val_accuracy: 0.7269
Epoch 154/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1716 -
accuracy: 0.9908 - val_loss: 6.1576 - val_accuracy: 0.8282
Epoch 155/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1766 -
accuracy: 0.9916 - val_loss: 5.6415 - val_accuracy: 0.9067
Epoch 156/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2744 -
accuracy: 0.9890 - val_loss: 7.1192 - val_accuracy: 0.8418
Epoch 157/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1577 -
accuracy: 0.9920 - val_loss: 10.7940 - val_accuracy: 0.8205
Epoch 158/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1596 -
accuracy: 0.9919 - val_loss: 17.0545 - val_accuracy: 0.7472
Epoch 159/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1405 -
accuracy: 0.9928 - val_loss: 9.0271 - val_accuracy: 0.8802
Epoch 160/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1759 -
accuracy: 0.9903 - val_loss: 1.2280 - val_accuracy: 0.9392
Epoch 161/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1427 -
accuracy: 0.9930 - val_loss: 3.8531 - val_accuracy: 0.8927
Epoch 162/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1481 -
accuracy: 0.9929 - val_loss: 5.3037 - val_accuracy: 0.8809
Epoch 163/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1727 -
accuracy: 0.9912 - val_loss: 4.8586 - val_accuracy: 0.8924
Epoch 164/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1837 -
accuracy: 0.9920 - val_loss: 3.7154 - val_accuracy: 0.8983
Epoch 165/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2115 -
accuracy: 0.9908 - val_loss: 3.6458 - val_accuracy: 0.8919
Epoch 166/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2172 -
accuracy: 0.9905 - val_loss: 3.5162 - val_accuracy: 0.9126
Epoch 167/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1817 -
accuracy: 0.9913 - val_loss: 7.0227 - val_accuracy: 0.8008
Epoch 168/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1823 -
accuracy: 0.9901 - val_loss: 4.0781 - val_accuracy: 0.9103
Epoch 169/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2311 -
accuracy: 0.9871 - val_loss: 6.8468 - val_accuracy: 0.8700
Epoch 170/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2023 -
accuracy: 0.9889 - val_loss: 6.5653 - val_accuracy: 0.8330
Epoch 171/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2118 -
accuracy: 0.9898 - val_loss: 10.8272 - val_accuracy: 0.8151
Epoch 172/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1856 -
accuracy: 0.9917 - val_loss: 3.2130 - val_accuracy: 0.8825
Epoch 173/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2108 -
accuracy: 0.9901 - val_loss: 5.1814 - val_accuracy: 0.8769
Epoch 174/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1898 -
accuracy: 0.9906 - val_loss: 5.5273 - val_accuracy: 0.8669
Epoch 175/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1648 -
accuracy: 0.9917 - val_loss: 11.0253 - val_accuracy: 0.7894
Epoch 176/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1893 -
accuracy: 0.9907 - val_loss: 6.6151 - val_accuracy: 0.8871
Epoch 177/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1736 -
accuracy: 0.9918 - val_loss: 7.9989 - val_accuracy: 0.8045
Epoch 178/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1705 -
accuracy: 0.9921 - val_loss: 3.7776 - val_accuracy: 0.9059
Epoch 179/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1709 -
accuracy: 0.9916 - val_loss: 0.9466 - val_accuracy: 0.9476
Epoch 180/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1845 -
accuracy: 0.9924 - val_loss: 0.1664 - val_accuracy: 0.9928
Epoch 181/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1652 -
accuracy: 0.9918 - val_loss: 2.3220 - val_accuracy: 0.9334
Epoch 182/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1636 -
accuracy: 0.9911 - val_loss: 6.7941 - val_accuracy: 0.8695
Epoch 183/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1800 -
accuracy: 0.9918 - val_loss: 2.2027 - val_accuracy: 0.9041
Epoch 184/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1667 -
accuracy: 0.9922 - val_loss: 5.6850 - val_accuracy: 0.8860
Epoch 185/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2272 -
accuracy: 0.9891 - val_loss: 7.8987 - val_accuracy: 0.8642
Epoch 186/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1836 -
accuracy: 0.9926 - val_loss: 4.5760 - val_accuracy: 0.8872
Epoch 187/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1791 -
accuracy: 0.9919 - val_loss: 5.9787 - val_accuracy: 0.8478
Epoch 188/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1639 -
accuracy: 0.9925 - val_loss: 3.5471 - val_accuracy: 0.9064
Epoch 189/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1809 -
accuracy: 0.9925 - val_loss: 4.3734 - val_accuracy: 0.8861
Epoch 190/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1833 -
accuracy: 0.9913 - val_loss: 11.2222 - val_accuracy: 0.8045
Epoch 191/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1687 -
accuracy: 0.9921 - val_loss: 6.1106 - val_accuracy: 0.8403
Epoch 192/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1827 -
accuracy: 0.9912 - val_loss: 9.6744 - val_accuracy: 0.8002
Epoch 193/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1584 -
accuracy: 0.9935 - val_loss: 3.8533 - val_accuracy: 0.8931
Epoch 194/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1613 -
accuracy: 0.9918 - val_loss: 4.9291 - val_accuracy: 0.8777
Epoch 195/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2006 -
accuracy: 0.9900 - val_loss: 9.5757 - val_accuracy: 0.7982
Epoch 196/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1583 -
accuracy: 0.9929 - val_loss: 4.5219 - val_accuracy: 0.8795
Epoch 197/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1586 -
accuracy: 0.9929 - val_loss: 6.6311 - val_accuracy: 0.8692
Epoch 198/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1581 -
accuracy: 0.9918 - val_loss: 8.1736 - val_accuracy: 0.8177
Epoch 199/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1718 -
accuracy: 0.9918 - val_loss: 9.0676 - val_accuracy: 0.8152
Epoch 200/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1607 -
accuracy: 0.9919 - val_loss: 8.8967 - val_accuracy: 0.8418
Epoch 201/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1497 -
accuracy: 0.9919 - val_loss: 16.5802 - val_accuracy: 0.7786
Epoch 202/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1457 -
accuracy: 0.9927 - val_loss: 10.0194 - val_accuracy: 0.8514
Epoch 203/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1539 -
accuracy: 0.9927 - val_loss: 46.8358 - val_accuracy: 0.6035
Epoch 204/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1909 -
accuracy: 0.9922 - val_loss: 10.7239 - val_accuracy: 0.8454
Epoch 205/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1491 -
accuracy: 0.9927 - val_loss: 14.0366 - val_accuracy: 0.8122
Epoch 206/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1610 -
accuracy: 0.9921 - val_loss: 8.5553 - val_accuracy: 0.8463
Epoch 207/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1704 -
accuracy: 0.9907 - val_loss: 8.4170 - val_accuracy: 0.8466
Epoch 208/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1375 -
accuracy: 0.9930 - val_loss: 15.1511 - val_accuracy: 0.7671
Epoch 209/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1295 -
accuracy: 0.9940 - val_loss: 3.9237 - val_accuracy: 0.8857
Epoch 210/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1587 -
accuracy: 0.9931 - val_loss: 21.6420 - val_accuracy: 0.7303
Epoch 211/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2007 -
accuracy: 0.9901 - val_loss: 18.9182 - val_accuracy: 0.7852
Epoch 212/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1652 -
accuracy: 0.9915 - val_loss: 11.7712 - val_accuracy: 0.7960
Epoch 213/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2119 -
accuracy: 0.9908 - val_loss: 19.6022 - val_accuracy: 0.7819
Epoch 214/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1350 -
accuracy: 0.9938 - val_loss: 16.9574 - val_accuracy: 0.7926
Epoch 215/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1912 -
accuracy: 0.9922 - val_loss: 9.3344 - val_accuracy: 0.8448
Epoch 216/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1870 -
accuracy: 0.9924 - val_loss: 10.6472 - val_accuracy: 0.8354
Epoch 217/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1489 -
accuracy: 0.9931 - val_loss: 9.7925 - val_accuracy: 0.8308
Epoch 218/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1420 -
accuracy: 0.9930 - val_loss: 7.0297 - val_accuracy: 0.8024
Epoch 219/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1826 -
accuracy: 0.9921 - val_loss: 15.9351 - val_accuracy: 0.7528
Epoch 220/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1694 -
accuracy: 0.9931 - val_loss: 4.2751 - val_accuracy: 0.9249
Epoch 221/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1556 -
accuracy: 0.9930 - val_loss: 57.0744 - val_accuracy: 0.5184
Epoch 222/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1706 -
accuracy: 0.9914 - val_loss: 5.9243 - val_accuracy: 0.9082
Epoch 223/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1710 -
accuracy: 0.9929 - val_loss: 7.0090 - val_accuracy: 0.8532
Epoch 224/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1728 -
accuracy: 0.9922 - val_loss: 10.2204 - val_accuracy: 0.8095
Epoch 225/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1559 -
accuracy: 0.9921 - val_loss: 5.4151 - val_accuracy: 0.8400
Epoch 226/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1704 -
accuracy: 0.9924 - val_loss: 18.9565 - val_accuracy: 0.7510
Epoch 227/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1489 -
accuracy: 0.9929 - val_loss: 10.1818 - val_accuracy: 0.8405
Epoch 228/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1436 -
accuracy: 0.9939 - val_loss: 11.6158 - val_accuracy: 0.8039
Epoch 229/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1388 -
accuracy: 0.9940 - val_loss: 3.5191 - val_accuracy: 0.8983
Epoch 230/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1417 -
accuracy: 0.9929 - val_loss: 5.6790 - val_accuracy: 0.8722
Epoch 231/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1246 -
accuracy: 0.9945 - val_loss: 5.6701 - val_accuracy: 0.8437
Epoch 232/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1775 -
accuracy: 0.9923 - val_loss: 11.9029 - val_accuracy: 0.8158
Epoch 233/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1653 -
accuracy: 0.9923 - val_loss: 8.1601 - val_accuracy: 0.8694
Epoch 234/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1564 -
accuracy: 0.9933 - val_loss: 5.8702 - val_accuracy: 0.8845
Epoch 235/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1525 -
accuracy: 0.9936 - val_loss: 21.7817 - val_accuracy: 0.7870
Epoch 236/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1663 -
accuracy: 0.9924 - val_loss: 4.2277 - val_accuracy: 0.9040
Epoch 237/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2040 -
accuracy: 0.9921 - val_loss: 2.5716 - val_accuracy: 0.9291
Epoch 238/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1202 -
accuracy: 0.9944 - val_loss: 6.4450 - val_accuracy: 0.8774
Epoch 239/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1527 -
accuracy: 0.9936 - val_loss: 2.4121 - val_accuracy: 0.9141
Epoch 240/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1391 -
accuracy: 0.9942 - val_loss: 31.7522 - val_accuracy: 0.6877
Epoch 241/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1794 -
accuracy: 0.9919 - val_loss: 12.0297 - val_accuracy: 0.8297
Epoch 242/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1939 -
accuracy: 0.9911 - val_loss: 16.5397 - val_accuracy: 0.7333
Epoch 243/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1766 -
accuracy: 0.9918 - val_loss: 14.6960 - val_accuracy: 0.7610
Epoch 244/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1618 -
accuracy: 0.9922 - val_loss: 22.0598 - val_accuracy: 0.6928
Epoch 245/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1261 -
accuracy: 0.9939 - val_loss: 9.4122 - val_accuracy: 0.8331
Epoch 246/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1392 -
accuracy: 0.9934 - val_loss: 14.0613 - val_accuracy: 0.8018
Epoch 247/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1448 -
accuracy: 0.9925 - val_loss: 7.4521 - val_accuracy: 0.9033
Epoch 248/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1406 -
accuracy: 0.9938 - val_loss: 4.4828 - val_accuracy: 0.8568
Epoch 249/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1492 -
accuracy: 0.9933 - val_loss: 3.6536 - val_accuracy: 0.9002
Epoch 250/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1655 -
accuracy: 0.9921 - val_loss: 12.7165 - val_accuracy: 0.7963
Epoch 251/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1483 -
accuracy: 0.9926 - val_loss: 18.6737 - val_accuracy: 0.7682
Epoch 252/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1605 -
accuracy: 0.9927 - val_loss: 14.6004 - val_accuracy: 0.7675
Epoch 253/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1225 -
accuracy: 0.9948 - val_loss: 6.7087 - val_accuracy: 0.8473
Epoch 254/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1165 -
accuracy: 0.9942 - val_loss: 11.7029 - val_accuracy: 0.7980
Epoch 255/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1165 -
accuracy: 0.9948 - val_loss: 15.0704 - val_accuracy: 0.8453
Epoch 256/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1635 -
accuracy: 0.9927 - val_loss: 10.8266 - val_accuracy: 0.8305
Epoch 257/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1683 -
accuracy: 0.9933 - val_loss: 13.0752 - val_accuracy: 0.8079
Epoch 258/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2181 -
accuracy: 0.9912 - val_loss: 20.0427 - val_accuracy: 0.7461
Epoch 259/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1893 -
accuracy: 0.9916 - val_loss: 40.3515 - val_accuracy: 0.6475
Epoch 260/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1516 -
accuracy: 0.9936 - val_loss: 4.4210 - val_accuracy: 0.9195
Epoch 261/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1542 -
accuracy: 0.9934 - val_loss: 10.7427 - val_accuracy: 0.8099
Epoch 262/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1303 -
accuracy: 0.9936 - val_loss: 9.5641 - val_accuracy: 0.8179
Epoch 263/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1158 -
accuracy: 0.9949 - val_loss: 8.5180 - val_accuracy: 0.8620
Epoch 264/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1891 -
accuracy: 0.9917 - val_loss: 13.8013 - val_accuracy: 0.7484
Epoch 265/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1791 -
accuracy: 0.9920 - val_loss: 18.1235 - val_accuracy: 0.7364
Epoch 266/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1390 -
accuracy: 0.9936 - val_loss: 9.7816 - val_accuracy: 0.8358
Epoch 267/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1254 -
accuracy: 0.9939 - val_loss: 6.9803 - val_accuracy: 0.8725
Epoch 268/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1456 -
accuracy: 0.9938 - val_loss: 6.2058 - val_accuracy: 0.8736
Epoch 269/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1467 -
accuracy: 0.9940 - val_loss: 8.6704 - val_accuracy: 0.8390
Epoch 270/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1368 -
accuracy: 0.9937 - val_loss: 5.9479 - val_accuracy: 0.8731
Epoch 271/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1401 -
accuracy: 0.9940 - val_loss: 30.0105 - val_accuracy: 0.6451
Epoch 272/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1557 -
accuracy: 0.9937 - val_loss: 7.9249 - val_accuracy: 0.8624
Epoch 273/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1502 -
accuracy: 0.9927 - val_loss: 10.7246 - val_accuracy: 0.8124
Epoch 274/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1172 -
accuracy: 0.9945 - val_loss: 6.0582 - val_accuracy: 0.8463
Epoch 275/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0992 -
accuracy: 0.9953 - val_loss: 4.6456 - val_accuracy: 0.8845
Epoch 276/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1504 -
accuracy: 0.9941 - val_loss: 3.3447 - val_accuracy: 0.9038
Epoch 277/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1357 -
accuracy: 0.9937 - val_loss: 11.5627 - val_accuracy: 0.8355
Epoch 278/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1080 -
accuracy: 0.9951 - val_loss: 17.1971 - val_accuracy: 0.7854
Epoch 279/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1328 -
accuracy: 0.9948 - val_loss: 5.3330 - val_accuracy: 0.8970
Epoch 280/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1762 -
accuracy: 0.9928 - val_loss: 5.5733 - val_accuracy: 0.8598
Epoch 281/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1683 -
accuracy: 0.9932 - val_loss: 16.4621 - val_accuracy: 0.7955
Epoch 282/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1445 -
accuracy: 0.9937 - val_loss: 14.4113 - val_accuracy: 0.7866
Epoch 283/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1420 -
accuracy: 0.9938 - val_loss: 12.4242 - val_accuracy: 0.8295
Epoch 284/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1900 -
accuracy: 0.9918 - val_loss: 11.4960 - val_accuracy: 0.8359
Epoch 285/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1553 -
accuracy: 0.9932 - val_loss: 2.8106 - val_accuracy: 0.9386
Epoch 286/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1670 -
accuracy: 0.9922 - val_loss: 6.9977 - val_accuracy: 0.8458
Epoch 287/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1677 -
accuracy: 0.9935 - val_loss: 11.4401 - val_accuracy: 0.7982
Epoch 288/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1772 -
accuracy: 0.9934 - val_loss: 9.7277 - val_accuracy: 0.8087
Epoch 289/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1607 -
accuracy: 0.9927 - val_loss: 0.2499 - val_accuracy: 0.9852
Epoch 290/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1725 -
accuracy: 0.9933 - val_loss: 4.5617 - val_accuracy: 0.8858
Epoch 291/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1597 -
accuracy: 0.9941 - val_loss: 9.5481 - val_accuracy: 0.8119
Epoch 292/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1837 -
accuracy: 0.9917 - val_loss: 8.3469 - val_accuracy: 0.8584
Epoch 293/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1445 -
accuracy: 0.9940 - val_loss: 3.0674 - val_accuracy: 0.9129
Epoch 294/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1613 -
accuracy: 0.9933 - val_loss: 10.5453 - val_accuracy: 0.8219
Epoch 295/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1661 -
accuracy: 0.9930 - val_loss: 8.9111 - val_accuracy: 0.8266
Epoch 296/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1126 -
accuracy: 0.9949 - val_loss: 7.1994 - val_accuracy: 0.8386
Epoch 297/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1395 -
accuracy: 0.9942 - val_loss: 7.5863 - val_accuracy: 0.8676
Epoch 298/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1438 -
accuracy: 0.9940 - val_loss: 7.0221 - val_accuracy: 0.8577
Epoch 299/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1257 -
accuracy: 0.9945 - val_loss: 4.4393 - val_accuracy: 0.9017
Epoch 300/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1130 -
accuracy: 0.9946 - val_loss: 10.1660 - val_accuracy: 0.8315
Epoch 301/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1064 -
accuracy: 0.9952 - val_loss: 13.7181 - val_accuracy: 0.8052
Epoch 302/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1411 -
accuracy: 0.9940 - val_loss: 1.5568 - val_accuracy: 0.9309
Epoch 303/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1342 -
accuracy: 0.9939 - val_loss: 2.0601 - val_accuracy: 0.9275
Epoch 304/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1092 -
accuracy: 0.9951 - val_loss: 11.3852 - val_accuracy: 0.8017
Epoch 305/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1414 -
accuracy: 0.9939 - val_loss: 12.3375 - val_accuracy: 0.8061
Epoch 306/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1267 -
accuracy: 0.9952 - val_loss: 6.1506 - val_accuracy: 0.8795
Epoch 307/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1218 -
accuracy: 0.9950 - val_loss: 11.3946 - val_accuracy: 0.8126
Epoch 308/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1312 -
accuracy: 0.9946 - val_loss: 17.4045 - val_accuracy: 0.7433
Epoch 309/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1719 -
accuracy: 0.9934 - val_loss: 10.7696 - val_accuracy: 0.8011
Epoch 310/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1281 -
accuracy: 0.9948 - val_loss: 3.2487 - val_accuracy: 0.9125
Epoch 311/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1699 -
accuracy: 0.9933 - val_loss: 12.0605 - val_accuracy: 0.8367
Epoch 312/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1626 -
accuracy: 0.9932 - val_loss: 17.7615 - val_accuracy: 0.7909
Epoch 313/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1476 -
accuracy: 0.9937 - val_loss: 8.7882 - val_accuracy: 0.8882
Epoch 314/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1290 -
accuracy: 0.9942 - val_loss: 2.4650 - val_accuracy: 0.9454
Epoch 315/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1227 -
accuracy: 0.9943 - val_loss: 13.2682 - val_accuracy: 0.7978
Epoch 316/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1454 -
accuracy: 0.9933 - val_loss: 12.0845 - val_accuracy: 0.8264
Epoch 317/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1604 -
accuracy: 0.9928 - val_loss: 9.8534 - val_accuracy: 0.8276
Epoch 318/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1505 -
accuracy: 0.9931 - val_loss: 4.4679 - val_accuracy: 0.8826
Epoch 319/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1723 -
accuracy: 0.9920 - val_loss: 4.1321 - val_accuracy: 0.9005
Epoch 320/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1357 -
accuracy: 0.9941 - val_loss: 4.9138 - val_accuracy: 0.8815
Epoch 321/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1579 -
accuracy: 0.9935 - val_loss: 7.7455 - val_accuracy: 0.8403
Epoch 322/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1737 -
accuracy: 0.9935 - val_loss: 3.9446 - val_accuracy: 0.9085
Epoch 323/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1370 -
accuracy: 0.9944 - val_loss: 13.1309 - val_accuracy: 0.7967
Epoch 324/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1217 -
accuracy: 0.9946 - val_loss: 6.9692 - val_accuracy: 0.8765
Epoch 325/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1459 -
accuracy: 0.9936 - val_loss: 8.3282 - val_accuracy: 0.8662
Epoch 326/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1228 -
accuracy: 0.9948 - val_loss: 3.4826 - val_accuracy: 0.9056
Epoch 327/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1469 -
accuracy: 0.9948 - val_loss: 4.3353 - val_accuracy: 0.9103
Epoch 328/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1252 -
accuracy: 0.9954 - val_loss: 6.7702 - val_accuracy: 0.8898
Epoch 329/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1251 -
accuracy: 0.9953 - val_loss: 12.9254 - val_accuracy: 0.8242
Epoch 330/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1254 -
accuracy: 0.9941 - val_loss: 11.8429 - val_accuracy: 0.8208
Epoch 331/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1191 -
accuracy: 0.9944 - val_loss: 13.6674 - val_accuracy: 0.8125
Epoch 332/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1290 -
accuracy: 0.9935 - val_loss: 6.9680 - val_accuracy: 0.8768
Epoch 333/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0916 -
accuracy: 0.9954 - val_loss: 3.5406 - val_accuracy: 0.9350
Epoch 334/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1249 -
accuracy: 0.9945 - val_loss: 3.1915 - val_accuracy: 0.9388
Epoch 335/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1302 -
accuracy: 0.9945 - val_loss: 9.5290 - val_accuracy: 0.8409
Epoch 336/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1854 -
accuracy: 0.9917 - val_loss: 0.5596 - val_accuracy: 0.9851
Epoch 337/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1314 -
accuracy: 0.9945 - val_loss: 2.0224 - val_accuracy: 0.9352
Epoch 338/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1090 -
accuracy: 0.9951 - val_loss: 5.5127 - val_accuracy: 0.9027
Epoch 339/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0824 -
accuracy: 0.9963 - val_loss: 2.8635 - val_accuracy: 0.9046
Epoch 340/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0982 -
accuracy: 0.9954 - val_loss: 6.1086 - val_accuracy: 0.8785
Epoch 341/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0770 -
accuracy: 0.9961 - val_loss: 7.8920 - val_accuracy: 0.8803
Epoch 342/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0960 -
accuracy: 0.9962 - val_loss: 1.1722 - val_accuracy: 0.9573
Epoch 343/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1478 -
accuracy: 0.9933 - val_loss: 4.6231 - val_accuracy: 0.9106
Epoch 344/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1520 -
accuracy: 0.9944 - val_loss: 6.0717 - val_accuracy: 0.8798
Epoch 345/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1033 -
accuracy: 0.9956 - val_loss: 3.1042 - val_accuracy: 0.9192
Epoch 346/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1167 -
accuracy: 0.9952 - val_loss: 3.3371 - val_accuracy: 0.9090
Epoch 347/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1079 -
accuracy: 0.9951 - val_loss: 5.5428 - val_accuracy: 0.8963
Epoch 348/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1213 -
accuracy: 0.9947 - val_loss: 4.9295 - val_accuracy: 0.8846
Epoch 349/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0912 -
accuracy: 0.9958 - val_loss: 7.3828 - val_accuracy: 0.8418
Epoch 350/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0806 -
accuracy: 0.9964 - val_loss: 7.0525 - val_accuracy: 0.8940
Epoch 351/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1224 -
accuracy: 0.9944 - val_loss: 10.6611 - val_accuracy: 0.8483
Epoch 352/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1321 -
accuracy: 0.9944 - val_loss: 4.3319 - val_accuracy: 0.9004
Epoch 353/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1065 -
accuracy: 0.9948 - val_loss: 5.8339 - val_accuracy: 0.8750
Epoch 354/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1061 -
accuracy: 0.9957 - val_loss: 5.8168 - val_accuracy: 0.8802
Epoch 355/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1145 -
accuracy: 0.9960 - val_loss: 2.8616 - val_accuracy: 0.9328
Epoch 356/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1200 -
accuracy: 0.9950 - val_loss: 5.1943 - val_accuracy: 0.8916
Epoch 357/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1013 -
accuracy: 0.9955 - val_loss: 7.1951 - val_accuracy: 0.8683
Epoch 358/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1169 -
accuracy: 0.9951 - val_loss: 4.8215 - val_accuracy: 0.8983
Epoch 359/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1229 -
accuracy: 0.9947 - val_loss: 3.6979 - val_accuracy: 0.9468
Epoch 360/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1044 -
accuracy: 0.9951 - val_loss: 10.5395 - val_accuracy: 0.8609
Epoch 361/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1067 -
accuracy: 0.9955 - val_loss: 11.3480 - val_accuracy: 0.8658
Epoch 362/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1253 -
accuracy: 0.9956 - val_loss: 5.0266 - val_accuracy: 0.8991
Epoch 363/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1243 -
accuracy: 0.9957 - val_loss: 4.6638 - val_accuracy: 0.9278
Epoch 364/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1358 -
accuracy: 0.9945 - val_loss: 7.1553 - val_accuracy: 0.8804
Epoch 365/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1998 -
accuracy: 0.9908 - val_loss: 15.9030 - val_accuracy: 0.7973
Epoch 366/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1244 -
accuracy: 0.9949 - val_loss: 6.0951 - val_accuracy: 0.9017
Epoch 367/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1092 -
accuracy: 0.9960 - val_loss: 19.6115 - val_accuracy: 0.7804
Epoch 368/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1306 -
accuracy: 0.9945 - val_loss: 4.1785 - val_accuracy: 0.9209
Epoch 369/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1677 -
accuracy: 0.9926 - val_loss: 9.3964 - val_accuracy: 0.8974
Epoch 370/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1410 -
accuracy: 0.9940 - val_loss: 1.0495 - val_accuracy: 0.9645
Epoch 371/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1365 -
accuracy: 0.9942 - val_loss: 10.3538 - val_accuracy: 0.8596
Epoch 372/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1178 -
accuracy: 0.9944 - val_loss: 9.8794 - val_accuracy: 0.8631
Epoch 373/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1360 -
accuracy: 0.9940 - val_loss: 3.5203 - val_accuracy: 0.9321
Epoch 374/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1021 -
accuracy: 0.9957 - val_loss: 3.4708 - val_accuracy: 0.9235
Epoch 375/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1007 -
accuracy: 0.9954 - val_loss: 4.7723 - val_accuracy: 0.9096
Epoch 376/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1110 -
accuracy: 0.9944 - val_loss: 3.9046 - val_accuracy: 0.9266
Epoch 377/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1415 -
accuracy: 0.9935 - val_loss: 10.1316 - val_accuracy: 0.8788
Epoch 378/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1375 -
accuracy: 0.9942 - val_loss: 8.5119 - val_accuracy: 0.8892
Epoch 379/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1013 -
accuracy: 0.9956 - val_loss: 10.6201 - val_accuracy: 0.8819
Epoch 380/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1097 -
accuracy: 0.9955 - val_loss: 7.4315 - val_accuracy: 0.8891
Epoch 381/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1316 -
accuracy: 0.9955 - val_loss: 3.6991 - val_accuracy: 0.9397
Epoch 382/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1519 -
accuracy: 0.9939 - val_loss: 5.5546 - val_accuracy: 0.9074
Epoch 383/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1402 -
accuracy: 0.9928 - val_loss: 3.7588 - val_accuracy: 0.9282
Epoch 384/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1097 -
accuracy: 0.9955 - val_loss: 9.8760 - val_accuracy: 0.8733
Epoch 385/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1011 -
accuracy: 0.9951 - val_loss: 4.5257 - val_accuracy: 0.9102
Epoch 386/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1115 -
accuracy: 0.9956 - val_loss: 14.8242 - val_accuracy: 0.8363
Epoch 387/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1214 -
accuracy: 0.9955 - val_loss: 7.5632 - val_accuracy: 0.9160
Epoch 388/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0670 -
accuracy: 0.9972 - val_loss: 5.0962 - val_accuracy: 0.9192
Epoch 389/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1433 -
accuracy: 0.9937 - val_loss: 3.3103 - val_accuracy: 0.9522
Epoch 390/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1516 -
accuracy: 0.9934 - val_loss: 7.2696 - val_accuracy: 0.9061
Epoch 391/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1179 -
accuracy: 0.9954 - val_loss: 10.8954 - val_accuracy: 0.8594
Epoch 392/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1151 -
accuracy: 0.9953 - val_loss: 8.6530 - val_accuracy: 0.8640
Epoch 393/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1240 -
accuracy: 0.9947 - val_loss: 5.5911 - val_accuracy: 0.8894
Epoch 394/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1420 -
accuracy: 0.9942 - val_loss: 10.6347 - val_accuracy: 0.8527
Epoch 395/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1812 -
accuracy: 0.9941 - val_loss: 8.5546 - val_accuracy: 0.8612
Epoch 396/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1423 -
accuracy: 0.9942 - val_loss: 10.8514 - val_accuracy: 0.8546
Epoch 397/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1462 -
accuracy: 0.9950 - val_loss: 2.2667 - val_accuracy: 0.9223
Epoch 398/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1407 -
accuracy: 0.9947 - val_loss: 8.2114 - val_accuracy: 0.8114
Epoch 399/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1367 -
accuracy: 0.9952 - val_loss: 9.2828 - val_accuracy: 0.8287
Epoch 400/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1500 -
accuracy: 0.9944 - val_loss: 9.3109 - val_accuracy: 0.8243
Epoch 401/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1363 -
accuracy: 0.9947 - val_loss: 7.1987 - val_accuracy: 0.8518
Epoch 402/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1241 -
accuracy: 0.9950 - val_loss: 14.9003 - val_accuracy: 0.7637
Epoch 403/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1348 -
accuracy: 0.9956 - val_loss: 8.5697 - val_accuracy: 0.8306
Epoch 404/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1549 -
accuracy: 0.9945 - val_loss: 4.6851 - val_accuracy: 0.8772
Epoch 405/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1604 -
accuracy: 0.9933 - val_loss: 37.1587 - val_accuracy: 0.7146
Epoch 406/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1593 -
accuracy: 0.9944 - val_loss: 2.1755 - val_accuracy: 0.9188
Epoch 407/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1244 -
accuracy: 0.9954 - val_loss: 7.8214 - val_accuracy: 0.8670
Epoch 408/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1048 -
accuracy: 0.9962 - val_loss: 13.8361 - val_accuracy: 0.7819
Epoch 409/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1700 -
accuracy: 0.9943 - val_loss: 5.6539 - val_accuracy: 0.8679
Epoch 410/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1705 -
accuracy: 0.9909 - val_loss: 8.8504 - val_accuracy: 0.8165
Epoch 411/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1599 -
accuracy: 0.9929 - val_loss: 5.8874 - val_accuracy: 0.8525
Epoch 412/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1300 -
accuracy: 0.9955 - val_loss: 2.6224 - val_accuracy: 0.8885
Epoch 413/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1040 -
accuracy: 0.9956 - val_loss: 1.0419 - val_accuracy: 0.9592
Epoch 414/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1067 -
accuracy: 0.9958 - val_loss: 10.0423 - val_accuracy: 0.8298
Epoch 415/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1226 -
accuracy: 0.9954 - val_loss: 20.3371 - val_accuracy: 0.7677
Epoch 416/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1434 -
accuracy: 0.9947 - val_loss: 7.3731 - val_accuracy: 0.8548
Epoch 417/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1378 -
accuracy: 0.9940 - val_loss: 9.5301 - val_accuracy: 0.8363
Epoch 418/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1333 -
accuracy: 0.9948 - val_loss: 3.8483 - val_accuracy: 0.8847
Epoch 419/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1229 -
accuracy: 0.9950 - val_loss: 8.3458 - val_accuracy: 0.8559
Epoch 420/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1612 -
accuracy: 0.9940 - val_loss: 16.6211 - val_accuracy: 0.7669
Epoch 421/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1507 -
accuracy: 0.9943 - val_loss: 4.0405 - val_accuracy: 0.8786
Epoch 422/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1501 -
accuracy: 0.9945 - val_loss: 5.2290 - val_accuracy: 0.8961
Epoch 423/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1259 -
accuracy: 0.9951 - val_loss: 8.5748 - val_accuracy: 0.8832
Epoch 424/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1238 -
accuracy: 0.9954 - val_loss: 10.2575 - val_accuracy: 0.8098
Epoch 425/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0968 -
accuracy: 0.9959 - val_loss: 5.6664 - val_accuracy: 0.8777
Epoch 426/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1161 -
accuracy: 0.9952 - val_loss: 8.7186 - val_accuracy: 0.8654
Epoch 427/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1274 -
accuracy: 0.9950 - val_loss: 14.1246 - val_accuracy: 0.8271
Epoch 428/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1122 -
accuracy: 0.9952 - val_loss: 4.8627 - val_accuracy: 0.8944
Epoch 429/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1331 -
accuracy: 0.9933 - val_loss: 7.6564 - val_accuracy: 0.8772
Epoch 430/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1378 -
accuracy: 0.9945 - val_loss: 22.3952 - val_accuracy: 0.7500
Epoch 431/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1377 -
accuracy: 0.9947 - val_loss: 11.7812 - val_accuracy: 0.8387
Epoch 432/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1428 -
accuracy: 0.9947 - val_loss: 8.3830 - val_accuracy: 0.8616
Epoch 433/500
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415/415 [==============================] - 2s 4ms/step - loss: 0.1271 -
accuracy: 0.9956 - val_loss: 13.8168 - val_accuracy: 0.7971
Epoch 434/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1442 -
accuracy: 0.9949 - val_loss: 4.8223 - val_accuracy: 0.8937
Epoch 435/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1780 -
accuracy: 0.9934 - val_loss: 5.3161 - val_accuracy: 0.8734
Epoch 436/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1925 -
accuracy: 0.9911 - val_loss: 5.7784 - val_accuracy: 0.9008
Epoch 437/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1124 -
accuracy: 0.9959 - val_loss: 3.6192 - val_accuracy: 0.9381
Epoch 438/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1142 -
accuracy: 0.9954 - val_loss: 5.8804 - val_accuracy: 0.9186
Epoch 439/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1296 -
accuracy: 0.9961 - val_loss: 20.1911 - val_accuracy: 0.7548
Epoch 440/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0995 -
accuracy: 0.9962 - val_loss: 4.9244 - val_accuracy: 0.8808
Epoch 441/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1311 -
accuracy: 0.9947 - val_loss: 8.1595 - val_accuracy: 0.8369
Epoch 442/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0785 -
accuracy: 0.9966 - val_loss: 15.5178 - val_accuracy: 0.7627
Epoch 443/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1023 -
accuracy: 0.9960 - val_loss: 9.7286 - val_accuracy: 0.8234
Epoch 444/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1198 -
accuracy: 0.9958 - val_loss: 3.0013 - val_accuracy: 0.9471
Epoch 445/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1101 -
accuracy: 0.9959 - val_loss: 5.3100 - val_accuracy: 0.8741
Epoch 446/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0977 -
accuracy: 0.9958 - val_loss: 3.8363 - val_accuracy: 0.9126
Epoch 447/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0947 -
accuracy: 0.9960 - val_loss: 21.9649 - val_accuracy: 0.6912
Epoch 448/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1560 -
accuracy: 0.9940 - val_loss: 12.9530 - val_accuracy: 0.7611
Epoch 449/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1855 -
accuracy: 0.9935 - val_loss: 14.8747 - val_accuracy: 0.7820
Epoch 450/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2005 -
accuracy: 0.9939 - val_loss: 11.9255 - val_accuracy: 0.7644
Epoch 451/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1461 -
accuracy: 0.9953 - val_loss: 12.1193 - val_accuracy: 0.8295
Epoch 452/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1750 -
accuracy: 0.9940 - val_loss: 12.4814 - val_accuracy: 0.8208
Epoch 453/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1119 -
accuracy: 0.9956 - val_loss: 22.9058 - val_accuracy: 0.7271
Epoch 454/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1229 -
accuracy: 0.9951 - val_loss: 13.8555 - val_accuracy: 0.7763
Epoch 455/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1369 -
accuracy: 0.9954 - val_loss: 10.9073 - val_accuracy: 0.8253
Epoch 456/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1331 -
accuracy: 0.9958 - val_loss: 10.9836 - val_accuracy: 0.8310
Epoch 457/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1367 -
accuracy: 0.9952 - val_loss: 26.9207 - val_accuracy: 0.7488
Epoch 458/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1235 -
accuracy: 0.9954 - val_loss: 6.1329 - val_accuracy: 0.8743
Epoch 459/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1471 -
accuracy: 0.9941 - val_loss: 11.0696 - val_accuracy: 0.8111
Epoch 460/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1374 -
accuracy: 0.9948 - val_loss: 8.5311 - val_accuracy: 0.8317
Epoch 461/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1188 -
accuracy: 0.9957 - val_loss: 2.4169 - val_accuracy: 0.9642
Epoch 462/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1250 -
accuracy: 0.9957 - val_loss: 10.4875 - val_accuracy: 0.8045
Epoch 463/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1282 -
accuracy: 0.9952 - val_loss: 8.5112 - val_accuracy: 0.8369
Epoch 464/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1269 -
accuracy: 0.9961 - val_loss: 7.0399 - val_accuracy: 0.8878
Epoch 465/500
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415/415 [==============================] - 2s 5ms/step - loss: 0.1304 -
accuracy: 0.9955 - val_loss: 13.6659 - val_accuracy: 0.8180
Epoch 466/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1342 -
accuracy: 0.9945 - val_loss: 6.9197 - val_accuracy: 0.8780
Epoch 467/500
415/415 [==============================] - 3s 6ms/step - loss: 0.1347 -
accuracy: 0.9946 - val_loss: 3.5635 - val_accuracy: 0.9102
Epoch 468/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1291 -
accuracy: 0.9955 - val_loss: 17.0173 - val_accuracy: 0.8144
Epoch 469/500
415/415 [==============================] - 2s 4ms/step - loss: 0.2434 -
accuracy: 0.9927 - val_loss: 12.2730 - val_accuracy: 0.8247
Epoch 470/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1884 -
accuracy: 0.9935 - val_loss: 14.4944 - val_accuracy: 0.8057
Epoch 471/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1893 -
accuracy: 0.9937 - val_loss: 5.9153 - val_accuracy: 0.8860
Epoch 472/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1335 -
accuracy: 0.9952 - val_loss: 4.4939 - val_accuracy: 0.9011
Epoch 473/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1298 -
accuracy: 0.9953 - val_loss: 17.1071 - val_accuracy: 0.7637
Epoch 474/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1284 -
accuracy: 0.9954 - val_loss: 7.8028 - val_accuracy: 0.8797
Epoch 475/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0921 -
accuracy: 0.9965 - val_loss: 2.1368 - val_accuracy: 0.9425
Epoch 476/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0944 -
accuracy: 0.9963 - val_loss: 12.0060 - val_accuracy: 0.8070
Epoch 477/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1171 -
accuracy: 0.9948 - val_loss: 7.3184 - val_accuracy: 0.9039
Epoch 478/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1573 -
accuracy: 0.9948 - val_loss: 5.6249 - val_accuracy: 0.9230
Epoch 479/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1840 -
accuracy: 0.9938 - val_loss: 7.4869 - val_accuracy: 0.8694
Epoch 480/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1377 -
accuracy: 0.9944 - val_loss: 13.7994 - val_accuracy: 0.7611
Epoch 481/500
```

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415/415 [==============================] - 2s 4ms/step - loss: 0.1146 -
accuracy: 0.9951 - val_loss: 8.9410 - val_accuracy: 0.8549
Epoch 482/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0984 -
accuracy: 0.9955 - val_loss: 8.2296 - val_accuracy: 0.8890
Epoch 483/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1295 -
accuracy: 0.9947 - val_loss: 10.3604 - val_accuracy: 0.8671
Epoch 484/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1088 -
accuracy: 0.9949 - val_loss: 3.4727 - val_accuracy: 0.9153
Epoch 485/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1455 -
accuracy: 0.9937 - val_loss: 4.3755 - val_accuracy: 0.9184
Epoch 486/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1246 -
accuracy: 0.9950 - val_loss: 5.2750 - val_accuracy: 0.9013
Epoch 487/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1128 -
accuracy: 0.9955 - val_loss: 21.6576 - val_accuracy: 0.7795
Epoch 488/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1239 -
accuracy: 0.9957 - val_loss: 9.8094 - val_accuracy: 0.8841
Epoch 489/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1459 -
accuracy: 0.9957 - val_loss: 2.3117 - val_accuracy: 0.9459
Epoch 490/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1110 -
accuracy: 0.9959 - val_loss: 9.9440 - val_accuracy: 0.8618
Epoch 491/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1196 -
accuracy: 0.9949 - val_loss: 3.4659 - val_accuracy: 0.9516
Epoch 492/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1360 -
accuracy: 0.9951 - val_loss: 3.4074 - val_accuracy: 0.9322
Epoch 493/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1185 -
accuracy: 0.9955 - val_loss: 13.5379 - val_accuracy: 0.8424
Epoch 494/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1262 -
accuracy: 0.9958 - val_loss: 4.6821 - val_accuracy: 0.9066
Epoch 495/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0888 -
accuracy: 0.9967 - val_loss: 9.3854 - val_accuracy: 0.8633
Epoch 496/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0756 -
accuracy: 0.9970 - val_loss: 4.3117 - val_accuracy: 0.8899
Epoch 497/500
```

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415/415 [==============================] - 2s 4ms/step - loss: 0.1054 -
accuracy: 0.9959 - val_loss: 6.9458 - val_accuracy: 0.8787
Epoch 498/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1249 -
accuracy: 0.9958 - val_loss: 5.9473 - val_accuracy: 0.8915
Epoch 499/500
415/415 [==============================] - 2s 4ms/step - loss: 0.1763 -
accuracy: 0.9942 - val_loss: 24.5547 - val_accuracy: 0.8067
Epoch 500/500
415/415 [==============================] - 2s 5ms/step - loss: 0.2041 -
accuracy: 0.9934 - val_loss: 12.9667 - val_accuracy: 0.8438
466/466 [==============================] - 1s 3ms/step - loss: 8.6584 -
accuracy: 0.8802
Epoch 1/500
415/415 [==============================] - 3s 5ms/step - loss: 4.1673 -
accuracy: 0.8778 - val_loss: 68.8007 - val_accuracy: 0.2768
Epoch 2/500
415/415 [==============================] - 3s 6ms/step - loss: 2.9989 -
accuracy: 0.9116 - val_loss: 8.7441 - val_accuracy: 0.8021
Epoch 3/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5878 -
accuracy: 0.9187 - val_loss: 41.1812 - val_accuracy: 0.5666
Epoch 4/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4364 -
accuracy: 0.9253 - val_loss: 17.8167 - val_accuracy: 0.7909
Epoch 5/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3344 -
accuracy: 0.9231 - val_loss: 26.8378 - val_accuracy: 0.7538
Epoch 6/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5288 -
accuracy: 0.9324 - val_loss: 48.9641 - val_accuracy: 0.6542
Epoch 7/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4061 -
accuracy: 0.9388 - val_loss: 16.9899 - val_accuracy: 0.7871
Epoch 8/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0997 -
accuracy: 0.9378 - val_loss: 100.1415 - val_accuracy: 0.4379
Epoch 9/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8781 -
accuracy: 0.9401 - val_loss: 9.5622 - val_accuracy: 0.8462
Epoch 10/500
415/415 [==============================] - 2s 5ms/step - loss: 4.5511 -
accuracy: 0.9409 - val_loss: 47.7158 - val_accuracy: 0.6652
Epoch 11/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6324 -
accuracy: 0.9468 - val_loss: 59.6110 - val_accuracy: 0.6599
Epoch 12/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7185 -
```

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accuracy: 0.9462 - val_loss: 97.5689 - val_accuracy: 0.7245
Epoch 13/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8048 -
accuracy: 0.9464 - val_loss: 65.3883 - val_accuracy: 0.5810
Epoch 14/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8994 -
accuracy: 0.9497 - val_loss: 14.8049 - val_accuracy: 0.8199
Epoch 15/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5749 -
accuracy: 0.9525 - val_loss: 188.7475 - val_accuracy: 0.4204
Epoch 16/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9627 -
accuracy: 0.9542 - val_loss: 38.2050 - val_accuracy: 0.7673
Epoch 17/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4552 -
accuracy: 0.9543 - val_loss: 69.2474 - val_accuracy: 0.6712
Epoch 18/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8278 -
accuracy: 0.9533 - val_loss: 96.6552 - val_accuracy: 0.5654
Epoch 19/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7850 -
accuracy: 0.9535 - val_loss: 47.6360 - val_accuracy: 0.6844
Epoch 20/500
415/415 [==============================] - 2s 5ms/step - loss: 4.5594 -
accuracy: 0.9515 - val_loss: 132.3212 - val_accuracy: 0.6446
Epoch 21/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9141 -
accuracy: 0.9544 - val_loss: 119.8521 - val_accuracy: 0.6091
Epoch 22/500
415/415 [==============================] - 2s 4ms/step - loss: 4.9039 -
accuracy: 0.9543 - val_loss: 26.3108 - val_accuracy: 0.8052
Epoch 23/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4917 -
accuracy: 0.9595 - val_loss: 19.9228 - val_accuracy: 0.8229
Epoch 24/500
415/415 [==============================] - 2s 4ms/step - loss: 4.2223 -
accuracy: 0.9580 - val_loss: 80.2933 - val_accuracy: 0.6794
Epoch 25/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8845 -
accuracy: 0.9568 - val_loss: 40.2763 - val_accuracy: 0.7722
Epoch 26/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6724 -
accuracy: 0.9599 - val_loss: 119.7682 - val_accuracy: 0.6189
Epoch 27/500
415/415 [==============================] - 2s 5ms/step - loss: 3.9209 -
accuracy: 0.9582 - val_loss: 114.7096 - val_accuracy: 0.6666
Epoch 28/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5107 -
```

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accuracy: 0.9596 - val_loss: 65.9281 - val_accuracy: 0.6568
Epoch 29/500
415/415 [==============================] - 2s 5ms/step - loss: 3.9085 -
accuracy: 0.9595 - val_loss: 433.6632 - val_accuracy: 0.4804
Epoch 30/500
415/415 [==============================] - 2s 4ms/step - loss: 4.2233 -
accuracy: 0.9570 - val_loss: 13.2344 - val_accuracy: 0.8903
Epoch 31/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6448 -
accuracy: 0.9607 - val_loss: 214.0497 - val_accuracy: 0.5179
Epoch 32/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5776 -
accuracy: 0.9625 - val_loss: 99.2422 - val_accuracy: 0.6621
Epoch 33/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9142 -
accuracy: 0.9613 - val_loss: 59.7504 - val_accuracy: 0.7650
Epoch 34/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9657 -
accuracy: 0.9609 - val_loss: 40.0240 - val_accuracy: 0.7807
Epoch 35/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7833 -
accuracy: 0.9624 - val_loss: 11.9758 - val_accuracy: 0.8912
Epoch 36/500
415/415 [==============================] - 2s 5ms/step - loss: 4.4487 -
accuracy: 0.9595 - val_loss: 20.2034 - val_accuracy: 0.8520
Epoch 37/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7429 -
accuracy: 0.9628 - val_loss: 26.1302 - val_accuracy: 0.8246
Epoch 38/500
415/415 [==============================] - 3s 6ms/step - loss: 3.9999 -
accuracy: 0.9623 - val_loss: 62.7254 - val_accuracy: 0.7568
Epoch 39/500
415/415 [==============================] - 2s 4ms/step - loss: 4.8557 -
accuracy: 0.9564 - val_loss: 29.5891 - val_accuracy: 0.7902
Epoch 40/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3321 -
accuracy: 0.9588 - val_loss: 42.9314 - val_accuracy: 0.7907
Epoch 41/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9681 -
accuracy: 0.9608 - val_loss: 26.0687 - val_accuracy: 0.8138
Epoch 42/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8016 -
accuracy: 0.9618 - val_loss: 27.5347 - val_accuracy: 0.8605
Epoch 43/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6494 -
accuracy: 0.9611 - val_loss: 4.6814 - val_accuracy: 0.9343
Epoch 44/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8106 -
```

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accuracy: 0.9618 - val_loss: 23.0163 - val_accuracy: 0.8397
Epoch 45/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7153 -
accuracy: 0.9605 - val_loss: 56.0624 - val_accuracy: 0.6789
Epoch 46/500
415/415 [==============================] - 2s 5ms/step - loss: 4.3122 -
accuracy: 0.9591 - val_loss: 74.4230 - val_accuracy: 0.7383
Epoch 47/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7780 -
accuracy: 0.9631 - val_loss: 26.0514 - val_accuracy: 0.8277
Epoch 48/500
415/415 [==============================] - 2s 4ms/step - loss: 4.4806 -
accuracy: 0.9611 - val_loss: 57.7719 - val_accuracy: 0.7683
Epoch 49/500
415/415 [==============================] - 2s 4ms/step - loss: 4.2690 -
accuracy: 0.9633 - val_loss: 25.8676 - val_accuracy: 0.8071
Epoch 50/500
415/415 [==============================] - 2s 4ms/step - loss: 4.6529 -
accuracy: 0.9606 - val_loss: 40.5513 - val_accuracy: 0.7499
Epoch 51/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9575 -
accuracy: 0.9649 - val_loss: 89.1603 - val_accuracy: 0.7285
Epoch 52/500
415/415 [==============================] - 2s 4ms/step - loss: 4.4040 -
accuracy: 0.9607 - val_loss: 90.9828 - val_accuracy: 0.7152
Epoch 53/500
415/415 [==============================] - 2s 5ms/step - loss: 4.1553 -
accuracy: 0.9627 - val_loss: 32.4432 - val_accuracy: 0.8669
Epoch 54/500
415/415 [==============================] - 2s 5ms/step - loss: 4.6964 -
accuracy: 0.9612 - val_loss: 25.7206 - val_accuracy: 0.8747
Epoch 55/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0420 -
accuracy: 0.9614 - val_loss: 108.4629 - val_accuracy: 0.6961
Epoch 56/500
415/415 [==============================] - 2s 5ms/step - loss: 4.8574 -
accuracy: 0.9600 - val_loss: 44.1787 - val_accuracy: 0.8404
Epoch 57/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3138 -
accuracy: 0.9615 - val_loss: 120.6246 - val_accuracy: 0.6630
Epoch 58/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0738 -
accuracy: 0.9619 - val_loss: 93.1017 - val_accuracy: 0.7194
Epoch 59/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7915 -
accuracy: 0.9631 - val_loss: 118.5112 - val_accuracy: 0.6357
Epoch 60/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2972 -
```

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accuracy: 0.9653 - val_loss: 63.3071 - val_accuracy: 0.7820
Epoch 61/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0396 -
accuracy: 0.9634 - val_loss: 61.4899 - val_accuracy: 0.8189
Epoch 62/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0013 -
accuracy: 0.9637 - val_loss: 35.8925 - val_accuracy: 0.8340
Epoch 63/500
415/415 [==============================] - 2s 6ms/step - loss: 3.8705 -
accuracy: 0.9649 - val_loss: 55.7600 - val_accuracy: 0.7905
Epoch 64/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6853 -
accuracy: 0.9674 - val_loss: 76.5662 - val_accuracy: 0.7498
Epoch 65/500
415/415 [==============================] - 2s 5ms/step - loss: 4.2134 -
accuracy: 0.9637 - val_loss: 56.6001 - val_accuracy: 0.8155
Epoch 66/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3810 -
accuracy: 0.9657 - val_loss: 30.5375 - val_accuracy: 0.8663
Epoch 67/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7275 -
accuracy: 0.9688 - val_loss: 77.7757 - val_accuracy: 0.8227
Epoch 68/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5912 -
accuracy: 0.9682 - val_loss: 14.6916 - val_accuracy: 0.9245
Epoch 69/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8476 -
accuracy: 0.9666 - val_loss: 13.0981 - val_accuracy: 0.9182
Epoch 70/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9192 -
accuracy: 0.9656 - val_loss: 123.4783 - val_accuracy: 0.6923
Epoch 71/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8575 -
accuracy: 0.9657 - val_loss: 70.9085 - val_accuracy: 0.7589
Epoch 72/500
415/415 [==============================] - 2s 5ms/step - loss: 3.3201 -
accuracy: 0.9694 - val_loss: 55.8835 - val_accuracy: 0.8091
Epoch 73/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8906 -
accuracy: 0.9679 - val_loss: 59.0014 - val_accuracy: 0.8258
Epoch 74/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7983 -
accuracy: 0.9686 - val_loss: 24.7599 - val_accuracy: 0.8503
Epoch 75/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4543 -
accuracy: 0.9683 - val_loss: 37.1086 - val_accuracy: 0.8219
Epoch 76/500
415/415 [==============================] - 2s 4ms/step - loss: 4.7215 -
```

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accuracy: 0.9637 - val_loss: 87.2061 - val_accuracy: 0.7529
Epoch 77/500
415/415 [==============================] - 2s 4ms/step - loss: 4.9170 -
accuracy: 0.9634 - val_loss: 18.5423 - val_accuracy: 0.8913
Epoch 78/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8266 -
accuracy: 0.9659 - val_loss: 4.5880 - val_accuracy: 0.9577
Epoch 79/500
415/415 [==============================] - 2s 4ms/step - loss: 4.5795 -
accuracy: 0.9646 - val_loss: 60.7711 - val_accuracy: 0.7589
Epoch 80/500
415/415 [==============================] - 2s 5ms/step - loss: 4.7140 -
accuracy: 0.9643 - val_loss: 58.9403 - val_accuracy: 0.7837
Epoch 81/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5412 -
accuracy: 0.9673 - val_loss: 26.5424 - val_accuracy: 0.8718
Epoch 82/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7927 -
accuracy: 0.9649 - val_loss: 61.3400 - val_accuracy: 0.7899
Epoch 83/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0492 -
accuracy: 0.9653 - val_loss: 96.7579 - val_accuracy: 0.7429
Epoch 84/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1539 -
accuracy: 0.9636 - val_loss: 113.9638 - val_accuracy: 0.6916
Epoch 85/500
415/415 [==============================] - 2s 4ms/step - loss: 4.2812 -
accuracy: 0.9648 - val_loss: 76.6488 - val_accuracy: 0.7537
Epoch 86/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7732 -
accuracy: 0.9675 - val_loss: 23.0936 - val_accuracy: 0.8556
Epoch 87/500
415/415 [==============================] - 2s 4ms/step - loss: 4.6887 -
accuracy: 0.9635 - val_loss: 39.7922 - val_accuracy: 0.8044
Epoch 88/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2133 -
accuracy: 0.9691 - val_loss: 51.2497 - val_accuracy: 0.8220
Epoch 89/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8625 -
accuracy: 0.9649 - val_loss: 30.3186 - val_accuracy: 0.8431
Epoch 90/500
415/415 [==============================] - 2s 5ms/step - loss: 4.2010 -
accuracy: 0.9649 - val_loss: 85.0852 - val_accuracy: 0.7775
Epoch 91/500
415/415 [==============================] - 2s 5ms/step - loss: 4.3504 -
accuracy: 0.9647 - val_loss: 94.4169 - val_accuracy: 0.7576
Epoch 92/500
415/415 [==============================] - 2s 4ms/step - loss: 4.4584 -
```

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accuracy: 0.9642 - val_loss: 72.9284 - val_accuracy: 0.7870
Epoch 93/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7968 -
accuracy: 0.9669 - val_loss: 74.4774 - val_accuracy: 0.7798
Epoch 94/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1537 -
accuracy: 0.9670 - val_loss: 195.5377 - val_accuracy: 0.5943
Epoch 95/500
415/415 [==============================] - 2s 4ms/step - loss: 4.2670 -
accuracy: 0.9643 - val_loss: 95.7936 - val_accuracy: 0.7328
Epoch 96/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6708 -
accuracy: 0.9687 - val_loss: 32.7878 - val_accuracy: 0.8582
Epoch 97/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0851 -
accuracy: 0.9690 - val_loss: 125.1030 - val_accuracy: 0.6694
Epoch 98/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0502 -
accuracy: 0.9685 - val_loss: 67.7454 - val_accuracy: 0.7605
Epoch 99/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5163 -
accuracy: 0.9700 - val_loss: 184.3702 - val_accuracy: 0.6328
Epoch 100/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4021 -
accuracy: 0.9711 - val_loss: 27.8412 - val_accuracy: 0.8967
Epoch 101/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6431 -
accuracy: 0.9689 - val_loss: 106.3280 - val_accuracy: 0.6864
Epoch 102/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7279 -
accuracy: 0.9690 - val_loss: 68.1230 - val_accuracy: 0.7700
Epoch 103/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5100 -
accuracy: 0.9710 - val_loss: 54.6035 - val_accuracy: 0.7678
Epoch 104/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0966 -
accuracy: 0.9675 - val_loss: 54.2395 - val_accuracy: 0.8343
Epoch 105/500
415/415 [==============================] - 2s 4ms/step - loss: 4.5620 -
accuracy: 0.9670 - val_loss: 152.1688 - val_accuracy: 0.6653
Epoch 106/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9731 -
accuracy: 0.9683 - val_loss: 57.9336 - val_accuracy: 0.7871
Epoch 107/500
415/415 [==============================] - 2s 5ms/step - loss: 4.4115 -
accuracy: 0.9661 - val_loss: 153.9942 - val_accuracy: 0.6729
Epoch 108/500
415/415 [==============================] - 2s 5ms/step - loss: 3.9082 -
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accuracy: 0.9694 - val_loss: 215.0788 - val_accuracy: 0.6271
Epoch 109/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6199 -
accuracy: 0.9699 - val_loss: 220.7611 - val_accuracy: 0.6336
Epoch 110/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7051 -
accuracy: 0.9715 - val_loss: 92.7047 - val_accuracy: 0.7333
Epoch 111/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5528 -
accuracy: 0.9703 - val_loss: 97.2831 - val_accuracy: 0.7614
Epoch 112/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9427 -
accuracy: 0.9689 - val_loss: 183.6274 - val_accuracy: 0.6632
Epoch 113/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8401 -
accuracy: 0.9719 - val_loss: 109.4586 - val_accuracy: 0.8509
Epoch 114/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4823 -
accuracy: 0.9713 - val_loss: 92.9958 - val_accuracy: 0.7584
Epoch 115/500
415/415 [==============================] - 2s 5ms/step - loss: 3.3926 -
accuracy: 0.9713 - val_loss: 80.4444 - val_accuracy: 0.7958
Epoch 116/500
415/415 [==============================] - 2s 6ms/step - loss: 3.4114 -
accuracy: 0.9697 - val_loss: 54.8966 - val_accuracy: 0.8542
Epoch 117/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5061 -
accuracy: 0.9706 - val_loss: 114.6917 - val_accuracy: 0.7744
Epoch 118/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6637 -
accuracy: 0.9706 - val_loss: 96.1320 - val_accuracy: 0.7696
Epoch 119/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9164 -
accuracy: 0.9683 - val_loss: 126.8683 - val_accuracy: 0.7106
Epoch 120/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7479 -
accuracy: 0.9697 - val_loss: 227.4447 - val_accuracy: 0.6503
Epoch 121/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6663 -
accuracy: 0.9702 - val_loss: 104.9024 - val_accuracy: 0.7561
Epoch 122/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1346 -
accuracy: 0.9693 - val_loss: 88.6623 - val_accuracy: 0.7345
Epoch 123/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5698 -
accuracy: 0.9697 - val_loss: 119.8869 - val_accuracy: 0.7230
Epoch 124/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6669 -
```

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accuracy: 0.9694 - val_loss: 40.1567 - val_accuracy: 0.9058
Epoch 125/500
415/415 [==============================] - 2s 5ms/step - loss: 4.7992 -
accuracy: 0.9659 - val_loss: 50.4402 - val_accuracy: 0.8468
Epoch 126/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7523 -
accuracy: 0.9697 - val_loss: 48.6172 - val_accuracy: 0.8415
Epoch 127/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4976 -
accuracy: 0.9715 - val_loss: 117.7467 - val_accuracy: 0.7334
Epoch 128/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5484 -
accuracy: 0.9703 - val_loss: 114.9907 - val_accuracy: 0.7123
Epoch 129/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3333 -
accuracy: 0.9719 - val_loss: 196.4755 - val_accuracy: 0.6271
Epoch 130/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6330 -
accuracy: 0.9712 - val_loss: 258.0719 - val_accuracy: 0.6131
Epoch 131/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6352 -
accuracy: 0.9702 - val_loss: 67.7392 - val_accuracy: 0.8198
Epoch 132/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5659 -
accuracy: 0.9706 - val_loss: 63.8916 - val_accuracy: 0.8219
Epoch 133/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6639 -
accuracy: 0.9715 - val_loss: 157.3009 - val_accuracy: 0.6937
Epoch 134/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4112 -
accuracy: 0.9724 - val_loss: 171.9314 - val_accuracy: 0.7065
Epoch 135/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8113 -
accuracy: 0.9696 - val_loss: 66.9319 - val_accuracy: 0.8497
Epoch 136/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5840 -
accuracy: 0.9712 - val_loss: 103.1822 - val_accuracy: 0.6847
Epoch 137/500
415/415 [==============================] - 2s 4ms/step - loss: 2.9040 -
accuracy: 0.9738 - val_loss: 75.1139 - val_accuracy: 0.7579
Epoch 138/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3209 -
accuracy: 0.9725 - val_loss: 75.5115 - val_accuracy: 0.7847
Epoch 139/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2463 -
accuracy: 0.9731 - val_loss: 137.4095 - val_accuracy: 0.7188
Epoch 140/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3365 -
```

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accuracy: 0.9689 - val_loss: 83.1679 - val_accuracy: 0.7947
Epoch 141/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9379 -
accuracy: 0.9711 - val_loss: 277.4976 - val_accuracy: 0.6399
Epoch 142/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8412 -
accuracy: 0.9712 - val_loss: 249.0106 - val_accuracy: 0.6555
Epoch 143/500
415/415 [==============================] - 2s 5ms/step - loss: 3.2800 -
accuracy: 0.9738 - val_loss: 46.0585 - val_accuracy: 0.8328
Epoch 144/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5055 -
accuracy: 0.9721 - val_loss: 88.5328 - val_accuracy: 0.7441
Epoch 145/500
415/415 [==============================] - 2s 5ms/step - loss: 3.2905 -
accuracy: 0.9734 - val_loss: 191.7415 - val_accuracy: 0.6700
Epoch 146/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9363 -
accuracy: 0.9715 - val_loss: 59.1833 - val_accuracy: 0.8176
Epoch 147/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8499 -
accuracy: 0.9710 - val_loss: 71.9984 - val_accuracy: 0.8132
Epoch 148/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7714 -
accuracy: 0.9692 - val_loss: 217.5073 - val_accuracy: 0.6346
Epoch 149/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1704 -
accuracy: 0.9694 - val_loss: 31.3834 - val_accuracy: 0.9035
Epoch 150/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6124 -
accuracy: 0.9699 - val_loss: 105.7372 - val_accuracy: 0.7391
Epoch 151/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8343 -
accuracy: 0.9702 - val_loss: 222.9659 - val_accuracy: 0.6795
Epoch 152/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5603 -
accuracy: 0.9721 - val_loss: 158.1870 - val_accuracy: 0.7326
Epoch 153/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6806 -
accuracy: 0.9719 - val_loss: 132.7212 - val_accuracy: 0.7065
Epoch 154/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5876 -
accuracy: 0.9725 - val_loss: 240.3780 - val_accuracy: 0.6506
Epoch 155/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6786 -
accuracy: 0.9705 - val_loss: 113.0697 - val_accuracy: 0.7314
Epoch 156/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4012 -
```

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accuracy: 0.9735 - val_loss: 65.9948 - val_accuracy: 0.8226
Epoch 157/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7909 -
accuracy: 0.9716 - val_loss: 98.7413 - val_accuracy: 0.7728
Epoch 158/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6221 -
accuracy: 0.9731 - val_loss: 195.8200 - val_accuracy: 0.6330
Epoch 159/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6624 -
accuracy: 0.9723 - val_loss: 89.2882 - val_accuracy: 0.7602
Epoch 160/500
415/415 [==============================] - 2s 5ms/step - loss: 4.1836 -
accuracy: 0.9693 - val_loss: 208.6048 - val_accuracy: 0.6312
Epoch 161/500
415/415 [==============================] - 2s 5ms/step - loss: 4.1228 -
accuracy: 0.9687 - val_loss: 107.6959 - val_accuracy: 0.7202
Epoch 162/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0635 -
accuracy: 0.9693 - val_loss: 144.9822 - val_accuracy: 0.7109
Epoch 163/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0476 -
accuracy: 0.9705 - val_loss: 65.7570 - val_accuracy: 0.8025
Epoch 164/500
415/415 [==============================] - 2s 4ms/step - loss: 4.4632 -
accuracy: 0.9681 - val_loss: 127.5071 - val_accuracy: 0.7451
Epoch 165/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1555 -
accuracy: 0.9686 - val_loss: 25.9361 - val_accuracy: 0.8440
Epoch 166/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9675 -
accuracy: 0.9700 - val_loss: 194.7150 - val_accuracy: 0.6989
Epoch 167/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8002 -
accuracy: 0.9704 - val_loss: 45.7733 - val_accuracy: 0.7924
Epoch 168/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6839 -
accuracy: 0.9713 - val_loss: 181.6829 - val_accuracy: 0.7487
Epoch 169/500
415/415 [==============================] - 2s 5ms/step - loss: 4.1034 -
accuracy: 0.9713 - val_loss: 82.7457 - val_accuracy: 0.7490
Epoch 170/500
415/415 [==============================] - 3s 6ms/step - loss: 4.1127 -
accuracy: 0.9697 - val_loss: 239.5904 - val_accuracy: 0.6645
Epoch 171/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0929 -
accuracy: 0.9675 - val_loss: 210.9300 - val_accuracy: 0.7175
Epoch 172/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1407 -
```

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accuracy: 0.9683 - val_loss: 148.0015 - val_accuracy: 0.7558
Epoch 173/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4228 -
accuracy: 0.9715 - val_loss: 185.0938 - val_accuracy: 0.7278
Epoch 174/500
415/415 [==============================] - 2s 4ms/step - loss: 5.2697 -
accuracy: 0.9693 - val_loss: 229.0538 - val_accuracy: 0.6565
Epoch 175/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2668 -
accuracy: 0.9738 - val_loss: 240.1900 - val_accuracy: 0.6781
Epoch 176/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6375 -
accuracy: 0.9708 - val_loss: 169.8930 - val_accuracy: 0.7122
Epoch 177/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4480 -
accuracy: 0.9729 - val_loss: 57.5133 - val_accuracy: 0.8802
Epoch 178/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7892 -
accuracy: 0.9711 - val_loss: 155.2067 - val_accuracy: 0.7229
Epoch 179/500
415/415 [==============================] - 2s 5ms/step - loss: 3.0974 -
accuracy: 0.9741 - val_loss: 241.1043 - val_accuracy: 0.7042
Epoch 180/500
415/415 [==============================] - 2s 6ms/step - loss: 3.4367 -
accuracy: 0.9734 - val_loss: 316.8990 - val_accuracy: 0.6241
Epoch 181/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8980 -
accuracy: 0.9711 - val_loss: 207.1410 - val_accuracy: 0.6653
Epoch 182/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9563 -
accuracy: 0.9710 - val_loss: 245.6040 - val_accuracy: 0.6955
Epoch 183/500
415/415 [==============================] - 2s 4ms/step - loss: 3.1553 -
accuracy: 0.9736 - val_loss: 165.8736 - val_accuracy: 0.7254
Epoch 184/500
415/415 [==============================] - 2s 4ms/step - loss: 2.9288 -
accuracy: 0.9736 - val_loss: 109.4079 - val_accuracy: 0.7582
Epoch 185/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3271 -
accuracy: 0.9731 - val_loss: 217.2859 - val_accuracy: 0.6909
Epoch 186/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8984 -
accuracy: 0.9720 - val_loss: 274.6955 - val_accuracy: 0.6531
Epoch 187/500
415/415 [==============================] - 2s 5ms/step - loss: 4.2024 -
accuracy: 0.9691 - val_loss: 105.4696 - val_accuracy: 0.7613
Epoch 188/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0939 -
```

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accuracy: 0.9685 - val_loss: 81.4609 - val_accuracy: 0.7860
Epoch 189/500
415/415 [==============================] - 2s 5ms/step - loss: 4.6775 -
accuracy: 0.9692 - val_loss: 203.9538 - val_accuracy: 0.7015
Epoch 190/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9695 -
accuracy: 0.9720 - val_loss: 73.4465 - val_accuracy: 0.8075
Epoch 191/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1256 -
accuracy: 0.9711 - val_loss: 123.6324 - val_accuracy: 0.7342
Epoch 192/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9634 -
accuracy: 0.9716 - val_loss: 101.0618 - val_accuracy: 0.7995
Epoch 193/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7932 -
accuracy: 0.9706 - val_loss: 53.5243 - val_accuracy: 0.8617
Epoch 194/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2285 -
accuracy: 0.9738 - val_loss: 36.3295 - val_accuracy: 0.9014
Epoch 195/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7041 -
accuracy: 0.9702 - val_loss: 502.9735 - val_accuracy: 0.4321
Epoch 196/500
415/415 [==============================] - 2s 5ms/step - loss: 3.9189 -
accuracy: 0.9694 - val_loss: 96.0517 - val_accuracy: 0.8143
Epoch 197/500
415/415 [==============================] - 3s 7ms/step - loss: 3.6449 -
accuracy: 0.9693 - val_loss: 94.1659 - val_accuracy: 0.8170
Epoch 198/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0644 -
accuracy: 0.9674 - val_loss: 172.1736 - val_accuracy: 0.7540
Epoch 199/500
415/415 [==============================] - 2s 4ms/step - loss: 4.2821 -
accuracy: 0.9689 - val_loss: 157.2018 - val_accuracy: 0.7630
Epoch 200/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0977 -
accuracy: 0.9710 - val_loss: 224.1640 - val_accuracy: 0.6737
Epoch 201/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2965 -
accuracy: 0.9737 - val_loss: 288.1315 - val_accuracy: 0.6230
Epoch 202/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7965 -
accuracy: 0.9711 - val_loss: 149.5098 - val_accuracy: 0.7429
Epoch 203/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8975 -
accuracy: 0.9730 - val_loss: 215.7651 - val_accuracy: 0.6903
Epoch 204/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8178 -
```

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accuracy: 0.9716 - val_loss: 303.7195 - val_accuracy: 0.6596
Epoch 205/500
415/415 [==============================] - 2s 6ms/step - loss: 3.7062 -
accuracy: 0.9715 - val_loss: 206.8200 - val_accuracy: 0.7193
Epoch 206/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4963 -
accuracy: 0.9728 - val_loss: 698.4645 - val_accuracy: 0.4649
Epoch 207/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7358 -
accuracy: 0.9721 - val_loss: 275.3855 - val_accuracy: 0.6966
Epoch 208/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7945 -
accuracy: 0.9723 - val_loss: 206.4018 - val_accuracy: 0.6987
Epoch 209/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0901 -
accuracy: 0.9711 - val_loss: 275.6120 - val_accuracy: 0.6363
Epoch 210/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5136 -
accuracy: 0.9730 - val_loss: 126.2067 - val_accuracy: 0.7804
Epoch 211/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4307 -
accuracy: 0.9735 - val_loss: 133.2085 - val_accuracy: 0.8306
Epoch 212/500
415/415 [==============================] - 2s 5ms/step - loss: 4.3892 -
accuracy: 0.9719 - val_loss: 339.8864 - val_accuracy: 0.7224
Epoch 213/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7708 -
accuracy: 0.9749 - val_loss: 393.8509 - val_accuracy: 0.6443
Epoch 214/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7679 -
accuracy: 0.9744 - val_loss: 291.7144 - val_accuracy: 0.6692
Epoch 215/500
415/415 [==============================] - 2s 6ms/step - loss: 3.4796 -
accuracy: 0.9715 - val_loss: 205.3867 - val_accuracy: 0.6890
Epoch 216/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9348 -
accuracy: 0.9701 - val_loss: 173.7420 - val_accuracy: 0.7040
Epoch 217/500
415/415 [==============================] - 2s 4ms/step - loss: 4.5759 -
accuracy: 0.9709 - val_loss: 255.1262 - val_accuracy: 0.6381
Epoch 218/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8308 -
accuracy: 0.9715 - val_loss: 108.0102 - val_accuracy: 0.7735
Epoch 219/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4654 -
accuracy: 0.9739 - val_loss: 91.2394 - val_accuracy: 0.8023
Epoch 220/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7450 -
```

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accuracy: 0.9736 - val_loss: 144.0288 - val_accuracy: 0.7494
Epoch 221/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4794 -
accuracy: 0.9746 - val_loss: 493.3668 - val_accuracy: 0.5853
Epoch 222/500
415/415 [==============================] - 2s 6ms/step - loss: 3.9135 -
accuracy: 0.9731 - val_loss: 289.0131 - val_accuracy: 0.6835
Epoch 223/500
415/415 [==============================] - 3s 6ms/step - loss: 4.0644 -
accuracy: 0.9711 - val_loss: 177.2813 - val_accuracy: 0.7301
Epoch 224/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8685 -
accuracy: 0.9714 - val_loss: 187.7181 - val_accuracy: 0.7969
Epoch 225/500
415/415 [==============================] - 2s 4ms/step - loss: 4.8741 -
accuracy: 0.9688 - val_loss: 188.2706 - val_accuracy: 0.7338
Epoch 226/500
415/415 [==============================] - 2s 4ms/step - loss: 6.4481 -
accuracy: 0.9683 - val_loss: 186.0324 - val_accuracy: 0.7399
Epoch 227/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4334 -
accuracy: 0.9743 - val_loss: 96.9572 - val_accuracy: 0.8078
Epoch 228/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6617 -
accuracy: 0.9735 - val_loss: 31.3478 - val_accuracy: 0.8813
Epoch 229/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5446 -
accuracy: 0.9746 - val_loss: 120.9577 - val_accuracy: 0.8090
Epoch 230/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5839 -
accuracy: 0.9734 - val_loss: 197.3896 - val_accuracy: 0.7129
Epoch 231/500
415/415 [==============================] - 2s 6ms/step - loss: 4.0352 -
accuracy: 0.9714 - val_loss: 253.7367 - val_accuracy: 0.6476
Epoch 232/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6641 -
accuracy: 0.9738 - val_loss: 68.2521 - val_accuracy: 0.8058
Epoch 233/500
415/415 [==============================] - 2s 5ms/step - loss: 3.9832 -
accuracy: 0.9718 - val_loss: 215.6442 - val_accuracy: 0.6737
Epoch 234/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9328 -
accuracy: 0.9731 - val_loss: 286.0136 - val_accuracy: 0.6557
Epoch 235/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8196 -
accuracy: 0.9727 - val_loss: 163.6457 - val_accuracy: 0.7098
Epoch 236/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9226 -
```

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accuracy: 0.9707 - val_loss: 216.0203 - val_accuracy: 0.7117
Epoch 237/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7645 -
accuracy: 0.9720 - val_loss: 195.4277 - val_accuracy: 0.7266
Epoch 238/500
415/415 [==============================] - 2s 4ms/step - loss: 4.5475 -
accuracy: 0.9703 - val_loss: 97.6486 - val_accuracy: 0.7924
Epoch 239/500
415/415 [==============================] - 2s 5ms/step - loss: 3.9871 -
accuracy: 0.9719 - val_loss: 190.6688 - val_accuracy: 0.7111
Epoch 240/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8111 -
accuracy: 0.9730 - val_loss: 105.6285 - val_accuracy: 0.8082
Epoch 241/500
415/415 [==============================] - 2s 5ms/step - loss: 4.2116 -
accuracy: 0.9718 - val_loss: 60.9459 - val_accuracy: 0.8505
Epoch 242/500
415/415 [==============================] - 2s 4ms/step - loss: 4.7905 -
accuracy: 0.9689 - val_loss: 164.0109 - val_accuracy: 0.7533
Epoch 243/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3002 -
accuracy: 0.9735 - val_loss: 88.9861 - val_accuracy: 0.8082
Epoch 244/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4411 -
accuracy: 0.9731 - val_loss: 52.6179 - val_accuracy: 0.8408
Epoch 245/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6054 -
accuracy: 0.9730 - val_loss: 72.4940 - val_accuracy: 0.7990
Epoch 246/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3831 -
accuracy: 0.9706 - val_loss: 127.2338 - val_accuracy: 0.7740
Epoch 247/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9667 -
accuracy: 0.9728 - val_loss: 82.4940 - val_accuracy: 0.8130
Epoch 248/500
415/415 [==============================] - 3s 6ms/step - loss: 3.6974 -
accuracy: 0.9745 - val_loss: 122.1085 - val_accuracy: 0.7857
Epoch 249/500
415/415 [==============================] - 3s 6ms/step - loss: 3.8135 -
accuracy: 0.9735 - val_loss: 179.4395 - val_accuracy: 0.7025
Epoch 250/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9052 -
accuracy: 0.9713 - val_loss: 85.7035 - val_accuracy: 0.8143
Epoch 251/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9910 -
accuracy: 0.9713 - val_loss: 122.0951 - val_accuracy: 0.8118
Epoch 252/500
415/415 [==============================] - 2s 4ms/step - loss: 4.8562 -
```

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accuracy: 0.9672 - val_loss: 201.5480 - val_accuracy: 0.6772
Epoch 253/500
415/415 [==============================] - 2s 4ms/step - loss: 4.2464 -
accuracy: 0.9698 - val_loss: 165.5209 - val_accuracy: 0.7271
Epoch 254/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7559 -
accuracy: 0.9722 - val_loss: 158.6348 - val_accuracy: 0.7388
Epoch 255/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3983 -
accuracy: 0.9739 - val_loss: 451.8798 - val_accuracy: 0.5198
Epoch 256/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4628 -
accuracy: 0.9737 - val_loss: 164.8718 - val_accuracy: 0.7329
Epoch 257/500
415/415 [==============================] - 2s 6ms/step - loss: 3.0978 -
accuracy: 0.9741 - val_loss: 147.6531 - val_accuracy: 0.7917
Epoch 258/500
415/415 [==============================] - 2s 6ms/step - loss: 3.8617 -
accuracy: 0.9734 - val_loss: 129.2723 - val_accuracy: 0.7644
Epoch 259/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5746 -
accuracy: 0.9741 - val_loss: 186.2831 - val_accuracy: 0.7411
Epoch 260/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5047 -
accuracy: 0.9730 - val_loss: 249.7193 - val_accuracy: 0.6400
Epoch 261/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7491 -
accuracy: 0.9718 - val_loss: 228.0222 - val_accuracy: 0.6545
Epoch 262/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3923 -
accuracy: 0.9746 - val_loss: 176.3683 - val_accuracy: 0.7243
Epoch 263/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3068 -
accuracy: 0.9761 - val_loss: 233.4209 - val_accuracy: 0.6866
Epoch 264/500
415/415 [==============================] - 2s 6ms/step - loss: 3.3631 -
accuracy: 0.9749 - val_loss: 220.2832 - val_accuracy: 0.6980
Epoch 265/500
415/415 [==============================] - 3s 6ms/step - loss: 3.2975 -
accuracy: 0.9743 - val_loss: 203.7186 - val_accuracy: 0.7141
Epoch 266/500
415/415 [==============================] - 2s 5ms/step - loss: 4.6743 -
accuracy: 0.9696 - val_loss: 344.0566 - val_accuracy: 0.6185
Epoch 267/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0946 -
accuracy: 0.9711 - val_loss: 147.9678 - val_accuracy: 0.7285
Epoch 268/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0939 -
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accuracy: 0.9699 - val_loss: 275.5105 - val_accuracy: 0.6905
Epoch 269/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7768 -
accuracy: 0.9731 - val_loss: 135.2649 - val_accuracy: 0.7537
Epoch 270/500
415/415 [==============================] - 2s 4ms/step - loss: 3.1317 -
accuracy: 0.9765 - val_loss: 71.2557 - val_accuracy: 0.8354
Epoch 271/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2197 -
accuracy: 0.9761 - val_loss: 187.5910 - val_accuracy: 0.6885
Epoch 272/500
415/415 [==============================] - 2s 5ms/step - loss: 3.3773 -
accuracy: 0.9743 - val_loss: 184.0166 - val_accuracy: 0.7003
Epoch 273/500
415/415 [==============================] - 2s 5ms/step - loss: 5.2441 -
accuracy: 0.9688 - val_loss: 156.9557 - val_accuracy: 0.7275
Epoch 274/500
415/415 [==============================] - 2s 6ms/step - loss: 3.6467 -
accuracy: 0.9732 - val_loss: 195.3056 - val_accuracy: 0.7031
Epoch 275/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5863 -
accuracy: 0.9743 - val_loss: 146.8698 - val_accuracy: 0.7559
Epoch 276/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1710 -
accuracy: 0.9719 - val_loss: 162.5679 - val_accuracy: 0.7503
Epoch 277/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4092 -
accuracy: 0.9740 - val_loss: 194.6057 - val_accuracy: 0.7232
Epoch 278/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7463 -
accuracy: 0.9731 - val_loss: 72.9305 - val_accuracy: 0.8235
Epoch 279/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7015 -
accuracy: 0.9711 - val_loss: 152.7184 - val_accuracy: 0.7051
Epoch 280/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7754 -
accuracy: 0.9702 - val_loss: 70.5117 - val_accuracy: 0.8266
Epoch 281/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6552 -
accuracy: 0.9724 - val_loss: 266.1787 - val_accuracy: 0.6171
Epoch 282/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4202 -
accuracy: 0.9745 - val_loss: 209.0657 - val_accuracy: 0.7373
Epoch 283/500
415/415 [==============================] - 2s 5ms/step - loss: 3.3255 -
accuracy: 0.9738 - val_loss: 91.6395 - val_accuracy: 0.8147
Epoch 284/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5701 -
```

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accuracy: 0.9735 - val_loss: 115.6239 - val_accuracy: 0.7722
Epoch 285/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7705 -
accuracy: 0.9727 - val_loss: 137.6471 - val_accuracy: 0.7622
Epoch 286/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0341 -
accuracy: 0.9698 - val_loss: 194.4743 - val_accuracy: 0.7186
Epoch 287/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9155 -
accuracy: 0.9716 - val_loss: 105.5257 - val_accuracy: 0.8170
Epoch 288/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8944 -
accuracy: 0.9740 - val_loss: 75.3938 - val_accuracy: 0.8237
Epoch 289/500
415/415 [==============================] - 2s 5ms/step - loss: 3.3885 -
accuracy: 0.9759 - val_loss: 84.5648 - val_accuracy: 0.8085
Epoch 290/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0491 -
accuracy: 0.9734 - val_loss: 178.1535 - val_accuracy: 0.7084
Epoch 291/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0058 -
accuracy: 0.9735 - val_loss: 173.0732 - val_accuracy: 0.7024
Epoch 292/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8349 -
accuracy: 0.9743 - val_loss: 55.0841 - val_accuracy: 0.8258
Epoch 293/500
415/415 [==============================] - 2s 4ms/step - loss: 3.1598 -
accuracy: 0.9755 - val_loss: 206.0883 - val_accuracy: 0.6584
Epoch 294/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2866 -
accuracy: 0.9754 - val_loss: 181.5163 - val_accuracy: 0.6488
Epoch 295/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2985 -
accuracy: 0.9756 - val_loss: 90.6028 - val_accuracy: 0.7831
Epoch 296/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0186 -
accuracy: 0.9714 - val_loss: 42.1693 - val_accuracy: 0.8709
Epoch 297/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7093 -
accuracy: 0.9725 - val_loss: 38.6685 - val_accuracy: 0.8531
Epoch 298/500
415/415 [==============================] - 2s 5ms/step - loss: 3.2811 -
accuracy: 0.9743 - val_loss: 48.4376 - val_accuracy: 0.8463
Epoch 299/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4445 -
accuracy: 0.9737 - val_loss: 55.3138 - val_accuracy: 0.8278
Epoch 300/500
415/415 [==============================] - 2s 5ms/step - loss: 4.3862 -
```

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accuracy: 0.9731 - val_loss: 111.4403 - val_accuracy: 0.7183
Epoch 301/500
415/415 [==============================] - 2s 5ms/step - loss: 3.1549 -
accuracy: 0.9760 - val_loss: 134.5894 - val_accuracy: 0.7068
Epoch 302/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3481 -
accuracy: 0.9744 - val_loss: 92.5127 - val_accuracy: 0.7706
Epoch 303/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6442 -
accuracy: 0.9739 - val_loss: 169.8988 - val_accuracy: 0.6934
Epoch 304/500
415/415 [==============================] - 2s 4ms/step - loss: 3.0397 -
accuracy: 0.9765 - val_loss: 97.8046 - val_accuracy: 0.7950
Epoch 305/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3904 -
accuracy: 0.9746 - val_loss: 174.4924 - val_accuracy: 0.7464
Epoch 306/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6952 -
accuracy: 0.9731 - val_loss: 81.8160 - val_accuracy: 0.7669
Epoch 307/500
415/415 [==============================] - 2s 5ms/step - loss: 4.1136 -
accuracy: 0.9691 - val_loss: 174.3282 - val_accuracy: 0.7201
Epoch 308/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6755 -
accuracy: 0.9710 - val_loss: 282.5737 - val_accuracy: 0.6080
Epoch 309/500
415/415 [==============================] - 2s 5ms/step - loss: 3.9973 -
accuracy: 0.9723 - val_loss: 138.8972 - val_accuracy: 0.7734
Epoch 310/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6658 -
accuracy: 0.9725 - val_loss: 213.1067 - val_accuracy: 0.6925
Epoch 311/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4248 -
accuracy: 0.9739 - val_loss: 86.0774 - val_accuracy: 0.7781
Epoch 312/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8673 -
accuracy: 0.9721 - val_loss: 56.1992 - val_accuracy: 0.8108
Epoch 313/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7159 -
accuracy: 0.9707 - val_loss: 70.1538 - val_accuracy: 0.8279
Epoch 314/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0230 -
accuracy: 0.9711 - val_loss: 122.8501 - val_accuracy: 0.7634
Epoch 315/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6862 -
accuracy: 0.9716 - val_loss: 97.2496 - val_accuracy: 0.7709
Epoch 316/500
415/415 [==============================] - 2s 6ms/step - loss: 3.3225 -
```

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accuracy: 0.9740 - val_loss: 101.8077 - val_accuracy: 0.7515
Epoch 317/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6208 -
accuracy: 0.9720 - val_loss: 104.9608 - val_accuracy: 0.7369
Epoch 318/500
415/415 [==============================] - 2s 5ms/step - loss: 4.6117 -
accuracy: 0.9657 - val_loss: 84.1986 - val_accuracy: 0.7592
Epoch 319/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0012 -
accuracy: 0.9699 - val_loss: 224.4504 - val_accuracy: 0.7034
Epoch 320/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2486 -
accuracy: 0.9746 - val_loss: 92.3042 - val_accuracy: 0.7468
Epoch 321/500
415/415 [==============================] - 2s 4ms/step - loss: 3.1401 -
accuracy: 0.9744 - val_loss: 170.8919 - val_accuracy: 0.6905
Epoch 322/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4524 -
accuracy: 0.9741 - val_loss: 91.1155 - val_accuracy: 0.7417
Epoch 323/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8032 -
accuracy: 0.9724 - val_loss: 181.9859 - val_accuracy: 0.7174
Epoch 324/500
415/415 [==============================] - 2s 5ms/step - loss: 3.1138 -
accuracy: 0.9748 - val_loss: 175.4094 - val_accuracy: 0.6954
Epoch 325/500
415/415 [==============================] - 3s 6ms/step - loss: 3.5338 -
accuracy: 0.9728 - val_loss: 73.2974 - val_accuracy: 0.8264
Epoch 326/500
415/415 [==============================] - 2s 6ms/step - loss: 3.5846 -
accuracy: 0.9734 - val_loss: 174.6317 - val_accuracy: 0.6845
Epoch 327/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6465 -
accuracy: 0.9738 - val_loss: 55.8931 - val_accuracy: 0.8370
Epoch 328/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6033 -
accuracy: 0.9727 - val_loss: 48.9324 - val_accuracy: 0.8027
Epoch 329/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9292 -
accuracy: 0.9720 - val_loss: 65.1491 - val_accuracy: 0.8094
Epoch 330/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7927 -
accuracy: 0.9718 - val_loss: 67.8672 - val_accuracy: 0.8037
Epoch 331/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7042 -
accuracy: 0.9718 - val_loss: 30.3522 - val_accuracy: 0.8675
Epoch 332/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9852 -
```

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accuracy: 0.9700 - val_loss: 73.0299 - val_accuracy: 0.7832
Epoch 333/500
415/415 [==============================] - 2s 6ms/step - loss: 3.9716 -
accuracy: 0.9692 - val_loss: 109.7843 - val_accuracy: 0.7763
Epoch 334/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6626 -
accuracy: 0.9705 - val_loss: 80.9314 - val_accuracy: 0.8324
Epoch 335/500
415/415 [==============================] - 2s 5ms/step - loss: 4.6160 -
accuracy: 0.9682 - val_loss: 98.4273 - val_accuracy: 0.7792
Epoch 336/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5324 -
accuracy: 0.9726 - val_loss: 216.0902 - val_accuracy: 0.7494
Epoch 337/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5624 -
accuracy: 0.9725 - val_loss: 190.1664 - val_accuracy: 0.7198
Epoch 338/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3862 -
accuracy: 0.9738 - val_loss: 87.8165 - val_accuracy: 0.7980
Epoch 339/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6957 -
accuracy: 0.9729 - val_loss: 186.3813 - val_accuracy: 0.7350
Epoch 340/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7911 -
accuracy: 0.9722 - val_loss: 80.8104 - val_accuracy: 0.8294
Epoch 341/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5706 -
accuracy: 0.9738 - val_loss: 84.9958 - val_accuracy: 0.7665
Epoch 342/500
415/415 [==============================] - 2s 5ms/step - loss: 4.2352 -
accuracy: 0.9711 - val_loss: 115.7022 - val_accuracy: 0.7725
Epoch 343/500
415/415 [==============================] - 2s 6ms/step - loss: 3.4669 -
accuracy: 0.9740 - val_loss: 178.7552 - val_accuracy: 0.7402
Epoch 344/500
415/415 [==============================] - 2s 5ms/step - loss: 3.2912 -
accuracy: 0.9744 - val_loss: 151.6505 - val_accuracy: 0.7472
Epoch 345/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6200 -
accuracy: 0.9725 - val_loss: 91.7895 - val_accuracy: 0.7821
Epoch 346/500
415/415 [==============================] - 2s 4ms/step - loss: 4.9115 -
accuracy: 0.9701 - val_loss: 212.3202 - val_accuracy: 0.7278
Epoch 347/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4398 -
accuracy: 0.9737 - val_loss: 96.7493 - val_accuracy: 0.7783
Epoch 348/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3804 -
```

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accuracy: 0.9708 - val_loss: 557.5063 - val_accuracy: 0.5693
Epoch 349/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6692 -
accuracy: 0.9728 - val_loss: 166.4182 - val_accuracy: 0.7167
Epoch 350/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1316 -
accuracy: 0.9702 - val_loss: 80.1752 - val_accuracy: 0.8171
Epoch 351/500
415/415 [==============================] - 2s 6ms/step - loss: 3.7252 -
accuracy: 0.9704 - val_loss: 133.5470 - val_accuracy: 0.7416
Epoch 352/500
415/415 [==============================] - 3s 6ms/step - loss: 3.7643 -
accuracy: 0.9702 - val_loss: 62.6334 - val_accuracy: 0.8432
Epoch 353/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4380 -
accuracy: 0.9728 - val_loss: 177.0918 - val_accuracy: 0.7085
Epoch 354/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2739 -
accuracy: 0.9755 - val_loss: 269.3984 - val_accuracy: 0.7017
Epoch 355/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4512 -
accuracy: 0.9745 - val_loss: 39.1923 - val_accuracy: 0.8417
Epoch 356/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5013 -
accuracy: 0.9740 - val_loss: 113.7679 - val_accuracy: 0.7683
Epoch 357/500
415/415 [==============================] - 2s 4ms/step - loss: 3.1112 -
accuracy: 0.9743 - val_loss: 332.4716 - val_accuracy: 0.6206
Epoch 358/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5055 -
accuracy: 0.9742 - val_loss: 178.3635 - val_accuracy: 0.7005
Epoch 359/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8558 -
accuracy: 0.9722 - val_loss: 19.3214 - val_accuracy: 0.9305
Epoch 360/500
415/415 [==============================] - 3s 6ms/step - loss: 3.9594 -
accuracy: 0.9737 - val_loss: 248.7163 - val_accuracy: 0.7213
Epoch 361/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4807 -
accuracy: 0.9730 - val_loss: 336.5075 - val_accuracy: 0.6021
Epoch 362/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5213 -
accuracy: 0.9748 - val_loss: 120.0873 - val_accuracy: 0.7638
Epoch 363/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4426 -
accuracy: 0.9741 - val_loss: 66.9987 - val_accuracy: 0.8205
Epoch 364/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6191 -
```

```
accuracy: 0.9753 - val_loss: 219.7174 - val_accuracy: 0.6826
Epoch 365/500
415/415 [==============================] - 2s 4ms/step - loss: 3.1181 -
accuracy: 0.9764 - val_loss: 97.0302 - val_accuracy: 0.7984
Epoch 366/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3122 -
accuracy: 0.9751 - val_loss: 206.8065 - val_accuracy: 0.7141
Epoch 367/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8573 -
accuracy: 0.9748 - val_loss: 115.5762 - val_accuracy: 0.7700
Epoch 368/500
415/415 [==============================] - 2s 6ms/step - loss: 3.7811 -
accuracy: 0.9731 - val_loss: 46.0673 - val_accuracy: 0.8445
Epoch 369/500
415/415 [==============================] - 2s 6ms/step - loss: 3.8611 -
accuracy: 0.9745 - val_loss: 209.6130 - val_accuracy: 0.7217
Epoch 370/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4820 -
accuracy: 0.9739 - val_loss: 159.4095 - val_accuracy: 0.7402
Epoch 371/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0033 -
accuracy: 0.9733 - val_loss: 211.0191 - val_accuracy: 0.7025
Epoch 372/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6372 -
accuracy: 0.9736 - val_loss: 132.5126 - val_accuracy: 0.7661
Epoch 373/500
415/415 [==============================] - 2s 4ms/step - loss: 4.8013 -
accuracy: 0.9715 - val_loss: 76.9880 - val_accuracy: 0.8103
Epoch 374/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4760 -
accuracy: 0.9743 - val_loss: 68.1082 - val_accuracy: 0.7978
Epoch 375/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4933 -
accuracy: 0.9745 - val_loss: 108.3011 - val_accuracy: 0.7728
Epoch 376/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6698 -
accuracy: 0.9733 - val_loss: 154.1057 - val_accuracy: 0.7346
Epoch 377/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4025 -
accuracy: 0.9755 - val_loss: 183.3611 - val_accuracy: 0.7271
Epoch 378/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6905 -
accuracy: 0.9751 - val_loss: 66.8601 - val_accuracy: 0.8232
Epoch 379/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8357 -
accuracy: 0.9747 - val_loss: 74.0921 - val_accuracy: 0.8172
Epoch 380/500
415/415 [==============================] - 2s 4ms/step - loss: 4.0788 -
```

```
accuracy: 0.9738 - val_loss: 167.5534 - val_accuracy: 0.7820
Epoch 381/500
415/415 [==============================] - 2s 4ms/step - loss: 3.1123 -
accuracy: 0.9771 - val_loss: 96.6637 - val_accuracy: 0.7833
Epoch 382/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9580 -
accuracy: 0.9729 - val_loss: 690.9458 - val_accuracy: 0.5316
Epoch 383/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7064 -
accuracy: 0.9733 - val_loss: 57.7027 - val_accuracy: 0.8102
Epoch 384/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7144 -
accuracy: 0.9733 - val_loss: 354.6887 - val_accuracy: 0.6814
Epoch 385/500
415/415 [==============================] - 2s 5ms/step - loss: 4.0139 -
accuracy: 0.9742 - val_loss: 258.1728 - val_accuracy: 0.7442
Epoch 386/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8962 -
accuracy: 0.9734 - val_loss: 114.3988 - val_accuracy: 0.7703
Epoch 387/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6556 -
accuracy: 0.9748 - val_loss: 232.5681 - val_accuracy: 0.7171
Epoch 388/500
415/415 [==============================] - 2s 5ms/step - loss: 4.1727 -
accuracy: 0.9730 - val_loss: 72.3958 - val_accuracy: 0.7875
Epoch 389/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4094 -
accuracy: 0.9757 - val_loss: 124.1440 - val_accuracy: 0.7866
Epoch 390/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4094 -
accuracy: 0.9752 - val_loss: 135.7975 - val_accuracy: 0.7581
Epoch 391/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5273 -
accuracy: 0.9752 - val_loss: 86.8411 - val_accuracy: 0.7814
Epoch 392/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2720 -
accuracy: 0.9768 - val_loss: 49.1378 - val_accuracy: 0.8014
Epoch 393/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6277 -
accuracy: 0.9749 - val_loss: 185.9824 - val_accuracy: 0.7421
Epoch 394/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6110 -
accuracy: 0.9738 - val_loss: 170.5264 - val_accuracy: 0.7558
Epoch 395/500
415/415 [==============================] - 2s 6ms/step - loss: 3.9342 -
accuracy: 0.9714 - val_loss: 278.1209 - val_accuracy: 0.7228
Epoch 396/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5260 -
```

```
accuracy: 0.9718 - val_loss: 116.1714 - val_accuracy: 0.7672
Epoch 397/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5347 -
accuracy: 0.9724 - val_loss: 103.0240 - val_accuracy: 0.7651
Epoch 398/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8255 -
accuracy: 0.9713 - val_loss: 187.7782 - val_accuracy: 0.7487
Epoch 399/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7288 -
accuracy: 0.9727 - val_loss: 115.7337 - val_accuracy: 0.7630
Epoch 400/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5183 -
accuracy: 0.9728 - val_loss: 125.3029 - val_accuracy: 0.7519
Epoch 401/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6154 -
accuracy: 0.9732 - val_loss: 190.7316 - val_accuracy: 0.7156
Epoch 402/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8130 -
accuracy: 0.9729 - val_loss: 131.2451 - val_accuracy: 0.7525
Epoch 403/500
415/415 [==============================] - 2s 5ms/step - loss: 4.4907 -
accuracy: 0.9696 - val_loss: 201.3122 - val_accuracy: 0.7426
Epoch 404/500
415/415 [==============================] - 2s 6ms/step - loss: 3.6932 -
accuracy: 0.9726 - val_loss: 183.5407 - val_accuracy: 0.7342
Epoch 405/500
415/415 [==============================] - 3s 6ms/step - loss: 3.7118 -
accuracy: 0.9713 - val_loss: 88.4013 - val_accuracy: 0.8006
Epoch 406/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5068 -
accuracy: 0.9730 - val_loss: 46.9930 - val_accuracy: 0.8814
Epoch 407/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7809 -
accuracy: 0.9732 - val_loss: 144.1131 - val_accuracy: 0.7500
Epoch 408/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7117 -
accuracy: 0.9733 - val_loss: 286.7289 - val_accuracy: 0.6678
Epoch 409/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3532 -
accuracy: 0.9749 - val_loss: 105.9590 - val_accuracy: 0.8322
Epoch 410/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2231 -
accuracy: 0.9750 - val_loss: 117.7253 - val_accuracy: 0.7975
Epoch 411/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4801 -
accuracy: 0.9751 - val_loss: 121.5608 - val_accuracy: 0.7904
Epoch 412/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5602 -
```

```
accuracy: 0.9744 - val_loss: 147.3835 - val_accuracy: 0.7675
Epoch 413/500
415/415 [==============================] - 2s 6ms/step - loss: 2.9792 -
accuracy: 0.9774 - val_loss: 129.8924 - val_accuracy: 0.7760
Epoch 414/500
415/415 [==============================] - 2s 6ms/step - loss: 3.2482 -
accuracy: 0.9765 - val_loss: 136.4740 - val_accuracy: 0.7699
Epoch 415/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3092 -
accuracy: 0.9752 - val_loss: 128.0065 - val_accuracy: 0.7945
Epoch 416/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2412 -
accuracy: 0.9763 - val_loss: 61.2004 - val_accuracy: 0.8882
Epoch 417/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8237 -
accuracy: 0.9737 - val_loss: 50.2722 - val_accuracy: 0.8918
Epoch 418/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6360 -
accuracy: 0.9758 - val_loss: 35.2757 - val_accuracy: 0.9139
Epoch 419/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2921 -
accuracy: 0.9769 - val_loss: 152.8268 - val_accuracy: 0.7457
Epoch 420/500
415/415 [==============================] - 2s 5ms/step - loss: 3.1468 -
accuracy: 0.9765 - val_loss: 23.0149 - val_accuracy: 0.9281
Epoch 421/500
415/415 [==============================] - 2s 6ms/step - loss: 3.5725 -
accuracy: 0.9752 - val_loss: 127.2889 - val_accuracy: 0.7825
Epoch 422/500
415/415 [==============================] - 2s 5ms/step - loss: 2.9306 -
accuracy: 0.9781 - val_loss: 72.1974 - val_accuracy: 0.8636
Epoch 423/500
415/415 [==============================] - 2s 5ms/step - loss: 3.1062 -
accuracy: 0.9775 - val_loss: 247.3679 - val_accuracy: 0.6781
Epoch 424/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7577 -
accuracy: 0.9761 - val_loss: 67.9929 - val_accuracy: 0.8913
Epoch 425/500
415/415 [==============================] - 2s 4ms/step - loss: 3.1608 -
accuracy: 0.9765 - val_loss: 55.1849 - val_accuracy: 0.8974
Epoch 426/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4004 -
accuracy: 0.9751 - val_loss: 139.5016 - val_accuracy: 0.7539
Epoch 427/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5616 -
accuracy: 0.9751 - val_loss: 107.1561 - val_accuracy: 0.7394
Epoch 428/500
415/415 [==============================] - 2s 5ms/step - loss: 3.2842 -
```

```
accuracy: 0.9754 - val_loss: 179.2694 - val_accuracy: 0.7241
Epoch 429/500
415/415 [==============================] - 2s 6ms/step - loss: 3.6148 -
accuracy: 0.9748 - val_loss: 147.6999 - val_accuracy: 0.7619
Epoch 430/500
415/415 [==============================] - 2s 6ms/step - loss: 3.7801 -
accuracy: 0.9727 - val_loss: 129.3829 - val_accuracy: 0.7676
Epoch 431/500
415/415 [==============================] - 2s 5ms/step - loss: 4.5904 -
accuracy: 0.9707 - val_loss: 160.2191 - val_accuracy: 0.7334
Epoch 432/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4542 -
accuracy: 0.9757 - val_loss: 113.3147 - val_accuracy: 0.7503
Epoch 433/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4914 -
accuracy: 0.9756 - val_loss: 63.5673 - val_accuracy: 0.8051
Epoch 434/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4737 -
accuracy: 0.9747 - val_loss: 161.2135 - val_accuracy: 0.7497
Epoch 435/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2365 -
accuracy: 0.9749 - val_loss: 133.2135 - val_accuracy: 0.7572
Epoch 436/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5941 -
accuracy: 0.9739 - val_loss: 24.3008 - val_accuracy: 0.8557
Epoch 437/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8396 -
accuracy: 0.9758 - val_loss: 71.5404 - val_accuracy: 0.8139
Epoch 438/500
415/415 [==============================] - 2s 6ms/step - loss: 3.3278 -
accuracy: 0.9781 - val_loss: 110.6838 - val_accuracy: 0.7693
Epoch 439/500
415/415 [==============================] - 2s 5ms/step - loss: 2.9744 -
accuracy: 0.9779 - val_loss: 28.3577 - val_accuracy: 0.8772
Epoch 440/500
415/415 [==============================] - 2s 6ms/step - loss: 3.0820 -
accuracy: 0.9776 - val_loss: 181.2910 - val_accuracy: 0.7743
Epoch 441/500
415/415 [==============================] - 2s 5ms/step - loss: 3.3938 -
accuracy: 0.9775 - val_loss: 47.7434 - val_accuracy: 0.8225
Epoch 442/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3124 -
accuracy: 0.9770 - val_loss: 64.0615 - val_accuracy: 0.7890
Epoch 443/500
415/415 [==============================] - 2s 4ms/step - loss: 3.0773 -
accuracy: 0.9775 - val_loss: 39.6407 - val_accuracy: 0.8347
Epoch 444/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6064 -
```

```
accuracy: 0.9770 - val_loss: 73.5017 - val_accuracy: 0.8053
Epoch 445/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8151 -
accuracy: 0.9757 - val_loss: 52.8353 - val_accuracy: 0.8435
Epoch 446/500
415/415 [==============================] - 2s 6ms/step - loss: 3.3757 -
accuracy: 0.9763 - val_loss: 57.8547 - val_accuracy: 0.8244
Epoch 447/500
415/415 [==============================] - 2s 6ms/step - loss: 3.2814 -
accuracy: 0.9761 - val_loss: 186.5259 - val_accuracy: 0.7679
Epoch 448/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4514 -
accuracy: 0.9767 - val_loss: 181.0524 - val_accuracy: 0.7903
Epoch 449/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3740 -
accuracy: 0.9718 - val_loss: 102.5272 - val_accuracy: 0.7971
Epoch 450/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4451 -
accuracy: 0.9753 - val_loss: 121.1613 - val_accuracy: 0.8162
Epoch 451/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4532 -
accuracy: 0.9749 - val_loss: 381.9732 - val_accuracy: 0.7143
Epoch 452/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6662 -
accuracy: 0.9752 - val_loss: 100.3138 - val_accuracy: 0.8502
Epoch 453/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5754 -
accuracy: 0.9758 - val_loss: 109.3258 - val_accuracy: 0.8204
Epoch 454/500
415/415 [==============================] - 2s 5ms/step - loss: 3.6080 -
accuracy: 0.9755 - val_loss: 97.9950 - val_accuracy: 0.8032
Epoch 455/500
415/415 [==============================] - 2s 5ms/step - loss: 3.0951 -
accuracy: 0.9772 - val_loss: 104.0836 - val_accuracy: 0.8013
Epoch 456/500
415/415 [==============================] - 2s 6ms/step - loss: 3.4031 -
accuracy: 0.9768 - val_loss: 165.3556 - val_accuracy: 0.7420
Epoch 457/500
415/415 [==============================] - 2s 5ms/step - loss: 3.0391 -
accuracy: 0.9777 - val_loss: 95.3551 - val_accuracy: 0.8551
Epoch 458/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2778 -
accuracy: 0.9774 - val_loss: 150.1569 - val_accuracy: 0.8172
Epoch 459/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4473 -
accuracy: 0.9764 - val_loss: 90.2234 - val_accuracy: 0.8774
Epoch 460/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2467 -
```

```
accuracy: 0.9768 - val_loss: 131.7597 - val_accuracy: 0.8555
Epoch 461/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4223 -
accuracy: 0.9771 - val_loss: 87.4772 - val_accuracy: 0.8928
Epoch 462/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8733 -
accuracy: 0.9765 - val_loss: 47.6687 - val_accuracy: 0.9042
Epoch 463/500
415/415 [==============================] - 2s 6ms/step - loss: 2.6908 -
accuracy: 0.9796 - val_loss: 67.9641 - val_accuracy: 0.8976
Epoch 464/500
415/415 [==============================] - 3s 6ms/step - loss: 3.0294 -
accuracy: 0.9778 - val_loss: 91.4780 - val_accuracy: 0.8454
Epoch 465/500
415/415 [==============================] - 3s 6ms/step - loss: 3.6516 -
accuracy: 0.9757 - val_loss: 106.5145 - val_accuracy: 0.8664
Epoch 466/500
415/415 [==============================] - 2s 4ms/step - loss: 2.9996 -
accuracy: 0.9784 - val_loss: 102.0483 - val_accuracy: 0.8577
Epoch 467/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4436 -
accuracy: 0.9771 - val_loss: 78.7586 - val_accuracy: 0.8758
Epoch 468/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4011 -
accuracy: 0.9763 - val_loss: 89.4015 - val_accuracy: 0.8787
Epoch 469/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3093 -
accuracy: 0.9773 - val_loss: 215.2268 - val_accuracy: 0.6921
Epoch 470/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2414 -
accuracy: 0.9764 - val_loss: 120.6813 - val_accuracy: 0.7756
Epoch 471/500
415/415 [==============================] - 2s 5ms/step - loss: 3.2002 -
accuracy: 0.9771 - val_loss: 198.9522 - val_accuracy: 0.7353
Epoch 472/500
415/415 [==============================] - 2s 5ms/step - loss: 3.3375 -
accuracy: 0.9763 - val_loss: 57.9454 - val_accuracy: 0.8255
Epoch 473/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4248 -
accuracy: 0.9758 - val_loss: 155.3595 - val_accuracy: 0.7489
Epoch 474/500
415/415 [==============================] - 2s 5ms/step - loss: 3.1311 -
accuracy: 0.9772 - val_loss: 85.3143 - val_accuracy: 0.7969
Epoch 475/500
415/415 [==============================] - 2s 5ms/step - loss: 3.3498 -
accuracy: 0.9771 - val_loss: 675.0258 - val_accuracy: 0.6273
Epoch 476/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2854 -
```

```
accuracy: 0.9775 - val_loss: 64.8006 - val_accuracy: 0.8138
Epoch 477/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6290 -
accuracy: 0.9754 - val_loss: 151.5447 - val_accuracy: 0.7485
Epoch 478/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3175 -
accuracy: 0.9750 - val_loss: 91.3005 - val_accuracy: 0.7912
Epoch 479/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3329 -
accuracy: 0.9771 - val_loss: 336.0504 - val_accuracy: 0.6810
Epoch 480/500
415/415 [==============================] - 2s 5ms/step - loss: 3.0153 -
accuracy: 0.9775 - val_loss: 103.1013 - val_accuracy: 0.7918
Epoch 481/500
415/415 [==============================] - 3s 6ms/step - loss: 3.1506 -
accuracy: 0.9758 - val_loss: 140.6651 - val_accuracy: 0.7388
Epoch 482/500
415/415 [==============================] - 2s 5ms/step - loss: 3.9096 -
accuracy: 0.9740 - val_loss: 72.2175 - val_accuracy: 0.8363
Epoch 483/500
415/415 [==============================] - 2s 6ms/step - loss: 3.2987 -
accuracy: 0.9762 - val_loss: 148.2057 - val_accuracy: 0.7495
Epoch 484/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3081 -
accuracy: 0.9750 - val_loss: 136.8221 - val_accuracy: 0.7595
Epoch 485/500
415/415 [==============================] - 2s 5ms/step - loss: 3.2975 -
accuracy: 0.9748 - val_loss: 275.9453 - val_accuracy: 0.6627
Epoch 486/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3031 -
accuracy: 0.9746 - val_loss: 118.8121 - val_accuracy: 0.7818
Epoch 487/500
415/415 [==============================] - 2s 5ms/step - loss: 3.5789 -
accuracy: 0.9747 - val_loss: 129.8873 - val_accuracy: 0.7737
Epoch 488/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3517 -
accuracy: 0.9744 - val_loss: 103.4989 - val_accuracy: 0.8208
Epoch 489/500
415/415 [==============================] - 2s 5ms/step - loss: 3.8879 -
accuracy: 0.9751 - val_loss: 226.9827 - val_accuracy: 0.7408
Epoch 490/500
415/415 [==============================] - 3s 6ms/step - loss: 3.1310 -
accuracy: 0.9768 - val_loss: 114.3654 - val_accuracy: 0.7920
Epoch 491/500
415/415 [==============================] - 3s 6ms/step - loss: 3.2896 -
accuracy: 0.9757 - val_loss: 108.0656 - val_accuracy: 0.8050
Epoch 492/500
415/415 [==============================] - 2s 5ms/step - loss: 3.0761 -
```

```
accuracy: 0.9774 - val_loss: 187.4962 - val_accuracy: 0.7516
Epoch 493/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3245 -
accuracy: 0.9781 - val_loss: 149.7062 - val_accuracy: 0.7684
Epoch 494/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8640 -
accuracy: 0.9756 - val_loss: 151.2122 - val_accuracy: 0.7975
Epoch 495/500
415/415 [==============================] - 2s 4ms/step - loss: 3.0249 -
accuracy: 0.9780 - val_loss: 135.2491 - val_accuracy: 0.8220
Epoch 496/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8359 -
accuracy: 0.9730 - val_loss: 173.9848 - val_accuracy: 0.7747
Epoch 497/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4465 -
accuracy: 0.9754 - val_loss: 118.2097 - val_accuracy: 0.8057
Epoch 498/500
415/415 [==============================] - 2s 6ms/step - loss: 3.1281 -
accuracy: 0.9759 - val_loss: 151.1457 - val_accuracy: 0.7915
Epoch 499/500
415/415 [==============================] - 3s 6ms/step - loss: 3.4429 -
accuracy: 0.9770 - val_loss: 38.3366 - val_accuracy: 0.8980
Epoch 500/500
415/415 [==============================] - 2s 5ms/step - loss: 3.0262 -
accuracy: 0.9787 - val_loss: 221.2763 - val_accuracy: 0.7471
466/466 [==============================] - 1s 3ms/step - loss: 161.9610 -
accuracy: 0.7893
```

[ ]:
```
metrics_vs_lr
```

[ ]:
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  'test_accuracy': 0.9709473848342896,
  'train_time': 320.10400342941284},
 {'batch_size': 128,
  'learning_rate': 0.001,
  'epochs': 100,
  'test_accuracy': 0.9779924750328064,
  'train_time': 170.55289220809937},
 {'batch_size': 128,
  'learning_rate': 0.01,
  'epochs': 28,
  'test_accuracy': 0.978663444519043,
  'train_time': 49.8336284160614},
 {'batch_size': 128,
  'learning_rate': 0.1,
```

```
  'epochs': 500,
  'test_accuracy': 0.8801664113998413,
  'train_time': 922.4003396034241},
 {'batch_size': 128,
  'learning_rate': 1,
  'epochs': 500,
  'test_accuracy': 0.7892512083053589,
  'train_time': 973.3395295143127}]
```

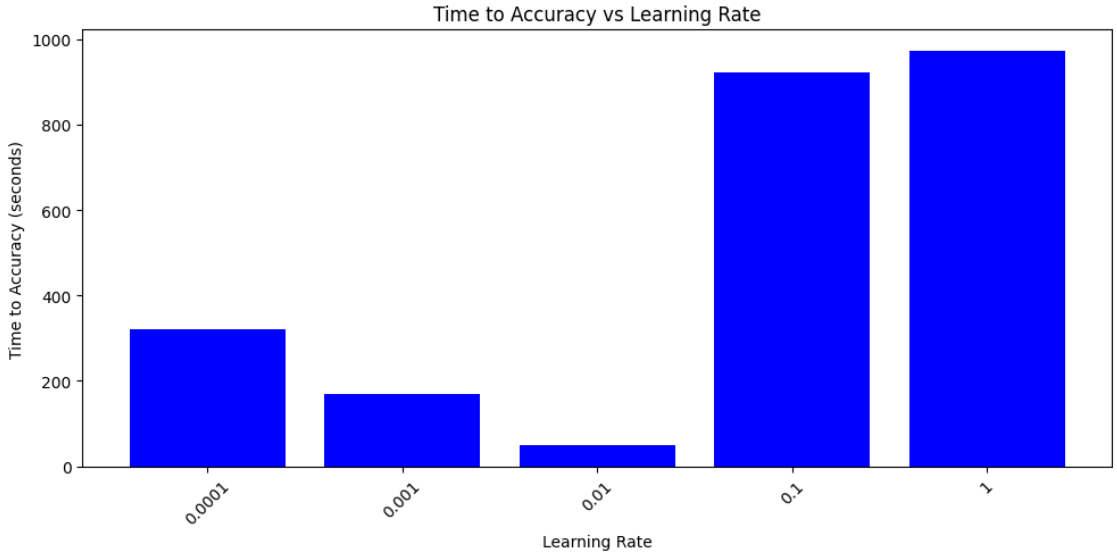
Next, you will visualize the results.

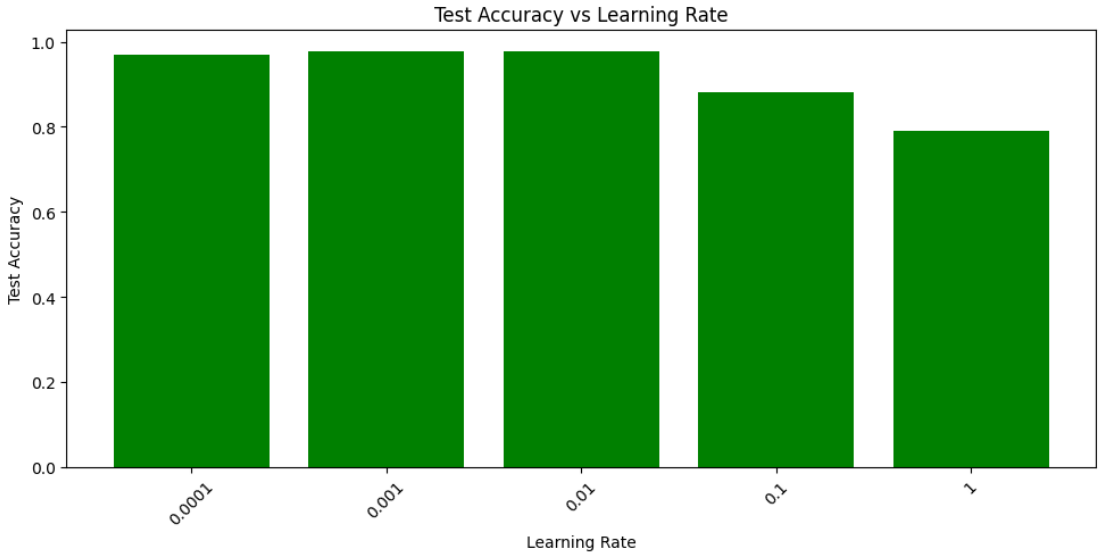
GPU runtime instructions: Create a figure with four subplots. In each subplot, create a bar plot with learning rate on the horizontal axis and (1) Time to accuracy, (2) Energy to accuracy, (3) Test accuracy, (4) Epochs, on the vertical axis on each subplot, respectively. Use an appropriate vertical range for each subplot. Label all axes.

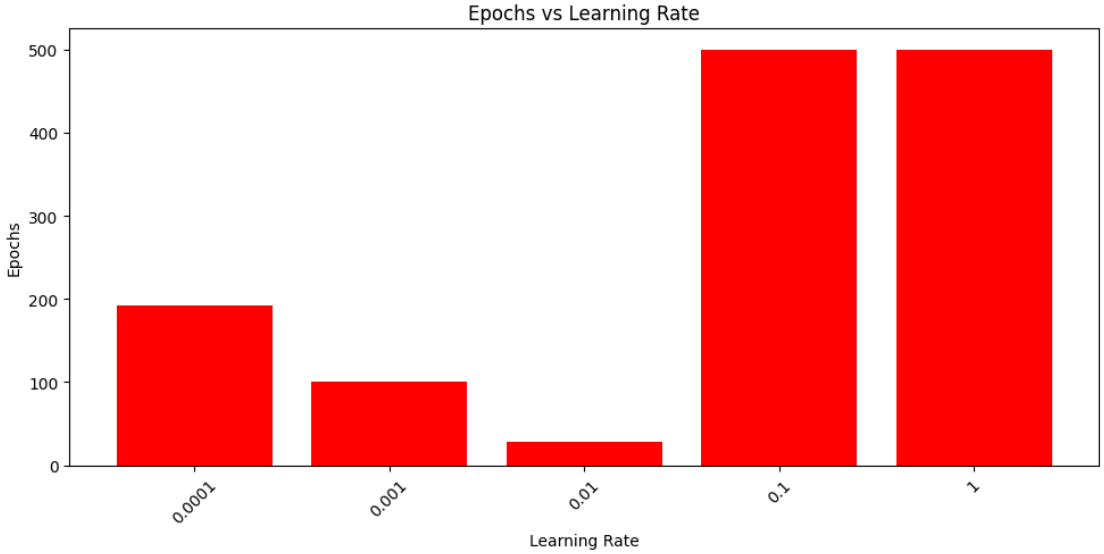
CPU runtime instructions: Create a figure with three subplots. In each subplot, create a bar plot with learning rate on the horizontal axis and (1) Time to accuracy, (2) Test accuracy, (3) Epochs, on the vertical axis on each subplot, respectively. Use an appropriate vertical range for each subplot. Label all axes.

[ ]:
```python
# TODO - visualize effect of varying learning rate, when training to a target␣
 ↪accuracy
# Extracting the data for plotting
learning_rates = [m['learning_rate'] for m in metrics_vs_lr]
time_to_accuracy = [m['train_time'] for m in metrics_vs_lr]
test_accuracies = [m['test_accuracy'] for m in metrics_vs_lr]
epochs = [m['epochs'] for m in metrics_vs_lr]
fig, axes = plt.subplots(3, 1, figsize=(10, 15))

# Converting learning rates to strings for better display on the x-axis
learning_rate_labels = [str(lr) for lr in learning_rates]

# Subplot 1: Time to Accuracy
axes[0].bar(learning_rate_labels, time_to_accuracy, color='blue')
axes[0].set_title('Time to Accuracy vs Learning Rate')
axes[0].set_xlabel('Learning Rate')
axes[0].set_ylabel('Time to Accuracy (seconds)')

# Subplot 2: Test Accuracy
axes[1].bar(learning_rate_labels, test_accuracies, color='green')
axes[1].set_title('Test Accuracy vs Learning Rate')
axes[1].set_xlabel('Learning Rate')
axes[1].set_ylabel('Test Accuracy')

# Subplot 3: Epochs
axes[2].bar(learning_rate_labels, epochs, color='red')
axes[2].set_title('Epochs vs Learning Rate')
```

```
axes[2].set_xlabel('Learning Rate')
axes[2].set_ylabel('Epochs')

# Adjusting x-axis and y-axis for better readability
for ax in axes:
    ax.tick_params(axis='x', labelrotation=45)  # Rotate x-axis labels for␣
 ↪clarity

plt.tight_layout()
plt.show()
```


Time to Accuracy vs Learning Rate
Time to Accuracy (seconds)
0
200
400
600
800
1000
0.0001
0.001
0.01
0.1
1
Learning Rate


Test Accuracy vs Learning Rate
Test Accuracy
0.0
0.2
0.4
0.6
0.8
1.0
0.0001
0.001
0.01
0.1
1
Learning Rate


Epochs vs Learning Rate
Epochs
0
100
200
300
400
500
0.0001
0.001
0.01
0.1
1
Learning Rate

Comment on the results: Given that the model is trained to a target validation accuracy, what is the effect of the learning rate on the training process?

Note: because of the stochastic nature of neural network training AND in the compute resource, these measurements can be very "noisy". Look for overall trends, but don't be concerned with small differences from one experiment to the next, or with occasional "outlier" results. Also note that if the number of epochs is 500, this is an indication that the target validation accuracy was *not* reached in 500 epochs!

Training Time:

A higher learning rate can lead to faster convergence, meaning the model may reach the target validation accuracy in fewer epochs. However, if the learning rate is too high, it might cause the model to overshoot the minimum of the loss function or even diverge, leading to increased training time or failure to converge.

A lower learning rate ensures more gradual and potentially more stable convergence. However, it may require more epochs to reach the target accuracy, resulting in longer training times. Too low a learning rate can lead to excessively slow convergence, also increasing training time.

Energy Consumption (GPU Runtime):

When using GPUs, the energy consumption is also an important consideration. A higher learning rate might reduce the number of epochs needed to train, potentially lowering total energy consumption. However, this is contingent on the model converging properly.

A lower learning rate, while potentially more stable, could increase the number of epochs needed and thus the overall energy consumption.

Finding the Balance:

The key is to find a balanced learning rate that allows for efficient convergence without overshooting or getting stuck in local minima.

Adaptive learning rate methods (like Adam, RMSprop, etc.) can dynamically adjust the learning rate during training, potentially offering a more efficient path to convergence.

Now, you will repeat, with a loop over different batch sizes -

[ ]:
```
# TODO - iterate over batch size and get TTA/ETA

# default learning rate and batch size -
lr = 0.001

metrics_vs_bs = []
for batch_size in [64, 128, 256, 512, 1024, 2048]:

    # Clearing the Keras session to free up memory
    K.clear_session()
```

```
    # Construct the model
    model = Sequential()
    model.add(Dense(nh, input_shape=(n_feat,), activation='sigmoid'))
    model.add(Dense(n_class, activation='softmax'))  # Assuming ytr.shape[1] is␣
↪the number of classes

    # Compile the model with the current learning rate
    model.compile(optimizer=Adam(learning_rate=lr),␣
↪loss='sparse_categorical_crossentropy', metrics=['accuracy'])

    # Start measurement

    start_time = time.time()

    # Fit the model
    history=model.fit(Xtr_scale, ytr, epochs=500, batch_size=batch_size,␣
↪validation_split=0.2, callbacks=[TrainToAccuracy(threshold=0.95,␣
↪patience=3)])

    # End measurement

    total_time = time.time() - start_time

    # Evaluate the model on test data
    test_loss, test_accuracy = model.evaluate(Xts_scale, yts)

    # Save metrics
    model_metrics = {
        'batch_size': batch_size,
        'epochs': len(history.history['accuracy']),
        'test_accuracy': test_accuracy,
        'train_time': total_time
    }

    metrics_vs_bs.append(model_metrics)
```

```
Epoch 1/500
829/829 [==============================] - 4s 4ms/step - loss: 0.3196 -
accuracy: 0.9154 - val_loss: 0.9059 - val_accuracy: 0.6937
Epoch 2/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0870 -
accuracy: 0.9793 - val_loss: 0.5168 - val_accuracy: 0.7965
Epoch 3/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0528 -
accuracy: 0.9867 - val_loss: 0.5995 - val_accuracy: 0.7963
Epoch 4/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0381 -
```

```
accuracy: 0.9903 - val_loss: 0.3707 - val_accuracy: 0.8544
Epoch 5/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0290 -
accuracy: 0.9920 - val_loss: 0.4108 - val_accuracy: 0.8475
Epoch 6/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0230 -
accuracy: 0.9935 - val_loss: 0.3274 - val_accuracy: 0.8805
Epoch 7/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0192 -
accuracy: 0.9947 - val_loss: 0.3660 - val_accuracy: 0.8759
Epoch 8/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0164 -
accuracy: 0.9958 - val_loss: 0.2964 - val_accuracy: 0.8940
Epoch 9/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0138 -
accuracy: 0.9963 - val_loss: 0.2889 - val_accuracy: 0.8957
Epoch 10/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0120 -
accuracy: 0.9970 - val_loss: 0.3100 - val_accuracy: 0.8943
Epoch 11/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0110 -
accuracy: 0.9970 - val_loss: 0.2081 - val_accuracy: 0.9226
Epoch 12/500
829/829 [==============================] - 4s 4ms/step - loss: 0.0099 -
accuracy: 0.9975 - val_loss: 0.1075 - val_accuracy: 0.9550
Epoch 13/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0087 -
accuracy: 0.9976 - val_loss: 0.2810 - val_accuracy: 0.9045
Epoch 14/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0079 -
accuracy: 0.9978 - val_loss: 0.2991 - val_accuracy: 0.9000
Epoch 15/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0072 -
accuracy: 0.9982 - val_loss: 0.2596 - val_accuracy: 0.9148
Epoch 16/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0068 -
accuracy: 0.9981 - val_loss: 0.1861 - val_accuracy: 0.9305
Epoch 17/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0060 -
accuracy: 0.9986 - val_loss: 0.2044 - val_accuracy: 0.9254
Epoch 18/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0057 -
accuracy: 0.9985 - val_loss: 0.1145 - val_accuracy: 0.9574
Epoch 19/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0054 -
accuracy: 0.9984 - val_loss: 0.1936 - val_accuracy: 0.9302
Epoch 20/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0053 -
```

```
accuracy: 0.9986 - val_loss: 0.1535 - val_accuracy: 0.9420
Epoch 21/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0044 -
accuracy: 0.9989 - val_loss: 0.0901 - val_accuracy: 0.9671
Epoch 22/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0041 -
accuracy: 0.9989 - val_loss: 0.1390 - val_accuracy: 0.9475
Epoch 23/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0042 -
accuracy: 0.9988 - val_loss: 0.1763 - val_accuracy: 0.9359
Epoch 24/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0041 -
accuracy: 0.9988 - val_loss: 0.4170 - val_accuracy: 0.8849
Epoch 25/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0035 -
accuracy: 0.9991 - val_loss: 0.2160 - val_accuracy: 0.9245
Epoch 26/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0033 -
accuracy: 0.9990 - val_loss: 0.3426 - val_accuracy: 0.8997
Epoch 27/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0033 -
accuracy: 0.9990 - val_loss: 0.1749 - val_accuracy: 0.9367
Epoch 28/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0031 -
accuracy: 0.9993 - val_loss: 0.1791 - val_accuracy: 0.9373
Epoch 29/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0028 -
accuracy: 0.9992 - val_loss: 0.2540 - val_accuracy: 0.9182
Epoch 30/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0025 -
accuracy: 0.9993 - val_loss: 0.2294 - val_accuracy: 0.9264
Epoch 31/500
829/829 [==============================] - 4s 4ms/step - loss: 0.0026 -
accuracy: 0.9992 - val_loss: 0.1372 - val_accuracy: 0.9578
Epoch 32/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0028 -
accuracy: 0.9993 - val_loss: 0.2313 - val_accuracy: 0.9275
Epoch 33/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0024 -
accuracy: 0.9994 - val_loss: 0.2138 - val_accuracy: 0.9307
Epoch 34/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0022 -
accuracy: 0.9994 - val_loss: 0.4494 - val_accuracy: 0.8815
Epoch 35/500
829/829 [==============================] - 4s 4ms/step - loss: 0.0024 -
accuracy: 0.9994 - val_loss: 0.2319 - val_accuracy: 0.9277
Epoch 36/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0018 -
```

```
accuracy: 0.9996 - val_loss: 0.1875 - val_accuracy: 0.9378
Epoch 37/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0018 -
accuracy: 0.9996 - val_loss: 0.2174 - val_accuracy: 0.9331
Epoch 38/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0024 -
accuracy: 0.9992 - val_loss: 0.1610 - val_accuracy: 0.9478
Epoch 39/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0022 -
accuracy: 0.9993 - val_loss: 0.2120 - val_accuracy: 0.9335
Epoch 40/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0016 -
accuracy: 0.9995 - val_loss: 0.1748 - val_accuracy: 0.9452
Epoch 41/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0020 -
accuracy: 0.9995 - val_loss: 0.1831 - val_accuracy: 0.9396
Epoch 42/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0015 -
accuracy: 0.9995 - val_loss: 0.1228 - val_accuracy: 0.9636
Epoch 43/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0015 -
accuracy: 0.9996 - val_loss: 0.2185 - val_accuracy: 0.9328
Epoch 44/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0015 -
accuracy: 0.9996 - val_loss: 0.1282 - val_accuracy: 0.9631
Epoch 45/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0014 -
accuracy: 0.9995 - val_loss: 0.2470 - val_accuracy: 0.9288
Epoch 46/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0013 -
accuracy: 0.9996 - val_loss: 0.1823 - val_accuracy: 0.9484
Epoch 47/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0014 -
accuracy: 0.9996 - val_loss: 0.6199 - val_accuracy: 0.8571
Epoch 48/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0010 -
accuracy: 0.9997 - val_loss: 0.2802 - val_accuracy: 0.9227
Epoch 49/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0015 -
accuracy: 0.9995 - val_loss: 0.2759 - val_accuracy: 0.9261
Epoch 50/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0016 -
accuracy: 0.9995 - val_loss: 0.2874 - val_accuracy: 0.9172
Epoch 51/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0019 -
accuracy: 0.9995 - val_loss: 0.2767 - val_accuracy: 0.9226
Epoch 52/500
829/829 [==============================] - 4s 5ms/step - loss: 9.5215e-04 -
```

```
accuracy: 0.9998 - val_loss: 0.1883 - val_accuracy: 0.9442
Epoch 53/500
829/829 [==============================] - 4s 4ms/step - loss: 0.0010 -
accuracy: 0.9997 - val_loss: 0.2105 - val_accuracy: 0.9400
Epoch 54/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.3015 - val_accuracy: 0.9189
Epoch 55/500
829/829 [==============================] - 3s 4ms/step - loss: 8.5076e-04 -
accuracy: 0.9997 - val_loss: 0.5232 - val_accuracy: 0.8765
Epoch 56/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0016 -
accuracy: 0.9995 - val_loss: 0.1789 - val_accuracy: 0.9452
Epoch 57/500
829/829 [==============================] - 4s 5ms/step - loss: 9.6005e-04 -
accuracy: 0.9998 - val_loss: 0.1365 - val_accuracy: 0.9568
Epoch 58/500
829/829 [==============================] - 3s 3ms/step - loss: 9.2742e-04 -
accuracy: 0.9997 - val_loss: 0.2668 - val_accuracy: 0.9223
Epoch 59/500
829/829 [==============================] - 3s 4ms/step - loss: 9.4288e-04 -
accuracy: 0.9997 - val_loss: 0.1743 - val_accuracy: 0.9512
Epoch 60/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0020 -
accuracy: 0.9992 - val_loss: 0.1315 - val_accuracy: 0.9614
Epoch 61/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0011 -
accuracy: 0.9996 - val_loss: 0.1881 - val_accuracy: 0.9454
Epoch 62/500
829/829 [==============================] - 3s 4ms/step - loss: 7.1695e-04 -
accuracy: 0.9997 - val_loss: 0.2620 - val_accuracy: 0.9294
Epoch 63/500
829/829 [==============================] - 3s 3ms/step - loss: 0.0010 -
accuracy: 0.9996 - val_loss: 0.1915 - val_accuracy: 0.9491
Epoch 64/500
829/829 [==============================] - 3s 4ms/step - loss: 5.9275e-04 -
accuracy: 0.9999 - val_loss: 0.3370 - val_accuracy: 0.9147
Epoch 65/500
829/829 [==============================] - 3s 4ms/step - loss: 5.7204e-04 -
accuracy: 0.9999 - val_loss: 0.5245 - val_accuracy: 0.8795
Epoch 66/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0012 -
accuracy: 0.9996 - val_loss: 0.7381 - val_accuracy: 0.8463
Epoch 67/500
829/829 [==============================] - 3s 4ms/step - loss: 6.2983e-04 -
accuracy: 0.9999 - val_loss: 0.2284 - val_accuracy: 0.9396
Epoch 68/500
829/829 [==============================] - 3s 4ms/step - loss: 4.8712e-04 -
```

```
accuracy: 0.9999 - val_loss: 0.2806 - val_accuracy: 0.9295
Epoch 69/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0011 -
accuracy: 0.9998 - val_loss: 0.2255 - val_accuracy: 0.9397
Epoch 70/500
829/829 [==============================] - 4s 5ms/step - loss: 8.2235e-04 -
accuracy: 0.9997 - val_loss: 0.1795 - val_accuracy: 0.9487
Epoch 71/500
829/829 [==============================] - 3s 4ms/step - loss: 7.5941e-04 -
accuracy: 0.9997 - val_loss: 0.6350 - val_accuracy: 0.8614
Epoch 72/500
829/829 [==============================] - 3s 3ms/step - loss: 7.5438e-04 -
accuracy: 0.9997 - val_loss: 0.2449 - val_accuracy: 0.9338
Epoch 73/500
829/829 [==============================] - 3s 3ms/step - loss: 5.8754e-04 -
accuracy: 0.9998 - val_loss: 0.3424 - val_accuracy: 0.9133
Epoch 74/500
829/829 [==============================] - 3s 4ms/step - loss: 7.4682e-04 -
accuracy: 0.9998 - val_loss: 0.3531 - val_accuracy: 0.9134
Epoch 75/500
829/829 [==============================] - 4s 5ms/step - loss: 5.2874e-04 -
accuracy: 0.9998 - val_loss: 0.3263 - val_accuracy: 0.9216
Epoch 76/500
829/829 [==============================] - 3s 3ms/step - loss: 9.7310e-04 -
accuracy: 0.9997 - val_loss: 0.2195 - val_accuracy: 0.9466
Epoch 77/500
829/829 [==============================] - 3s 3ms/step - loss: 6.9897e-04 -
accuracy: 0.9998 - val_loss: 0.3439 - val_accuracy: 0.9169
Epoch 78/500
829/829 [==============================] - 3s 4ms/step - loss: 4.6115e-04 -
accuracy: 0.9998 - val_loss: 0.3345 - val_accuracy: 0.9180
Epoch 79/500
829/829 [==============================] - 4s 5ms/step - loss: 4.4068e-04 -
accuracy: 0.9999 - val_loss: 0.4588 - val_accuracy: 0.8914
Epoch 80/500
829/829 [==============================] - 3s 4ms/step - loss: 9.3093e-04 -
accuracy: 0.9997 - val_loss: 0.2585 - val_accuracy: 0.9362
Epoch 81/500
829/829 [==============================] - 3s 3ms/step - loss: 3.7035e-04 -
accuracy: 0.9999 - val_loss: 0.3463 - val_accuracy: 0.9183
Epoch 82/500
829/829 [==============================] - 3s 3ms/step - loss: 6.1166e-04 -
accuracy: 0.9998 - val_loss: 0.3353 - val_accuracy: 0.9205
Epoch 83/500
829/829 [==============================] - 3s 4ms/step - loss: 7.6429e-04 -
accuracy: 0.9997 - val_loss: 0.3168 - val_accuracy: 0.9245
Epoch 84/500
829/829 [==============================] - 4s 4ms/step - loss: 4.4263e-04 -
```

```
accuracy: 0.9999 - val_loss: 0.5917 - val_accuracy: 0.8764
Epoch 85/500
829/829 [==============================] - 3s 4ms/step - loss: 5.7167e-04 -
accuracy: 0.9998 - val_loss: 0.3060 - val_accuracy: 0.9301
Epoch 86/500
829/829 [==============================] - 3s 4ms/step - loss: 2.9484e-04 -
accuracy: 0.9999 - val_loss: 0.3289 - val_accuracy: 0.9227
Epoch 87/500
829/829 [==============================] - 3s 3ms/step - loss: 5.8223e-04 -
accuracy: 0.9999 - val_loss: 0.2710 - val_accuracy: 0.9346
Epoch 88/500
829/829 [==============================] - 4s 5ms/step - loss: 4.1736e-04 -
accuracy: 0.9999 - val_loss: 0.8973 - val_accuracy: 0.8405
Epoch 89/500
829/829 [==============================] - 3s 4ms/step - loss: 7.4701e-04 -
accuracy: 0.9998 - val_loss: 0.2290 - val_accuracy: 0.9465
Epoch 90/500
829/829 [==============================] - 3s 4ms/step - loss: 5.5063e-04 -
accuracy: 0.9999 - val_loss: 0.2743 - val_accuracy: 0.9351
Epoch 91/500
829/829 [==============================] - 3s 3ms/step - loss: 8.3519e-04 -
accuracy: 0.9997 - val_loss: 0.2588 - val_accuracy: 0.9395
Epoch 92/500
829/829 [==============================] - 4s 4ms/step - loss: 2.9419e-04 -
accuracy: 0.9999 - val_loss: 0.4757 - val_accuracy: 0.8910
Epoch 93/500
829/829 [==============================] - 4s 4ms/step - loss: 3.8832e-04 -
accuracy: 0.9999 - val_loss: 0.4378 - val_accuracy: 0.8988
Epoch 94/500
829/829 [==============================] - 3s 3ms/step - loss: 2.5935e-04 -
accuracy: 0.9999 - val_loss: 0.3209 - val_accuracy: 0.9226
Epoch 95/500
829/829 [==============================] - 3s 3ms/step - loss: 3.7420e-04 -
accuracy: 0.9999 - val_loss: 0.5292 - val_accuracy: 0.8869
Epoch 96/500
829/829 [==============================] - 3s 3ms/step - loss: 4.6976e-04 -
accuracy: 0.9999 - val_loss: 0.2642 - val_accuracy: 0.9381
Epoch 97/500
829/829 [==============================] - 4s 5ms/step - loss: 7.9087e-04 -
accuracy: 0.9998 - val_loss: 0.4035 - val_accuracy: 0.9100
Epoch 98/500
829/829 [==============================] - 4s 4ms/step - loss: 3.9025e-04 -
accuracy: 0.9999 - val_loss: 0.3337 - val_accuracy: 0.9268
Epoch 99/500
829/829 [==============================] - 3s 3ms/step - loss: 8.5612e-04 -
accuracy: 0.9997 - val_loss: 0.3464 - val_accuracy: 0.9181
Epoch 100/500
829/829 [==============================] - 3s 4ms/step - loss: 4.1878e-04 -
```

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accuracy: 0.9999 - val_loss: 0.3020 - val_accuracy: 0.9267
Epoch 101/500
829/829 [==============================] - 4s 4ms/step - loss: 7.1743e-04 -
accuracy: 0.9998 - val_loss: 0.2525 - val_accuracy: 0.9415
Epoch 102/500
829/829 [==============================] - 4s 5ms/step - loss: 2.2352e-04 -
accuracy: 0.9999 - val_loss: 0.2946 - val_accuracy: 0.9328
Epoch 103/500
829/829 [==============================] - 3s 4ms/step - loss: 4.0413e-04 -
accuracy: 0.9999 - val_loss: 0.3266 - val_accuracy: 0.9272
Epoch 104/500
829/829 [==============================] - 3s 4ms/step - loss: 1.4023e-04 -
accuracy: 1.0000 - val_loss: 0.4338 - val_accuracy: 0.9056
Epoch 105/500
829/829 [==============================] - 3s 4ms/step - loss: 2.0066e-04 -
accuracy: 1.0000 - val_loss: 0.3244 - val_accuracy: 0.9301
Epoch 106/500
829/829 [==============================] - 4s 5ms/step - loss: 4.7208e-04 -
accuracy: 0.9999 - val_loss: 0.3813 - val_accuracy: 0.9191
Epoch 107/500
829/829 [==============================] - 3s 4ms/step - loss: 7.5228e-04 -
accuracy: 0.9998 - val_loss: 0.4811 - val_accuracy: 0.8971
Epoch 108/500
829/829 [==============================] - 3s 3ms/step - loss: 2.9668e-04 -
accuracy: 0.9999 - val_loss: 0.3208 - val_accuracy: 0.9302
Epoch 109/500
829/829 [==============================] - 3s 4ms/step - loss: 3.4762e-04 -
accuracy: 0.9999 - val_loss: 0.5386 - val_accuracy: 0.8892
Epoch 110/500
829/829 [==============================] - 4s 4ms/step - loss: 3.5851e-04 -
accuracy: 0.9999 - val_loss: 0.3927 - val_accuracy: 0.9178
Epoch 111/500
829/829 [==============================] - 4s 4ms/step - loss: 1.5972e-04 -
accuracy: 0.9999 - val_loss: 0.4183 - val_accuracy: 0.9107
Epoch 112/500
829/829 [==============================] - 3s 4ms/step - loss: 3.2814e-04 -
accuracy: 0.9999 - val_loss: 0.4588 - val_accuracy: 0.9019
Epoch 113/500
829/829 [==============================] - 3s 4ms/step - loss: 9.7795e-04 -
accuracy: 0.9997 - val_loss: 0.3717 - val_accuracy: 0.9186
Epoch 114/500
829/829 [==============================] - 3s 4ms/step - loss: 6.2342e-04 -
accuracy: 0.9998 - val_loss: 0.3856 - val_accuracy: 0.9118
Epoch 115/500
829/829 [==============================] - 4s 5ms/step - loss: 2.0319e-04 -
accuracy: 0.9999 - val_loss: 0.3986 - val_accuracy: 0.9109
Epoch 116/500
829/829 [==============================] - 3s 4ms/step - loss: 2.7871e-04 -
```

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accuracy: 0.9999 - val_loss: 0.6451 - val_accuracy: 0.8692
Epoch 117/500
829/829 [==============================] - 3s 3ms/step - loss: 1.6127e-04 -
accuracy: 1.0000 - val_loss: 0.5577 - val_accuracy: 0.8824
Epoch 118/500
829/829 [==============================] - 3s 3ms/step - loss: 3.4381e-04 -
accuracy: 0.9999 - val_loss: 0.4867 - val_accuracy: 0.8943
Epoch 119/500
829/829 [==============================] - 4s 4ms/step - loss: 2.7163e-04 -
accuracy: 0.9999 - val_loss: 0.3692 - val_accuracy: 0.9174
Epoch 120/500
829/829 [==============================] - 3s 4ms/step - loss: 7.3239e-04 -
accuracy: 0.9998 - val_loss: 0.4281 - val_accuracy: 0.9018
Epoch 121/500
829/829 [==============================] - 3s 3ms/step - loss: 5.1111e-04 -
accuracy: 0.9998 - val_loss: 0.4012 - val_accuracy: 0.9070
Epoch 122/500
829/829 [==============================] - 3s 3ms/step - loss: 4.7276e-04 -
accuracy: 0.9998 - val_loss: 2.3529 - val_accuracy: 0.7349
Epoch 123/500
829/829 [==============================] - 3s 4ms/step - loss: 5.4039e-04 -
accuracy: 1.0000 - val_loss: 0.2359 - val_accuracy: 0.9394
Epoch 124/500
829/829 [==============================] - 4s 5ms/step - loss: 3.9689e-04 -
accuracy: 0.9998 - val_loss: 0.2104 - val_accuracy: 0.9501
Epoch 125/500
829/829 [==============================] - 3s 3ms/step - loss: 1.1125e-04 -
accuracy: 1.0000 - val_loss: 0.4395 - val_accuracy: 0.9054
Epoch 126/500
829/829 [==============================] - 3s 3ms/step - loss: 4.1757e-04 -
accuracy: 0.9999 - val_loss: 0.3261 - val_accuracy: 0.9242
Epoch 127/500
829/829 [==============================] - 3s 4ms/step - loss: 5.6275e-04 -
accuracy: 0.9998 - val_loss: 0.3617 - val_accuracy: 0.9186
Epoch 128/500
829/829 [==============================] - 3s 4ms/step - loss: 2.8127e-04 -
accuracy: 0.9999 - val_loss: 0.3407 - val_accuracy: 0.9226
Epoch 129/500
829/829 [==============================] - 4s 4ms/step - loss: 1.1168e-04 -
accuracy: 1.0000 - val_loss: 0.3600 - val_accuracy: 0.9188
Epoch 130/500
829/829 [==============================] - 3s 4ms/step - loss: 1.1772e-04 -
accuracy: 1.0000 - val_loss: 0.3163 - val_accuracy: 0.9275
Epoch 131/500
829/829 [==============================] - 3s 3ms/step - loss: 6.5613e-04 -
accuracy: 0.9999 - val_loss: 0.3101 - val_accuracy: 0.9274
Epoch 132/500
829/829 [==============================] - 3s 3ms/step - loss: 1.9521e-04 -
```

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accuracy: 0.9999 - val_loss: 0.3614 - val_accuracy: 0.9207
Epoch 133/500
829/829 [==============================] - 4s 5ms/step - loss: 3.1563e-04 -
accuracy: 0.9999 - val_loss: 0.2638 - val_accuracy: 0.9368
Epoch 134/500
829/829 [==============================] - 3s 4ms/step - loss: 2.3472e-04 -
accuracy: 1.0000 - val_loss: 0.3755 - val_accuracy: 0.9137
Epoch 135/500
829/829 [==============================] - 3s 4ms/step - loss: 1.1087e-04 -
accuracy: 1.0000 - val_loss: 0.3578 - val_accuracy: 0.9217
Epoch 136/500
829/829 [==============================] - 3s 4ms/step - loss: 0.0012 -
accuracy: 0.9997 - val_loss: 0.4444 - val_accuracy: 0.9097
Epoch 137/500
829/829 [==============================] - 4s 4ms/step - loss: 2.3866e-04 -
accuracy: 1.0000 - val_loss: 0.4732 - val_accuracy: 0.9060
Epoch 138/500
829/829 [==============================] - 4s 5ms/step - loss: 1.8519e-04 -
accuracy: 0.9999 - val_loss: 0.4948 - val_accuracy: 0.9012
Epoch 139/500
829/829 [==============================] - 3s 4ms/step - loss: 1.7462e-04 -
accuracy: 1.0000 - val_loss: 0.5106 - val_accuracy: 0.8996
Epoch 140/500
829/829 [==============================] - 3s 4ms/step - loss: 4.5373e-05 -
accuracy: 1.0000 - val_loss: 0.5069 - val_accuracy: 0.8993
Epoch 141/500
829/829 [==============================] - 3s 4ms/step - loss: 5.7214e-04 -
accuracy: 0.9999 - val_loss: 0.4225 - val_accuracy: 0.9146
Epoch 142/500
829/829 [==============================] - 4s 5ms/step - loss: 3.5297e-04 -
accuracy: 0.9999 - val_loss: 0.5172 - val_accuracy: 0.9008
Epoch 143/500
829/829 [==============================] - 3s 3ms/step - loss: 2.4800e-04 -
accuracy: 0.9999 - val_loss: 0.4974 - val_accuracy: 0.9021
Epoch 144/500
829/829 [==============================] - 3s 4ms/step - loss: 3.9801e-05 -
accuracy: 1.0000 - val_loss: 0.4958 - val_accuracy: 0.9011
Epoch 145/500
829/829 [==============================] - 3s 4ms/step - loss: 7.2254e-04 -
accuracy: 0.9999 - val_loss: 0.4993 - val_accuracy: 0.8957
Epoch 146/500
829/829 [==============================] - 4s 5ms/step - loss: 0.0011 -
accuracy: 0.9996 - val_loss: 0.3888 - val_accuracy: 0.9108
Epoch 147/500
829/829 [==============================] - 4s 4ms/step - loss: 2.1400e-04 -
accuracy: 0.9999 - val_loss: 0.3532 - val_accuracy: 0.9178
Epoch 148/500
829/829 [==============================] - 3s 4ms/step - loss: 3.3997e-04 -
```

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accuracy: 0.9998 - val_loss: 0.2138 - val_accuracy: 0.9463
Epoch 149/500
829/829 [==============================] - 3s 3ms/step - loss: 7.4944e-05 -
accuracy: 1.0000 - val_loss: 0.2182 - val_accuracy: 0.9466
Epoch 150/500
829/829 [==============================] - 3s 4ms/step - loss: 1.9939e-04 -
accuracy: 1.0000 - val_loss: 0.2819 - val_accuracy: 0.9335
Epoch 151/500
829/829 [==============================] - 4s 5ms/step - loss: 1.1553e-04 -
accuracy: 1.0000 - val_loss: 0.3023 - val_accuracy: 0.9322
Epoch 152/500
829/829 [==============================] - 3s 4ms/step - loss: 3.9982e-04 -
accuracy: 0.9999 - val_loss: 0.3162 - val_accuracy: 0.9277
Epoch 153/500
829/829 [==============================] - 3s 4ms/step - loss: 1.2368e-04 -
accuracy: 1.0000 - val_loss: 0.3570 - val_accuracy: 0.9204
Epoch 154/500
829/829 [==============================] - 3s 4ms/step - loss: 7.2503e-04 -
accuracy: 0.9997 - val_loss: 0.3916 - val_accuracy: 0.9114
Epoch 155/500
829/829 [==============================] - 4s 5ms/step - loss: 1.4147e-04 -
accuracy: 1.0000 - val_loss: 0.3315 - val_accuracy: 0.9206
Epoch 156/500
829/829 [==============================] - 3s 4ms/step - loss: 3.8720e-05 -
accuracy: 1.0000 - val_loss: 0.3216 - val_accuracy: 0.9239
Epoch 157/500
829/829 [==============================] - 3s 3ms/step - loss: 5.3806e-04 -
accuracy: 0.9999 - val_loss: 0.2843 - val_accuracy: 0.9285
Epoch 158/500
829/829 [==============================] - 3s 3ms/step - loss: 1.6629e-04 -
accuracy: 0.9999 - val_loss: 0.3115 - val_accuracy: 0.9241
Epoch 159/500
829/829 [==============================] - 3s 4ms/step - loss: 3.7113e-05 -
accuracy: 1.0000 - val_loss: 0.2946 - val_accuracy: 0.9292
Epoch 160/500
829/829 [==============================] - 4s 4ms/step - loss: 4.6372e-04 -
accuracy: 0.9999 - val_loss: 0.3712 - val_accuracy: 0.9152
Epoch 161/500
829/829 [==============================] - 3s 4ms/step - loss: 1.9132e-04 -
accuracy: 0.9999 - val_loss: 0.3142 - val_accuracy: 0.9263
Epoch 162/500
829/829 [==============================] - 3s 4ms/step - loss: 4.6684e-05 -
accuracy: 1.0000 - val_loss: 0.3441 - val_accuracy: 0.9202
Epoch 163/500
829/829 [==============================] - 3s 4ms/step - loss: 5.0768e-04 -
accuracy: 0.9998 - val_loss: 0.1719 - val_accuracy: 0.9578
Epoch 164/500
829/829 [==============================] - 4s 5ms/step - loss: 4.8353e-04 -
```

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accuracy: 0.9999 - val_loss: 0.1838 - val_accuracy: 0.9531
Epoch 165/500
829/829 [==============================] - 3s 4ms/step - loss: 4.3013e-05 -
accuracy: 1.0000 - val_loss: 0.4241 - val_accuracy: 0.9143
Epoch 166/500
829/829 [==============================] - 3s 4ms/step - loss: 1.9496e-04 -
accuracy: 1.0000 - val_loss: 0.1820 - val_accuracy: 0.9549
Epoch 167/500
829/829 [==============================] - 3s 3ms/step - loss: 4.5461e-04 -
accuracy: 0.9999 - val_loss: 0.1634 - val_accuracy: 0.9614
Epoch 168/500
829/829 [==============================] - 4s 4ms/step - loss: 2.3667e-05 -
accuracy: 1.0000 - val_loss: 0.2298 - val_accuracy: 0.9454
Epoch 169/500
829/829 [==============================] - 4s 5ms/step - loss: 2.0279e-05 -
accuracy: 1.0000 - val_loss: 0.2491 - val_accuracy: 0.9426
Epoch 170/500
829/829 [==============================] - 3s 4ms/step - loss: 5.4167e-04 -
accuracy: 0.9998 - val_loss: 0.2162 - val_accuracy: 0.9491
Epoch 171/500
829/829 [==============================] - 3s 4ms/step - loss: 3.0194e-05 -
accuracy: 1.0000 - val_loss: 0.2444 - val_accuracy: 0.9435
Epoch 172/500
829/829 [==============================] - 3s 4ms/step - loss: 2.7417e-05 -
accuracy: 1.0000 - val_loss: 0.2642 - val_accuracy: 0.9391
Epoch 173/500
829/829 [==============================] - 4s 5ms/step - loss: 2.8251e-04 -
accuracy: 0.9998 - val_loss: 0.1967 - val_accuracy: 0.9529
Epoch 174/500
829/829 [==============================] - 3s 3ms/step - loss: 3.9550e-05 -
accuracy: 1.0000 - val_loss: 0.2328 - val_accuracy: 0.9453
Epoch 175/500
829/829 [==============================] - 3s 4ms/step - loss: 3.5286e-04 -
accuracy: 0.9999 - val_loss: 0.2927 - val_accuracy: 0.9337
Epoch 176/500
829/829 [==============================] - 3s 4ms/step - loss: 3.1690e-04 -
accuracy: 0.9999 - val_loss: 0.4848 - val_accuracy: 0.9081
Epoch 177/500
829/829 [==============================] - 4s 4ms/step - loss: 2.8382e-04 -
accuracy: 0.9999 - val_loss: 0.2657 - val_accuracy: 0.9383
Epoch 178/500
829/829 [==============================] - 4s 4ms/step - loss: 4.4638e-05 -
accuracy: 1.0000 - val_loss: 0.2851 - val_accuracy: 0.9353
Epoch 179/500
829/829 [==============================] - 3s 4ms/step - loss: 1.6664e-04 -
accuracy: 1.0000 - val_loss: 0.2251 - val_accuracy: 0.9463
Epoch 180/500
829/829 [==============================] - 3s 3ms/step - loss: 3.9436e-05 -
```

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accuracy: 1.0000 - val_loss: 0.2741 - val_accuracy: 0.9374
Epoch 181/500
829/829 [==============================] - 3s 4ms/step - loss: 2.2241e-05 -
accuracy: 1.0000 - val_loss: 0.2397 - val_accuracy: 0.9432
Epoch 182/500
829/829 [==============================] - 4s 5ms/step - loss: 8.0991e-04 -
accuracy: 0.9998 - val_loss: 0.1672 - val_accuracy: 0.9624
Epoch 183/500
829/829 [==============================] - 3s 4ms/step - loss: 5.4170e-05 -
accuracy: 1.0000 - val_loss: 0.2887 - val_accuracy: 0.9350
Epoch 184/500
829/829 [==============================] - 3s 4ms/step - loss: 2.2034e-05 -
accuracy: 1.0000 - val_loss: 0.2094 - val_accuracy: 0.9521
Epoch 185/500
829/829 [==============================] - 3s 4ms/step - loss: 3.7664e-04 -
accuracy: 0.9999 - val_loss: 0.2684 - val_accuracy: 0.9383
Epoch 186/500
829/829 [==============================] - 4s 5ms/step - loss: 3.0822e-04 -
accuracy: 0.9999 - val_loss: 0.3543 - val_accuracy: 0.9216
Epoch 187/500
829/829 [==============================] - 3s 4ms/step - loss: 2.3602e-05 -
accuracy: 1.0000 - val_loss: 0.5602 - val_accuracy: 0.8920
Epoch 188/500
829/829 [==============================] - 3s 4ms/step - loss: 3.8448e-04 -
accuracy: 0.9998 - val_loss: 0.3272 - val_accuracy: 0.9294
Epoch 189/500
829/829 [==============================] - 3s 4ms/step - loss: 3.4731e-04 -
accuracy: 0.9999 - val_loss: 0.2655 - val_accuracy: 0.9383
Epoch 190/500
829/829 [==============================] - 3s 4ms/step - loss: 2.1086e-04 -
accuracy: 0.9999 - val_loss: 0.2451 - val_accuracy: 0.9429
Epoch 191/500
829/829 [==============================] - 4s 5ms/step - loss: 1.0809e-04 -
accuracy: 1.0000 - val_loss: 0.2880 - val_accuracy: 0.9349
Epoch 192/500
829/829 [==============================] - 3s 4ms/step - loss: 2.0593e-05 -
accuracy: 1.0000 - val_loss: 0.3005 - val_accuracy: 0.9316
Epoch 193/500
829/829 [==============================] - 3s 3ms/step - loss: 1.7223e-04 -
accuracy: 0.9999 - val_loss: 0.1847 - val_accuracy: 0.9528
Epoch 194/500
829/829 [==============================] - 3s 4ms/step - loss: 1.8570e-04 -
accuracy: 1.0000 - val_loss: 0.3159 - val_accuracy: 0.9284
Epoch 195/500
829/829 [==============================] - 4s 5ms/step - loss: 3.4321e-04 -
accuracy: 1.0000 - val_loss: 0.2136 - val_accuracy: 0.9469
Epoch 196/500
829/829 [==============================] - 4s 4ms/step - loss: 3.1000e-05 -
```

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accuracy: 1.0000 - val_loss: 0.2287 - val_accuracy: 0.9456
Epoch 197/500
829/829 [==============================] - 3s 4ms/step - loss: 8.9685e-05 -
accuracy: 1.0000 - val_loss: 0.2895 - val_accuracy: 0.9335
Epoch 198/500
829/829 [==============================] - 3s 4ms/step - loss: 1.5265e-04 -
accuracy: 0.9999 - val_loss: 0.1822 - val_accuracy: 0.9565
Epoch 199/500
829/829 [==============================] - 3s 4ms/step - loss: 8.2274e-04 -
accuracy: 0.9998 - val_loss: 0.2196 - val_accuracy: 0.9495
Epoch 200/500
829/829 [==============================] - 4s 5ms/step - loss: 6.4505e-05 -
accuracy: 1.0000 - val_loss: 0.2230 - val_accuracy: 0.9501
Epoch 201/500
829/829 [==============================] - 3s 4ms/step - loss: 1.8438e-05 -
accuracy: 1.0000 - val_loss: 0.2691 - val_accuracy: 0.9403
Epoch 202/500
829/829 [==============================] - 3s 4ms/step - loss: 1.1618e-05 -
accuracy: 1.0000 - val_loss: 0.3211 - val_accuracy: 0.9316
Epoch 203/500
829/829 [==============================] - 3s 4ms/step - loss: 4.0818e-04 -
accuracy: 0.9999 - val_loss: 0.2277 - val_accuracy: 0.9520
Epoch 204/500
829/829 [==============================] - 4s 5ms/step - loss: 1.3592e-04 -
accuracy: 1.0000 - val_loss: 0.2109 - val_accuracy: 0.9546
Epoch 205/500
829/829 [==============================] - 3s 4ms/step - loss: 6.1650e-05 -
accuracy: 1.0000 - val_loss: 0.3084 - val_accuracy: 0.9345
Epoch 206/500
829/829 [==============================] - 3s 4ms/step - loss: 3.2680e-04 -
accuracy: 0.9999 - val_loss: 0.2790 - val_accuracy: 0.9403
Epoch 207/500
829/829 [==============================] - 3s 4ms/step - loss: 2.5794e-05 -
accuracy: 1.0000 - val_loss: 0.2956 - val_accuracy: 0.9375
Epoch 208/500
829/829 [==============================] - 4s 4ms/step - loss: 1.1899e-05 -
accuracy: 1.0000 - val_loss: 0.3080 - val_accuracy: 0.9365
Epoch 209/500
829/829 [==============================] - 4s 4ms/step - loss: 2.3633e-05 -
accuracy: 1.0000 - val_loss: 0.4036 - val_accuracy: 0.9243
Epoch 210/500
829/829 [==============================] - 3s 4ms/step - loss: 7.0632e-04 -
accuracy: 0.9998 - val_loss: 0.4761 - val_accuracy: 0.9104
Epoch 211/500
829/829 [==============================] - 3s 4ms/step - loss: 1.1712e-04 -
accuracy: 1.0000 - val_loss: 0.3449 - val_accuracy: 0.9307
Epoch 212/500
829/829 [==============================] - 3s 4ms/step - loss: 1.0500e-05 -
```

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accuracy: 1.0000 - val_loss: 0.3605 - val_accuracy: 0.9272
Epoch 213/500
829/829 [==============================] - 4s 5ms/step - loss: 1.0019e-05 -
accuracy: 1.0000 - val_loss: 0.3471 - val_accuracy: 0.9297
Epoch 214/500
829/829 [==============================] - 3s 3ms/step - loss: 6.6326e-04 -
accuracy: 0.9998 - val_loss: 0.5552 - val_accuracy: 0.9023
Epoch 215/500
829/829 [==============================] - 3s 4ms/step - loss: 3.5530e-04 -
accuracy: 0.9999 - val_loss: 0.4911 - val_accuracy: 0.9143
Epoch 216/500
829/829 [==============================] - 3s 4ms/step - loss: 4.3187e-04 -
accuracy: 0.9999 - val_loss: 0.4011 - val_accuracy: 0.9257
Epoch 217/500
829/829 [==============================] - 4s 5ms/step - loss: 2.4342e-05 -
accuracy: 1.0000 - val_loss: 0.3653 - val_accuracy: 0.9355
Epoch 218/500
829/829 [==============================] - 4s 4ms/step - loss: 1.9839e-05 -
accuracy: 1.0000 - val_loss: 0.4047 - val_accuracy: 0.9297
Epoch 219/500
829/829 [==============================] - 3s 4ms/step - loss: 1.3509e-05 -
accuracy: 1.0000 - val_loss: 0.4024 - val_accuracy: 0.9306
Epoch 220/500
829/829 [==============================] - 3s 4ms/step - loss: 1.2916e-04 -
accuracy: 0.9999 - val_loss: 0.4217 - val_accuracy: 0.9266
Epoch 221/500
829/829 [==============================] - 4s 4ms/step - loss: 2.0306e-05 -
accuracy: 1.0000 - val_loss: 0.4525 - val_accuracy: 0.9211
Epoch 222/500
829/829 [==============================] - 4s 4ms/step - loss: 2.1250e-04 -
accuracy: 0.9999 - val_loss: 0.6029 - val_accuracy: 0.8955
Epoch 223/500
829/829 [==============================] - 3s 4ms/step - loss: 5.2373e-04 -
accuracy: 0.9999 - val_loss: 0.3300 - val_accuracy: 0.9340
Epoch 224/500
829/829 [==============================] - 3s 4ms/step - loss: 6.9499e-04 -
accuracy: 0.9998 - val_loss: 0.2057 - val_accuracy: 0.9548
Epoch 225/500
829/829 [==============================] - 3s 4ms/step - loss: 3.0537e-05 -
accuracy: 1.0000 - val_loss: 0.2484 - val_accuracy: 0.9462
Epoch 226/500
829/829 [==============================] - 4s 5ms/step - loss: 3.8772e-05 -
accuracy: 1.0000 - val_loss: 0.2289 - val_accuracy: 0.9503
Epoch 227/500
829/829 [==============================] - 3s 4ms/step - loss: 1.5151e-05 -
accuracy: 1.0000 - val_loss: 0.2590 - val_accuracy: 0.9440
Epoch 228/500
829/829 [==============================] - 3s 4ms/step - loss: 9.6311e-06 -
```

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accuracy: 1.0000 - val_loss: 0.2384 - val_accuracy: 0.9481
Epoch 229/500
829/829 [==============================] - 3s 4ms/step - loss: 8.4189e-06 -
accuracy: 1.0000 - val_loss: 0.2873 - val_accuracy: 0.9392
Epoch 230/500
829/829 [==============================] - 4s 5ms/step - loss: 5.9074e-04 -
accuracy: 0.9998 - val_loss: 0.2932 - val_accuracy: 0.9388
Epoch 231/500
829/829 [==============================] - 4s 5ms/step - loss: 5.1723e-05 -
accuracy: 1.0000 - val_loss: 0.3103 - val_accuracy: 0.9368
Epoch 232/500
829/829 [==============================] - 3s 4ms/step - loss: 7.7947e-06 -
accuracy: 1.0000 - val_loss: 0.3705 - val_accuracy: 0.9253
Epoch 233/500
829/829 [==============================] - 3s 4ms/step - loss: 7.9502e-06 -
accuracy: 1.0000 - val_loss: 0.3989 - val_accuracy: 0.9217
Epoch 234/500
829/829 [==============================] - 3s 4ms/step - loss: 9.8851e-06 -
accuracy: 1.0000 - val_loss: 0.3440 - val_accuracy: 0.9325
Epoch 235/500
829/829 [==============================] - 4s 5ms/step - loss: 4.8580e-04 -
accuracy: 0.9999 - val_loss: 0.3735 - val_accuracy: 0.9315
Epoch 236/500
829/829 [==============================] - 3s 4ms/step - loss: 2.9833e-04 -
accuracy: 0.9999 - val_loss: 0.4226 - val_accuracy: 0.9218
Epoch 237/500
829/829 [==============================] - 3s 4ms/step - loss: 1.0986e-04 -
accuracy: 1.0000 - val_loss: 0.3363 - val_accuracy: 0.9359
Epoch 238/500
829/829 [==============================] - 3s 4ms/step - loss: 8.6720e-06 -
accuracy: 1.0000 - val_loss: 0.3482 - val_accuracy: 0.9337
Epoch 239/500
829/829 [==============================] - 4s 5ms/step - loss: 7.9508e-06 -
accuracy: 1.0000 - val_loss: 0.3937 - val_accuracy: 0.9254
Epoch 240/500
829/829 [==============================] - 3s 4ms/step - loss: 1.5615e-05 -
accuracy: 1.0000 - val_loss: 0.3819 - val_accuracy: 0.9263
Epoch 241/500
829/829 [==============================] - 3s 4ms/step - loss: 1.5732e-04 -
accuracy: 1.0000 - val_loss: 0.2400 - val_accuracy: 0.9501
Epoch 242/500
829/829 [==============================] - 3s 4ms/step - loss: 1.4940e-04 -
accuracy: 1.0000 - val_loss: 0.2752 - val_accuracy: 0.9432
Epoch 243/500
829/829 [==============================] - 4s 5ms/step - loss: 3.7007e-04 -
accuracy: 0.9999 - val_loss: 0.2593 - val_accuracy: 0.9466
Epoch 244/500
829/829 [==============================] - 4s 5ms/step - loss: 1.2207e-04 -
```

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accuracy: 1.0000 - val_loss: 0.2826 - val_accuracy: 0.9433
Epoch 245/500
829/829 [==============================] - 3s 4ms/step - loss: 2.7098e-04 -
accuracy: 0.9999 - val_loss: 0.1446 - val_accuracy: 0.9699
Epoch 246/500
829/829 [==============================] - 3s 4ms/step - loss: 2.0785e-05 -
accuracy: 1.0000 - val_loss: 0.2033 - val_accuracy: 0.9573
Epoch 247/500
822/829 [============================>.] - ETA: 0s - loss: 2.1067e-05 -
accuracy: 1.0000
Reached 95.0% accuracy, so stopping training after 247 epochs!
829/829 [==============================] - 4s 4ms/step - loss: 2.0918e-05 -
accuracy: 1.0000 - val_loss: 0.2351 - val_accuracy: 0.9522
466/466 [==============================] - 1s 2ms/step - loss: 0.1349 -
accuracy: 0.9768
Epoch 1/500
415/415 [==============================] - 3s 5ms/step - loss: 0.4403 -
accuracy: 0.8817 - val_loss: 0.9420 - val_accuracy: 0.6603
Epoch 2/500
415/415 [==============================] - 2s 5ms/step - loss: 0.1393 -
accuracy: 0.9678 - val_loss: 0.7482 - val_accuracy: 0.7408
Epoch 3/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0854 -
accuracy: 0.9799 - val_loss: 0.6758 - val_accuracy: 0.7583
Epoch 4/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0616 -
accuracy: 0.9850 - val_loss: 0.4186 - val_accuracy: 0.8306
Epoch 5/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0482 -
accuracy: 0.9879 - val_loss: 0.4777 - val_accuracy: 0.8220
Epoch 6/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0392 -
accuracy: 0.9899 - val_loss: 0.5358 - val_accuracy: 0.8115
Epoch 7/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0322 -
accuracy: 0.9916 - val_loss: 0.3325 - val_accuracy: 0.8670
Epoch 8/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0275 -
accuracy: 0.9932 - val_loss: 0.3563 - val_accuracy: 0.8648
Epoch 9/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0241 -
accuracy: 0.9938 - val_loss: 0.4119 - val_accuracy: 0.8528
Epoch 10/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0205 -
accuracy: 0.9945 - val_loss: 0.3764 - val_accuracy: 0.8645
Epoch 11/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0180 -
accuracy: 0.9955 - val_loss: 0.3131 - val_accuracy: 0.8856
```

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Epoch 12/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0162 -
accuracy: 0.9962 - val_loss: 0.2072 - val_accuracy: 0.9180
Epoch 13/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0145 -
accuracy: 0.9965 - val_loss: 0.2101 - val_accuracy: 0.9189
Epoch 14/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0133 -
accuracy: 0.9967 - val_loss: 0.2201 - val_accuracy: 0.9150
Epoch 15/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0121 -
accuracy: 0.9970 - val_loss: 0.1689 - val_accuracy: 0.9318
Epoch 16/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0109 -
accuracy: 0.9974 - val_loss: 0.1415 - val_accuracy: 0.9420
Epoch 17/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0101 -
accuracy: 0.9977 - val_loss: 0.1823 - val_accuracy: 0.9294
Epoch 18/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0093 -
accuracy: 0.9976 - val_loss: 0.1856 - val_accuracy: 0.9283
Epoch 19/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0089 -
accuracy: 0.9977 - val_loss: 0.2108 - val_accuracy: 0.9205
Epoch 20/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0080 -
accuracy: 0.9981 - val_loss: 0.3047 - val_accuracy: 0.8974
Epoch 21/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0075 -
accuracy: 0.9982 - val_loss: 0.3360 - val_accuracy: 0.8918
Epoch 22/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0071 -
accuracy: 0.9984 - val_loss: 0.2724 - val_accuracy: 0.9073
Epoch 23/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0066 -
accuracy: 0.9985 - val_loss: 0.2776 - val_accuracy: 0.9056
Epoch 24/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0061 -
accuracy: 0.9985 - val_loss: 0.1402 - val_accuracy: 0.9477
Epoch 25/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0060 -
accuracy: 0.9985 - val_loss: 0.1822 - val_accuracy: 0.9329
Epoch 26/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0055 -
accuracy: 0.9987 - val_loss: 0.1658 - val_accuracy: 0.9411
Epoch 27/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0052 -
accuracy: 0.9987 - val_loss: 0.2215 - val_accuracy: 0.9207
```

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Epoch 28/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0051 -
accuracy: 0.9987 - val_loss: 0.2582 - val_accuracy: 0.9107
Epoch 29/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0044 -
accuracy: 0.9989 - val_loss: 0.2155 - val_accuracy: 0.9240
Epoch 30/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0044 -
accuracy: 0.9988 - val_loss: 0.1718 - val_accuracy: 0.9418
Epoch 31/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0041 -
accuracy: 0.9989 - val_loss: 0.2469 - val_accuracy: 0.9182
Epoch 32/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0054 -
accuracy: 0.9984 - val_loss: 0.1582 - val_accuracy: 0.9437
Epoch 33/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0040 -
accuracy: 0.9989 - val_loss: 0.3121 - val_accuracy: 0.9013
Epoch 34/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0036 -
accuracy: 0.9991 - val_loss: 0.2204 - val_accuracy: 0.9275
Epoch 35/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0033 -
accuracy: 0.9992 - val_loss: 0.1886 - val_accuracy: 0.9409
Epoch 36/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0030 -
accuracy: 0.9992 - val_loss: 0.1321 - val_accuracy: 0.9634
Epoch 37/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0029 -
accuracy: 0.9993 - val_loss: 0.1871 - val_accuracy: 0.9417
Epoch 38/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0029 -
accuracy: 0.9993 - val_loss: 0.2463 - val_accuracy: 0.9207
Epoch 39/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0031 -
accuracy: 0.9991 - val_loss: 0.2443 - val_accuracy: 0.9243
Epoch 40/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0026 -
accuracy: 0.9992 - val_loss: 0.1765 - val_accuracy: 0.9453
Epoch 41/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0026 -
accuracy: 0.9993 - val_loss: 0.2472 - val_accuracy: 0.9237
Epoch 42/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0025 -
accuracy: 0.9994 - val_loss: 0.2390 - val_accuracy: 0.9239
Epoch 43/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0024 -
accuracy: 0.9994 - val_loss: 0.1682 - val_accuracy: 0.9549
```

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Epoch 44/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0024 -
accuracy: 0.9994 - val_loss: 0.2089 - val_accuracy: 0.9399
Epoch 45/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0023 -
accuracy: 0.9995 - val_loss: 0.2058 - val_accuracy: 0.9401
Epoch 46/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0022 -
accuracy: 0.9995 - val_loss: 0.2716 - val_accuracy: 0.9189
Epoch 47/500
415/415 [==============================] - 1s 4ms/step - loss: 0.0021 -
accuracy: 0.9994 - val_loss: 0.2893 - val_accuracy: 0.9180
Epoch 48/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0022 -
accuracy: 0.9995 - val_loss: 0.2042 - val_accuracy: 0.9396
Epoch 49/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0017 -
accuracy: 0.9996 - val_loss: 0.1803 - val_accuracy: 0.9517
Epoch 50/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0017 -
accuracy: 0.9996 - val_loss: 0.2718 - val_accuracy: 0.9213
Epoch 51/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0019 -
accuracy: 0.9995 - val_loss: 0.1989 - val_accuracy: 0.9406
Epoch 52/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0018 -
accuracy: 0.9995 - val_loss: 0.2318 - val_accuracy: 0.9365
Epoch 53/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0017 -
accuracy: 0.9997 - val_loss: 0.2120 - val_accuracy: 0.9396
Epoch 54/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0016 -
accuracy: 0.9995 - val_loss: 0.2736 - val_accuracy: 0.9197
Epoch 55/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0014 -
accuracy: 0.9996 - val_loss: 0.2513 - val_accuracy: 0.9281
Epoch 56/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0016 -
accuracy: 0.9995 - val_loss: 0.1729 - val_accuracy: 0.9540
Epoch 57/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0012 -
accuracy: 0.9997 - val_loss: 0.2125 - val_accuracy: 0.9408
Epoch 58/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0014 -
accuracy: 0.9997 - val_loss: 0.2221 - val_accuracy: 0.9442
Epoch 59/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0014 -
accuracy: 0.9996 - val_loss: 0.2446 - val_accuracy: 0.9369
```

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Epoch 60/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0014 -
accuracy: 0.9998 - val_loss: 0.2198 - val_accuracy: 0.9423
Epoch 61/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0012 -
accuracy: 0.9998 - val_loss: 0.2488 - val_accuracy: 0.9325
Epoch 62/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0011 -
accuracy: 0.9997 - val_loss: 0.3289 - val_accuracy: 0.9089
Epoch 63/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0011 -
accuracy: 0.9998 - val_loss: 0.1950 - val_accuracy: 0.9503
Epoch 64/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0011 -
accuracy: 0.9998 - val_loss: 0.3155 - val_accuracy: 0.9134
Epoch 65/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0011 -
accuracy: 0.9998 - val_loss: 0.2279 - val_accuracy: 0.9405
Epoch 66/500
415/415 [==============================] - 2s 4ms/step - loss: 9.4409e-04 -
accuracy: 0.9998 - val_loss: 0.4817 - val_accuracy: 0.8810
Epoch 67/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0010 -
accuracy: 0.9998 - val_loss: 0.2764 - val_accuracy: 0.9269
Epoch 68/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0012 -
accuracy: 0.9996 - val_loss: 0.2803 - val_accuracy: 0.9238
Epoch 69/500
415/415 [==============================] - 2s 4ms/step - loss: 8.0236e-04 -
accuracy: 0.9998 - val_loss: 0.2740 - val_accuracy: 0.9288
Epoch 70/500
415/415 [==============================] - 2s 4ms/step - loss: 8.3340e-04 -
accuracy: 0.9998 - val_loss: 0.2224 - val_accuracy: 0.9384
Epoch 71/500
415/415 [==============================] - 2s 5ms/step - loss: 8.0080e-04 -
accuracy: 0.9998 - val_loss: 0.2785 - val_accuracy: 0.9254
Epoch 72/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0011 -
accuracy: 0.9997 - val_loss: 0.6598 - val_accuracy: 0.8553
Epoch 73/500
415/415 [==============================] - 2s 4ms/step - loss: 9.6046e-04 -
accuracy: 0.9997 - val_loss: 0.2055 - val_accuracy: 0.9466
Epoch 74/500
415/415 [==============================] - 1s 4ms/step - loss: 7.6138e-04 -
accuracy: 0.9998 - val_loss: 0.2134 - val_accuracy: 0.9438
Epoch 75/500
415/415 [==============================] - 2s 4ms/step - loss: 9.3333e-04 -
accuracy: 0.9997 - val_loss: 0.2627 - val_accuracy: 0.9283
```

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Epoch 76/500
415/415 [==============================] - 2s 4ms/step - loss: 8.8723e-04 -
accuracy: 0.9998 - val_loss: 0.4266 - val_accuracy: 0.8894
Epoch 77/500
415/415 [==============================] - 2s 4ms/step - loss: 5.4101e-04 -
accuracy: 0.9999 - val_loss: 0.2298 - val_accuracy: 0.9358
Epoch 78/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0013 -
accuracy: 0.9995 - val_loss: 0.2560 - val_accuracy: 0.9313
Epoch 79/500
415/415 [==============================] - 2s 5ms/step - loss: 8.0275e-04 -
accuracy: 0.9998 - val_loss: 0.2093 - val_accuracy: 0.9438
Epoch 80/500
415/415 [==============================] - 2s 5ms/step - loss: 6.6478e-04 -
accuracy: 0.9998 - val_loss: 0.2274 - val_accuracy: 0.9358
Epoch 81/500
415/415 [==============================] - 2s 5ms/step - loss: 5.3454e-04 -
accuracy: 0.9999 - val_loss: 0.3264 - val_accuracy: 0.9109
Epoch 82/500
415/415 [==============================] - 2s 4ms/step - loss: 5.6532e-04 -
accuracy: 0.9998 - val_loss: 0.2260 - val_accuracy: 0.9391
Epoch 83/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9222e-04 -
accuracy: 1.0000 - val_loss: 0.2377 - val_accuracy: 0.9375
Epoch 84/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.1059 - val_accuracy: 0.9700
Epoch 85/500
415/415 [==============================] - 2s 4ms/step - loss: 6.5848e-04 -
accuracy: 0.9998 - val_loss: 0.1835 - val_accuracy: 0.9501
Epoch 86/500
415/415 [==============================] - 2s 4ms/step - loss: 4.6816e-04 -
accuracy: 0.9999 - val_loss: 0.2878 - val_accuracy: 0.9212
Epoch 87/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0016 -
accuracy: 0.9994 - val_loss: 0.2127 - val_accuracy: 0.9432
Epoch 88/500
415/415 [==============================] - 2s 5ms/step - loss: 6.3647e-04 -
accuracy: 0.9998 - val_loss: 0.2244 - val_accuracy: 0.9402
Epoch 89/500
415/415 [==============================] - 2s 5ms/step - loss: 4.5985e-04 -
accuracy: 0.9999 - val_loss: 0.2318 - val_accuracy: 0.9383
Epoch 90/500
415/415 [==============================] - 2s 4ms/step - loss: 5.2882e-04 -
accuracy: 0.9998 - val_loss: 0.2556 - val_accuracy: 0.9330
Epoch 91/500
415/415 [==============================] - 2s 4ms/step - loss: 4.9147e-04 -
accuracy: 0.9999 - val_loss: 0.3014 - val_accuracy: 0.9218
```

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Epoch 92/500
415/415 [==============================] - 2s 4ms/step - loss: 5.0271e-04 -
accuracy: 0.9999 - val_loss: 0.2592 - val_accuracy: 0.9319
Epoch 93/500
415/415 [==============================] - 2s 4ms/step - loss: 3.6883e-04 -
accuracy: 0.9999 - val_loss: 0.4161 - val_accuracy: 0.8962
Epoch 94/500
415/415 [==============================] - 2s 4ms/step - loss: 5.0762e-04 -
accuracy: 0.9999 - val_loss: 0.3858 - val_accuracy: 0.9013
Epoch 95/500
415/415 [==============================] - 2s 4ms/step - loss: 6.7612e-04 -
accuracy: 0.9998 - val_loss: 0.1918 - val_accuracy: 0.9494
Epoch 96/500
415/415 [==============================] - 2s 4ms/step - loss: 4.5013e-04 -
accuracy: 0.9999 - val_loss: 0.1858 - val_accuracy: 0.9526
Epoch 97/500
415/415 [==============================] - 2s 5ms/step - loss: 5.4938e-04 -
accuracy: 0.9998 - val_loss: 0.2092 - val_accuracy: 0.9469
Epoch 98/500
415/415 [==============================] - 2s 5ms/step - loss: 6.4352e-04 -
accuracy: 0.9998 - val_loss: 0.1484 - val_accuracy: 0.9598
Epoch 99/500
415/415 [==============================] - 2s 4ms/step - loss: 9.6451e-04 -
accuracy: 0.9996 - val_loss: 0.2516 - val_accuracy: 0.9312
Epoch 100/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9596e-04 -
accuracy: 0.9999 - val_loss: 0.2557 - val_accuracy: 0.9303
Epoch 101/500
415/415 [==============================] - 2s 4ms/step - loss: 3.0749e-04 -
accuracy: 0.9999 - val_loss: 0.2131 - val_accuracy: 0.9432
Epoch 102/500
415/415 [==============================] - 2s 4ms/step - loss: 3.9319e-04 -
accuracy: 0.9999 - val_loss: 0.1983 - val_accuracy: 0.9521
Epoch 103/500
415/415 [==============================] - 1s 4ms/step - loss: 5.8105e-04 -
accuracy: 0.9998 - val_loss: 0.2622 - val_accuracy: 0.9323
Epoch 104/500
415/415 [==============================] - 2s 4ms/step - loss: 3.1732e-04 -
accuracy: 0.9999 - val_loss: 0.2604 - val_accuracy: 0.9371
Epoch 105/500
415/415 [==============================] - 2s 5ms/step - loss: 4.1186e-04 -
accuracy: 0.9999 - val_loss: 0.2461 - val_accuracy: 0.9384
Epoch 106/500
415/415 [==============================] - 2s 5ms/step - loss: 2.3049e-04 -
accuracy: 0.9999 - val_loss: 0.3608 - val_accuracy: 0.9085
Epoch 107/500
415/415 [==============================] - 2s 5ms/step - loss: 3.1854e-04 -
accuracy: 0.9999 - val_loss: 0.2713 - val_accuracy: 0.9339
```

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Epoch 108/500
415/415 [==============================] - 2s 4ms/step - loss: 4.7062e-04 -
accuracy: 0.9999 - val_loss: 0.3145 - val_accuracy: 0.9295
Epoch 109/500
415/415 [==============================] - 2s 4ms/step - loss: 6.5497e-04 -
accuracy: 0.9998 - val_loss: 0.2431 - val_accuracy: 0.9435
Epoch 110/500
415/415 [==============================] - 2s 4ms/step - loss: 2.7568e-04 -
accuracy: 1.0000 - val_loss: 0.4941 - val_accuracy: 0.8876
Epoch 111/500
415/415 [==============================] - 2s 4ms/step - loss: 3.8906e-04 -
accuracy: 0.9999 - val_loss: 0.2539 - val_accuracy: 0.9380
Epoch 112/500
415/415 [==============================] - 2s 4ms/step - loss: 4.8423e-04 -
accuracy: 0.9998 - val_loss: 0.3217 - val_accuracy: 0.9231
Epoch 113/500
415/415 [==============================] - 2s 4ms/step - loss: 2.5829e-04 -
accuracy: 0.9999 - val_loss: 0.2738 - val_accuracy: 0.9400
Epoch 114/500
415/415 [==============================] - 2s 5ms/step - loss: 6.3330e-04 -
accuracy: 0.9998 - val_loss: 0.2828 - val_accuracy: 0.9318
Epoch 115/500
415/415 [==============================] - 2s 5ms/step - loss: 1.9738e-04 -
accuracy: 0.9999 - val_loss: 0.2562 - val_accuracy: 0.9402
Epoch 116/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3056e-04 -
accuracy: 0.9999 - val_loss: 0.6460 - val_accuracy: 0.8648
Epoch 117/500
415/415 [==============================] - 1s 4ms/step - loss: 3.7002e-04 -
accuracy: 0.9999 - val_loss: 0.2132 - val_accuracy: 0.9429
Epoch 118/500
415/415 [==============================] - 2s 4ms/step - loss: 2.1241e-04 -
accuracy: 1.0000 - val_loss: 0.2240 - val_accuracy: 0.9417
Epoch 119/500
415/415 [==============================] - 2s 4ms/step - loss: 1.6847e-04 -
accuracy: 1.0000 - val_loss: 0.2013 - val_accuracy: 0.9453
Epoch 120/500
415/415 [==============================] - 2s 4ms/step - loss: 0.0012 -
accuracy: 0.9996 - val_loss: 0.2414 - val_accuracy: 0.9413
Epoch 121/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3627e-04 -
accuracy: 0.9999 - val_loss: 0.2895 - val_accuracy: 0.9283
Epoch 122/500
415/415 [==============================] - 2s 4ms/step - loss: 2.4723e-04 -
accuracy: 0.9999 - val_loss: 0.3011 - val_accuracy: 0.9287
Epoch 123/500
415/415 [==============================] - 2s 5ms/step - loss: 4.4307e-04 -
accuracy: 0.9998 - val_loss: 0.2843 - val_accuracy: 0.9284
```

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Epoch 124/500
415/415 [==============================] - 2s 5ms/step - loss: 1.3776e-04 -
accuracy: 1.0000 - val_loss: 0.2657 - val_accuracy: 0.9340
Epoch 125/500
415/415 [==============================] - 2s 4ms/step - loss: 2.3981e-04 -
accuracy: 0.9999 - val_loss: 0.1920 - val_accuracy: 0.9568
Epoch 126/500
415/415 [==============================] - 2s 4ms/step - loss: 2.3168e-04 -
accuracy: 1.0000 - val_loss: 0.2519 - val_accuracy: 0.9390
Epoch 127/500
415/415 [==============================] - 2s 4ms/step - loss: 2.4259e-04 -
accuracy: 0.9999 - val_loss: 0.2635 - val_accuracy: 0.9356
Epoch 128/500
415/415 [==============================] - 2s 4ms/step - loss: 2.6479e-04 -
accuracy: 0.9998 - val_loss: 0.4152 - val_accuracy: 0.9041
Epoch 129/500
415/415 [==============================] - 2s 4ms/step - loss: 6.3099e-04 -
accuracy: 0.9998 - val_loss: 0.2793 - val_accuracy: 0.9315
Epoch 130/500
415/415 [==============================] - 2s 4ms/step - loss: 1.0247e-04 -
accuracy: 1.0000 - val_loss: 0.2813 - val_accuracy: 0.9350
Epoch 131/500
415/415 [==============================] - 2s 4ms/step - loss: 1.4370e-04 -
accuracy: 1.0000 - val_loss: 0.2500 - val_accuracy: 0.9442
Epoch 132/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7811e-04 -
accuracy: 0.9999 - val_loss: 0.3870 - val_accuracy: 0.9202
Epoch 133/500
415/415 [==============================] - 2s 5ms/step - loss: 4.6011e-04 -
accuracy: 0.9999 - val_loss: 0.3488 - val_accuracy: 0.9318
Epoch 134/500
415/415 [==============================] - 2s 4ms/step - loss: 2.6165e-04 -
accuracy: 0.9999 - val_loss: 0.4305 - val_accuracy: 0.9170
Epoch 135/500
415/415 [==============================] - 2s 4ms/step - loss: 9.5294e-05 -
accuracy: 1.0000 - val_loss: 0.3760 - val_accuracy: 0.9273
Epoch 136/500
415/415 [==============================] - 2s 4ms/step - loss: 3.2459e-04 -
accuracy: 0.9999 - val_loss: 0.3171 - val_accuracy: 0.9371
Epoch 137/500
415/415 [==============================] - 2s 4ms/step - loss: 1.2929e-04 -
accuracy: 1.0000 - val_loss: 0.3272 - val_accuracy: 0.9342
Epoch 138/500
415/415 [==============================] - 2s 4ms/step - loss: 1.9134e-04 -
accuracy: 0.9999 - val_loss: 0.3796 - val_accuracy: 0.9208
Epoch 139/500
415/415 [==============================] - 2s 4ms/step - loss: 2.8256e-04 -
accuracy: 0.9999 - val_loss: 0.3286 - val_accuracy: 0.9359
```

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Epoch 140/500
415/415 [==============================] - 2s 4ms/step - loss: 2.7478e-04 -
accuracy: 1.0000 - val_loss: 0.3568 - val_accuracy: 0.9338
Epoch 141/500
415/415 [==============================] - 2s 5ms/step - loss: 1.0909e-04 -
accuracy: 1.0000 - val_loss: 0.3369 - val_accuracy: 0.9394
Epoch 142/500
415/415 [==============================] - 2s 5ms/step - loss: 3.7260e-04 -
accuracy: 0.9999 - val_loss: 0.3310 - val_accuracy: 0.9430
Epoch 143/500
415/415 [==============================] - 2s 4ms/step - loss: 5.8699e-04 -
accuracy: 0.9999 - val_loss: 0.4202 - val_accuracy: 0.9111
Epoch 144/500
415/415 [==============================] - 2s 4ms/step - loss: 1.1279e-04 -
accuracy: 1.0000 - val_loss: 0.3839 - val_accuracy: 0.9215
Epoch 145/500
415/415 [==============================] - 2s 4ms/step - loss: 1.5779e-04 -
accuracy: 0.9999 - val_loss: 0.3332 - val_accuracy: 0.9377
Epoch 146/500
415/415 [==============================] - 2s 4ms/step - loss: 8.9794e-05 -
accuracy: 1.0000 - val_loss: 0.3060 - val_accuracy: 0.9395
Epoch 147/500
415/415 [==============================] - 2s 4ms/step - loss: 7.1280e-04 -
accuracy: 0.9998 - val_loss: 0.4378 - val_accuracy: 0.9082
Epoch 148/500
415/415 [==============================] - 2s 4ms/step - loss: 1.7356e-04 -
accuracy: 1.0000 - val_loss: 0.3221 - val_accuracy: 0.9389
Epoch 149/500
415/415 [==============================] - 2s 5ms/step - loss: 6.8630e-05 -
accuracy: 1.0000 - val_loss: 0.3606 - val_accuracy: 0.9272
Epoch 150/500
415/415 [==============================] - 2s 5ms/step - loss: 6.9384e-05 -
accuracy: 1.0000 - val_loss: 0.3450 - val_accuracy: 0.9324
Epoch 151/500
415/415 [==============================] - 2s 5ms/step - loss: 8.7593e-05 -
accuracy: 1.0000 - val_loss: 0.3355 - val_accuracy: 0.9352
Epoch 152/500
415/415 [==============================] - 2s 4ms/step - loss: 4.4472e-04 -
accuracy: 0.9998 - val_loss: 0.4296 - val_accuracy: 0.9235
Epoch 153/500
415/415 [==============================] - 2s 4ms/step - loss: 4.2640e-04 -
accuracy: 0.9999 - val_loss: 0.3755 - val_accuracy: 0.9263
Epoch 154/500
415/415 [==============================] - 2s 4ms/step - loss: 9.0939e-05 -
accuracy: 1.0000 - val_loss: 0.4112 - val_accuracy: 0.9200
Epoch 155/500
415/415 [==============================] - 2s 4ms/step - loss: 9.2740e-05 -
accuracy: 1.0000 - val_loss: 0.3732 - val_accuracy: 0.9257
```

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Epoch 156/500
415/415 [==============================] - 2s 4ms/step - loss: 1.7934e-04 -
accuracy: 0.9999 - val_loss: 0.3718 - val_accuracy: 0.9269
Epoch 157/500
415/415 [==============================] - 2s 4ms/step - loss: 1.3682e-04 -
accuracy: 1.0000 - val_loss: 0.3680 - val_accuracy: 0.9292
Epoch 158/500
415/415 [==============================] - 2s 5ms/step - loss: 5.5899e-04 -
accuracy: 0.9998 - val_loss: 0.4172 - val_accuracy: 0.9342
Epoch 159/500
415/415 [==============================] - 2s 5ms/step - loss: 1.8903e-04 -
accuracy: 1.0000 - val_loss: 0.4944 - val_accuracy: 0.9119
Epoch 160/500
415/415 [==============================] - 2s 4ms/step - loss: 7.8293e-05 -
accuracy: 1.0000 - val_loss: 0.4814 - val_accuracy: 0.9156
Epoch 161/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5692e-04 -
accuracy: 0.9999 - val_loss: 0.3986 - val_accuracy: 0.9303
Epoch 162/500
415/415 [==============================] - 2s 4ms/step - loss: 5.1026e-04 -
accuracy: 0.9998 - val_loss: 0.3854 - val_accuracy: 0.9292
Epoch 163/500
415/415 [==============================] - 2s 4ms/step - loss: 1.1521e-04 -
accuracy: 1.0000 - val_loss: 0.4456 - val_accuracy: 0.9134
Epoch 164/500
415/415 [==============================] - 2s 4ms/step - loss: 6.5856e-05 -
accuracy: 1.0000 - val_loss: 0.4011 - val_accuracy: 0.9231
Epoch 165/500
415/415 [==============================] - 2s 4ms/step - loss: 1.4627e-04 -
accuracy: 1.0000 - val_loss: 0.3572 - val_accuracy: 0.9322
Epoch 166/500
415/415 [==============================] - 2s 4ms/step - loss: 5.3138e-05 -
accuracy: 1.0000 - val_loss: 0.3657 - val_accuracy: 0.9288
Epoch 167/500
415/415 [==============================] - 2s 5ms/step - loss: 8.7132e-05 -
accuracy: 1.0000 - val_loss: 0.3045 - val_accuracy: 0.9464
Epoch 168/500
415/415 [==============================] - 2s 5ms/step - loss: 4.4566e-05 -
accuracy: 1.0000 - val_loss: 0.3527 - val_accuracy: 0.9327
Epoch 169/500
415/415 [==============================] - 2s 4ms/step - loss: 3.5299e-04 -
accuracy: 0.9998 - val_loss: 0.3576 - val_accuracy: 0.9295
Epoch 170/500
415/415 [==============================] - 2s 4ms/step - loss: 6.1929e-05 -
accuracy: 1.0000 - val_loss: 0.3441 - val_accuracy: 0.9329
Epoch 171/500
415/415 [==============================] - 2s 4ms/step - loss: 7.1099e-05 -
accuracy: 1.0000 - val_loss: 0.4194 - val_accuracy: 0.9173
```

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Epoch 172/500
415/415 [==============================] - 2s 4ms/step - loss: 1.3207e-04 -
accuracy: 0.9999 - val_loss: 0.3429 - val_accuracy: 0.9354
Epoch 173/500
415/415 [==============================] - 2s 4ms/step - loss: 9.9731e-05 -
accuracy: 1.0000 - val_loss: 0.3268 - val_accuracy: 0.9383
Epoch 174/500
415/415 [==============================] - 2s 4ms/step - loss: 4.1363e-05 -
accuracy: 1.0000 - val_loss: 0.3517 - val_accuracy: 0.9308
Epoch 175/500
415/415 [==============================] - 2s 5ms/step - loss: 6.8096e-05 -
accuracy: 1.0000 - val_loss: 0.2661 - val_accuracy: 0.9500
Epoch 176/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0011 -
accuracy: 0.9998 - val_loss: 0.5402 - val_accuracy: 0.8951
Epoch 177/500
415/415 [==============================] - 2s 5ms/step - loss: 0.0011 -
accuracy: 0.9996 - val_loss: 0.2309 - val_accuracy: 0.9463
Epoch 178/500
415/415 [==============================] - 2s 4ms/step - loss: 6.9887e-05 -
accuracy: 1.0000 - val_loss: 0.2570 - val_accuracy: 0.9457
Epoch 179/500
415/415 [==============================] - 2s 4ms/step - loss: 7.2551e-05 -
accuracy: 1.0000 - val_loss: 0.2685 - val_accuracy: 0.9442
Epoch 180/500
415/415 [==============================] - 2s 4ms/step - loss: 2.4186e-04 -
accuracy: 0.9999 - val_loss: 0.2720 - val_accuracy: 0.9420
Epoch 181/500
415/415 [==============================] - 2s 4ms/step - loss: 2.9875e-05 -
accuracy: 1.0000 - val_loss: 0.2953 - val_accuracy: 0.9355
Epoch 182/500
415/415 [==============================] - 2s 4ms/step - loss: 2.0733e-04 -
accuracy: 1.0000 - val_loss: 0.2892 - val_accuracy: 0.9427
Epoch 183/500
415/415 [==============================] - 2s 4ms/step - loss: 4.3611e-05 -
accuracy: 1.0000 - val_loss: 0.3091 - val_accuracy: 0.9396
Epoch 184/500
415/415 [==============================] - 2s 5ms/step - loss: 5.0927e-05 -
accuracy: 1.0000 - val_loss: 0.3193 - val_accuracy: 0.9380
Epoch 185/500
415/415 [==============================] - 2s 5ms/step - loss: 5.1872e-04 -
accuracy: 0.9999 - val_loss: 0.3435 - val_accuracy: 0.9195
Epoch 186/500
415/415 [==============================] - 2s 5ms/step - loss: 8.0801e-05 -
accuracy: 1.0000 - val_loss: 0.2413 - val_accuracy: 0.9460
Epoch 187/500
415/415 [==============================] - 2s 4ms/step - loss: 2.0399e-04 -
accuracy: 1.0000 - val_loss: 0.3151 - val_accuracy: 0.9374
```

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Epoch 188/500
415/415 [==============================] - 2s 4ms/step - loss: 4.7691e-04 -
accuracy: 0.9998 - val_loss: 0.2874 - val_accuracy: 0.9393
Epoch 189/500
415/415 [==============================] - 2s 4ms/step - loss: 5.7558e-05 -
accuracy: 1.0000 - val_loss: 0.3837 - val_accuracy: 0.9204
Epoch 190/500
415/415 [==============================] - 2s 4ms/step - loss: 3.3972e-04 -
accuracy: 0.9999 - val_loss: 0.2715 - val_accuracy: 0.9438
Epoch 191/500
415/415 [==============================] - 2s 4ms/step - loss: 1.0653e-04 -
accuracy: 1.0000 - val_loss: 0.2861 - val_accuracy: 0.9402
Epoch 192/500
415/415 [==============================] - 2s 4ms/step - loss: 3.4294e-05 -
accuracy: 1.0000 - val_loss: 0.3406 - val_accuracy: 0.9312
Epoch 193/500
415/415 [==============================] - 2s 5ms/step - loss: 4.6368e-05 -
accuracy: 1.0000 - val_loss: 0.3781 - val_accuracy: 0.9267
Epoch 194/500
415/415 [==============================] - 2s 5ms/step - loss: 3.4804e-05 -
accuracy: 1.0000 - val_loss: 0.4123 - val_accuracy: 0.9174
Epoch 195/500
415/415 [==============================] - 2s 4ms/step - loss: 3.7818e-05 -
accuracy: 1.0000 - val_loss: 0.3553 - val_accuracy: 0.9341
Epoch 196/500
415/415 [==============================] - 2s 4ms/step - loss: 4.8856e-04 -
accuracy: 0.9998 - val_loss: 1.0021 - val_accuracy: 0.8703
Epoch 197/500
415/415 [==============================] - 2s 4ms/step - loss: 2.5070e-04 -
accuracy: 0.9999 - val_loss: 0.1654 - val_accuracy: 0.9608
Epoch 198/500
415/415 [==============================] - 2s 4ms/step - loss: 6.2519e-05 -
accuracy: 1.0000 - val_loss: 0.2139 - val_accuracy: 0.9528
Epoch 199/500
400/415 [===========================>..] - ETA: 0s - loss: 6.3746e-05 -
accuracy: 1.0000
Reached 95.0% accuracy, so stopping training after 199 epochs!
415/415 [==============================] - 2s 4ms/step - loss: 6.2700e-05 -
accuracy: 1.0000 - val_loss: 0.2338 - val_accuracy: 0.9514
466/466 [==============================] - 1s 3ms/step - loss: 0.0815 -
accuracy: 0.9832
Epoch 1/500
208/208 [==============================] - 2s 4ms/step - loss: 0.6317 -
accuracy: 0.8226 - val_loss: 1.0236 - val_accuracy: 0.6155
Epoch 2/500
208/208 [==============================] - 1s 4ms/step - loss: 0.2248 -
accuracy: 0.9506 - val_loss: 0.9244 - val_accuracy: 0.6690
Epoch 3/500
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208/208 [==============================] - 1s 4ms/step - loss: 0.1455 -
accuracy: 0.9668 - val_loss: 0.8824 - val_accuracy: 0.6983
Epoch 4/500
208/208 [==============================] - 1s 4ms/step - loss: 0.1061 -
accuracy: 0.9752 - val_loss: 0.6814 - val_accuracy: 0.7531
Epoch 5/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0834 -
accuracy: 0.9808 - val_loss: 0.6731 - val_accuracy: 0.7623
Epoch 6/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0689 -
accuracy: 0.9838 - val_loss: 0.4829 - val_accuracy: 0.8071
Epoch 7/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0580 -
accuracy: 0.9862 - val_loss: 0.5090 - val_accuracy: 0.8058
Epoch 8/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0505 -
accuracy: 0.9877 - val_loss: 0.5628 - val_accuracy: 0.7962
Epoch 9/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0447 -
accuracy: 0.9890 - val_loss: 0.5520 - val_accuracy: 0.8052
Epoch 10/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0394 -
accuracy: 0.9904 - val_loss: 0.4944 - val_accuracy: 0.8211
Epoch 11/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0353 -
accuracy: 0.9913 - val_loss: 0.4541 - val_accuracy: 0.8344
Epoch 12/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0316 -
accuracy: 0.9925 - val_loss: 0.3858 - val_accuracy: 0.8534
Epoch 13/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0285 -
accuracy: 0.9930 - val_loss: 0.4218 - val_accuracy: 0.8464
Epoch 14/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0257 -
accuracy: 0.9939 - val_loss: 0.4304 - val_accuracy: 0.8479
Epoch 15/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0235 -
accuracy: 0.9945 - val_loss: 0.2615 - val_accuracy: 0.8943
Epoch 16/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0216 -
accuracy: 0.9947 - val_loss: 0.4071 - val_accuracy: 0.8551
Epoch 17/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0201 -
accuracy: 0.9954 - val_loss: 0.3146 - val_accuracy: 0.8838
Epoch 18/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0185 -
accuracy: 0.9957 - val_loss: 0.2793 - val_accuracy: 0.8926
Epoch 19/500
```

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208/208 [==============================] - 1s 4ms/step - loss: 0.0171 -
accuracy: 0.9960 - val_loss: 0.2945 - val_accuracy: 0.8902
Epoch 20/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0159 -
accuracy: 0.9961 - val_loss: 0.2261 - val_accuracy: 0.9118
Epoch 21/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0149 -
accuracy: 0.9966 - val_loss: 0.2834 - val_accuracy: 0.8961
Epoch 22/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0138 -
accuracy: 0.9967 - val_loss: 0.3329 - val_accuracy: 0.8832
Epoch 23/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0128 -
accuracy: 0.9968 - val_loss: 0.4032 - val_accuracy: 0.8672
Epoch 24/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0120 -
accuracy: 0.9974 - val_loss: 0.3714 - val_accuracy: 0.8765
Epoch 25/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0114 -
accuracy: 0.9974 - val_loss: 0.2194 - val_accuracy: 0.9188
Epoch 26/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0111 -
accuracy: 0.9976 - val_loss: 0.2637 - val_accuracy: 0.9054
Epoch 27/500
208/208 [==============================] - 1s 6ms/step - loss: 0.0102 -
accuracy: 0.9979 - val_loss: 0.1880 - val_accuracy: 0.9287
Epoch 28/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0098 -
accuracy: 0.9979 - val_loss: 0.3008 - val_accuracy: 0.8965
Epoch 29/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0091 -
accuracy: 0.9981 - val_loss: 0.2576 - val_accuracy: 0.9082
Epoch 30/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0086 -
accuracy: 0.9981 - val_loss: 0.3490 - val_accuracy: 0.8871
Epoch 31/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0081 -
accuracy: 0.9983 - val_loss: 0.3241 - val_accuracy: 0.8927
Epoch 32/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0078 -
accuracy: 0.9983 - val_loss: 0.3328 - val_accuracy: 0.8925
Epoch 33/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0075 -
accuracy: 0.9985 - val_loss: 0.3883 - val_accuracy: 0.8802
Epoch 34/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0073 -
accuracy: 0.9984 - val_loss: 0.2265 - val_accuracy: 0.9209
Epoch 35/500
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208/208 [==============================] - 1s 4ms/step - loss: 0.0066 -
accuracy: 0.9986 - val_loss: 0.1671 - val_accuracy: 0.9443
Epoch 36/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0062 -
accuracy: 0.9987 - val_loss: 0.3034 - val_accuracy: 0.9022
Epoch 37/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0060 -
accuracy: 0.9987 - val_loss: 0.2440 - val_accuracy: 0.9168
Epoch 38/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0058 -
accuracy: 0.9987 - val_loss: 0.1983 - val_accuracy: 0.9393
Epoch 39/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0058 -
accuracy: 0.9986 - val_loss: 0.2348 - val_accuracy: 0.9254
Epoch 40/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0056 -
accuracy: 0.9987 - val_loss: 0.3236 - val_accuracy: 0.9003
Epoch 41/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0052 -
accuracy: 0.9987 - val_loss: 0.4274 - val_accuracy: 0.8782
Epoch 42/500
208/208 [==============================] - 1s 6ms/step - loss: 0.0048 -
accuracy: 0.9990 - val_loss: 0.3942 - val_accuracy: 0.8869
Epoch 43/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0049 -
accuracy: 0.9989 - val_loss: 0.3143 - val_accuracy: 0.9057
Epoch 44/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0047 -
accuracy: 0.9988 - val_loss: 0.3718 - val_accuracy: 0.8925
Epoch 45/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0043 -
accuracy: 0.9990 - val_loss: 0.2684 - val_accuracy: 0.9192
Epoch 46/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0043 -
accuracy: 0.9991 - val_loss: 0.4435 - val_accuracy: 0.8771
Epoch 47/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0042 -
accuracy: 0.9991 - val_loss: 0.2357 - val_accuracy: 0.9321
Epoch 48/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0037 -
accuracy: 0.9992 - val_loss: 0.2618 - val_accuracy: 0.9265
Epoch 49/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0037 -
accuracy: 0.9992 - val_loss: 0.3538 - val_accuracy: 0.9013
Epoch 50/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0034 -
accuracy: 0.9993 - val_loss: 0.2614 - val_accuracy: 0.9290
Epoch 51/500
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208/208 [==============================] - 1s 4ms/step - loss: 0.0036 -
accuracy: 0.9992 - val_loss: 0.2557 - val_accuracy: 0.9340
Epoch 52/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0034 -
accuracy: 0.9992 - val_loss: 0.2409 - val_accuracy: 0.9349
Epoch 53/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0032 -
accuracy: 0.9992 - val_loss: 0.2742 - val_accuracy: 0.9289
Epoch 54/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0031 -
accuracy: 0.9993 - val_loss: 0.3531 - val_accuracy: 0.9028
Epoch 55/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0031 -
accuracy: 0.9993 - val_loss: 0.2901 - val_accuracy: 0.9232
Epoch 56/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0032 -
accuracy: 0.9993 - val_loss: 0.3026 - val_accuracy: 0.9195
Epoch 57/500
208/208 [==============================] - 1s 6ms/step - loss: 0.0027 -
accuracy: 0.9994 - val_loss: 0.4247 - val_accuracy: 0.8884
Epoch 58/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0027 -
accuracy: 0.9994 - val_loss: 0.3100 - val_accuracy: 0.9189
Epoch 59/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0025 -
accuracy: 0.9995 - val_loss: 0.3295 - val_accuracy: 0.9146
Epoch 60/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0029 -
accuracy: 0.9993 - val_loss: 0.2642 - val_accuracy: 0.9346
Epoch 61/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0024 -
accuracy: 0.9994 - val_loss: 0.4296 - val_accuracy: 0.8895
Epoch 62/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0023 -
accuracy: 0.9994 - val_loss: 0.3089 - val_accuracy: 0.9253
Epoch 63/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0023 -
accuracy: 0.9995 - val_loss: 0.3290 - val_accuracy: 0.9177
Epoch 64/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0023 -
accuracy: 0.9995 - val_loss: 0.2482 - val_accuracy: 0.9440
Epoch 65/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0020 -
accuracy: 0.9996 - val_loss: 0.2465 - val_accuracy: 0.9425
Epoch 66/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0021 -
accuracy: 0.9995 - val_loss: 0.2876 - val_accuracy: 0.9351
Epoch 67/500
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208/208 [==============================] - 1s 4ms/step - loss: 0.0020 -
accuracy: 0.9996 - val_loss: 0.2871 - val_accuracy: 0.9310
Epoch 68/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0019 -
accuracy: 0.9996 - val_loss: 0.3857 - val_accuracy: 0.9023
Epoch 69/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0019 -
accuracy: 0.9997 - val_loss: 0.3249 - val_accuracy: 0.9165
Epoch 70/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0020 -
accuracy: 0.9995 - val_loss: 0.2781 - val_accuracy: 0.9325
Epoch 71/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0018 -
accuracy: 0.9997 - val_loss: 0.3105 - val_accuracy: 0.9260
Epoch 72/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0017 -
accuracy: 0.9996 - val_loss: 0.3056 - val_accuracy: 0.9319
Epoch 73/500
208/208 [==============================] - 1s 6ms/step - loss: 0.0015 -
accuracy: 0.9997 - val_loss: 0.3241 - val_accuracy: 0.9215
Epoch 74/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0017 -
accuracy: 0.9995 - val_loss: 0.3131 - val_accuracy: 0.9270
Epoch 75/500
208/208 [==============================] - 1s 6ms/step - loss: 0.0015 -
accuracy: 0.9996 - val_loss: 0.2996 - val_accuracy: 0.9392
Epoch 76/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0015 -
accuracy: 0.9997 - val_loss: 0.2890 - val_accuracy: 0.9360
Epoch 77/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0015 -
accuracy: 0.9996 - val_loss: 0.3026 - val_accuracy: 0.9329
Epoch 78/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0014 -
accuracy: 0.9997 - val_loss: 0.3932 - val_accuracy: 0.9044
Epoch 79/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.3380 - val_accuracy: 0.9183
Epoch 80/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0013 -
accuracy: 0.9998 - val_loss: 0.3069 - val_accuracy: 0.9278
Epoch 81/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0014 -
accuracy: 0.9996 - val_loss: 0.3699 - val_accuracy: 0.9094
Epoch 82/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.3128 - val_accuracy: 0.9281
Epoch 83/500
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208/208 [==============================] - 1s 4ms/step - loss: 0.0012 -
accuracy: 0.9996 - val_loss: 0.2957 - val_accuracy: 0.9328
Epoch 84/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.2861 - val_accuracy: 0.9350
Epoch 85/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0013 -
accuracy: 0.9996 - val_loss: 0.3742 - val_accuracy: 0.9128
Epoch 86/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0012 -
accuracy: 0.9998 - val_loss: 0.3752 - val_accuracy: 0.9159
Epoch 87/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0010 -
accuracy: 0.9998 - val_loss: 0.3572 - val_accuracy: 0.9162
Epoch 88/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0011 -
accuracy: 0.9997 - val_loss: 0.3301 - val_accuracy: 0.9221
Epoch 89/500
208/208 [==============================] - 1s 6ms/step - loss: 9.9905e-04 -
accuracy: 0.9998 - val_loss: 0.3559 - val_accuracy: 0.9162
Epoch 90/500
208/208 [==============================] - 1s 5ms/step - loss: 9.7645e-04 -
accuracy: 0.9998 - val_loss: 0.2859 - val_accuracy: 0.9395
Epoch 91/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0010 -
accuracy: 0.9998 - val_loss: 0.3801 - val_accuracy: 0.9149
Epoch 92/500
208/208 [==============================] - 1s 5ms/step - loss: 9.4978e-04 -
accuracy: 0.9998 - val_loss: 0.3900 - val_accuracy: 0.9128
Epoch 93/500
208/208 [==============================] - 1s 6ms/step - loss: 9.4876e-04 -
accuracy: 0.9998 - val_loss: 0.3384 - val_accuracy: 0.9232
Epoch 94/500
208/208 [==============================] - 1s 4ms/step - loss: 9.3970e-04 -
accuracy: 0.9998 - val_loss: 0.3461 - val_accuracy: 0.9245
Epoch 95/500
208/208 [==============================] - 1s 4ms/step - loss: 8.7662e-04 -
accuracy: 0.9999 - val_loss: 0.2965 - val_accuracy: 0.9393
Epoch 96/500
208/208 [==============================] - 1s 4ms/step - loss: 8.2819e-04 -
accuracy: 0.9998 - val_loss: 0.3902 - val_accuracy: 0.9133
Epoch 97/500
208/208 [==============================] - 1s 4ms/step - loss: 8.1394e-04 -
accuracy: 0.9998 - val_loss: 0.2876 - val_accuracy: 0.9403
Epoch 98/500
208/208 [==============================] - 1s 4ms/step - loss: 7.5885e-04 -
accuracy: 0.9998 - val_loss: 0.3209 - val_accuracy: 0.9319
Epoch 99/500
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208/208 [==============================] - 1s 4ms/step - loss: 9.9731e-04 -
accuracy: 0.9997 - val_loss: 0.4056 - val_accuracy: 0.9057
Epoch 100/500
208/208 [==============================] - 1s 4ms/step - loss: 7.5678e-04 -
accuracy: 0.9998 - val_loss: 0.3203 - val_accuracy: 0.9322
Epoch 101/500
208/208 [==============================] - 1s 4ms/step - loss: 7.5443e-04 -
accuracy: 0.9999 - val_loss: 0.2776 - val_accuracy: 0.9421
Epoch 102/500
208/208 [==============================] - 1s 4ms/step - loss: 9.5135e-04 -
accuracy: 0.9998 - val_loss: 0.3234 - val_accuracy: 0.9297
Epoch 103/500
208/208 [==============================] - 1s 4ms/step - loss: 7.1336e-04 -
accuracy: 0.9999 - val_loss: 0.3424 - val_accuracy: 0.9252
Epoch 104/500
208/208 [==============================] - 1s 4ms/step - loss: 7.7575e-04 -
accuracy: 0.9998 - val_loss: 0.2921 - val_accuracy: 0.9419
Epoch 105/500
208/208 [==============================] - 1s 4ms/step - loss: 6.6482e-04 -
accuracy: 0.9999 - val_loss: 0.3767 - val_accuracy: 0.9179
Epoch 106/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0012 -
accuracy: 0.9997 - val_loss: 0.3335 - val_accuracy: 0.9358
Epoch 107/500
208/208 [==============================] - 1s 5ms/step - loss: 6.4562e-04 -
accuracy: 0.9999 - val_loss: 0.3821 - val_accuracy: 0.9147
Epoch 108/500
208/208 [==============================] - 1s 5ms/step - loss: 5.9638e-04 -
accuracy: 0.9999 - val_loss: 0.4290 - val_accuracy: 0.9032
Epoch 109/500
208/208 [==============================] - 1s 6ms/step - loss: 6.1021e-04 -
accuracy: 0.9999 - val_loss: 0.3538 - val_accuracy: 0.9266
Epoch 110/500
208/208 [==============================] - 1s 5ms/step - loss: 5.4753e-04 -
accuracy: 0.9999 - val_loss: 0.3256 - val_accuracy: 0.9263
Epoch 111/500
208/208 [==============================] - 1s 4ms/step - loss: 7.5623e-04 -
accuracy: 0.9999 - val_loss: 0.7616 - val_accuracy: 0.8488
Epoch 112/500
208/208 [==============================] - 1s 4ms/step - loss: 6.3992e-04 -
accuracy: 0.9999 - val_loss: 0.2252 - val_accuracy: 0.9520
Epoch 113/500
208/208 [==============================] - 1s 4ms/step - loss: 5.3705e-04 -
accuracy: 0.9999 - val_loss: 0.2819 - val_accuracy: 0.9378
Epoch 114/500
208/208 [==============================] - 1s 4ms/step - loss: 5.4092e-04 -
accuracy: 0.9999 - val_loss: 0.2927 - val_accuracy: 0.9395
Epoch 115/500
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208/208 [==============================] - 1s 4ms/step - loss: 5.1881e-04 -
accuracy: 0.9999 - val_loss: 0.3159 - val_accuracy: 0.9312
Epoch 116/500
208/208 [==============================] - 1s 4ms/step - loss: 7.6564e-04 -
accuracy: 0.9998 - val_loss: 0.3043 - val_accuracy: 0.9252
Epoch 117/500
208/208 [==============================] - 1s 4ms/step - loss: 4.5206e-04 -
accuracy: 0.9999 - val_loss: 0.2844 - val_accuracy: 0.9371
Epoch 118/500
208/208 [==============================] - 1s 4ms/step - loss: 6.1373e-04 -
accuracy: 0.9999 - val_loss: 0.3056 - val_accuracy: 0.9351
Epoch 119/500
208/208 [==============================] - 1s 4ms/step - loss: 6.5649e-04 -
accuracy: 0.9998 - val_loss: 0.3073 - val_accuracy: 0.9374
Epoch 120/500
208/208 [==============================] - 1s 4ms/step - loss: 3.6752e-04 -
accuracy: 1.0000 - val_loss: 0.3614 - val_accuracy: 0.9198
Epoch 121/500
208/208 [==============================] - 1s 4ms/step - loss: 5.4632e-04 -
accuracy: 0.9998 - val_loss: 0.6377 - val_accuracy: 0.8666
Epoch 122/500
208/208 [==============================] - 1s 4ms/step - loss: 8.2424e-04 -
accuracy: 0.9998 - val_loss: 0.3317 - val_accuracy: 0.9311
Epoch 123/500
208/208 [==============================] - 1s 5ms/step - loss: 4.6825e-04 -
accuracy: 0.9999 - val_loss: 0.2768 - val_accuracy: 0.9448
Epoch 124/500
208/208 [==============================] - 1s 5ms/step - loss: 4.0308e-04 -
accuracy: 0.9999 - val_loss: 0.3158 - val_accuracy: 0.9348
Epoch 125/500
208/208 [==============================] - 1s 6ms/step - loss: 3.6253e-04 -
accuracy: 0.9999 - val_loss: 0.3572 - val_accuracy: 0.9223
Epoch 126/500
208/208 [==============================] - 1s 5ms/step - loss: 4.4662e-04 -
accuracy: 0.9999 - val_loss: 0.3188 - val_accuracy: 0.9352
Epoch 127/500
208/208 [==============================] - 1s 5ms/step - loss: 5.2627e-04 -
accuracy: 0.9999 - val_loss: 0.3400 - val_accuracy: 0.9378
Epoch 128/500
208/208 [==============================] - 1s 4ms/step - loss: 7.0774e-04 -
accuracy: 0.9999 - val_loss: 0.3686 - val_accuracy: 0.9278
Epoch 129/500
208/208 [==============================] - 1s 4ms/step - loss: 3.2832e-04 -
accuracy: 1.0000 - val_loss: 0.3950 - val_accuracy: 0.9251
Epoch 130/500
208/208 [==============================] - 1s 4ms/step - loss: 3.6370e-04 -
accuracy: 0.9999 - val_loss: 0.3624 - val_accuracy: 0.9265
Epoch 131/500
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208/208 [==============================] - 1s 4ms/step - loss: 4.0123e-04 -
accuracy: 0.9999 - val_loss: 0.3769 - val_accuracy: 0.9221
Epoch 132/500
208/208 [==============================] - 1s 4ms/step - loss: 3.3749e-04 -
accuracy: 0.9999 - val_loss: 0.4145 - val_accuracy: 0.9152
Epoch 133/500
208/208 [==============================] - 1s 4ms/step - loss: 3.4057e-04 -
accuracy: 0.9999 - val_loss: 0.3940 - val_accuracy: 0.9211
Epoch 134/500
208/208 [==============================] - 1s 4ms/step - loss: 4.3371e-04 -
accuracy: 0.9999 - val_loss: 0.3012 - val_accuracy: 0.9435
Epoch 135/500
208/208 [==============================] - 1s 4ms/step - loss: 5.7912e-04 -
accuracy: 0.9998 - val_loss: 0.3199 - val_accuracy: 0.9360
Epoch 136/500
208/208 [==============================] - 1s 4ms/step - loss: 3.5737e-04 -
accuracy: 0.9999 - val_loss: 0.3578 - val_accuracy: 0.9311
Epoch 137/500
208/208 [==============================] - 1s 4ms/step - loss: 3.5572e-04 -
accuracy: 0.9999 - val_loss: 0.4402 - val_accuracy: 0.9115
Epoch 138/500
208/208 [==============================] - 1s 4ms/step - loss: 4.0784e-04 -
accuracy: 0.9999 - val_loss: 0.5286 - val_accuracy: 0.8944
Epoch 139/500
208/208 [==============================] - 1s 6ms/step - loss: 4.6057e-04 -
accuracy: 0.9999 - val_loss: 0.3813 - val_accuracy: 0.9306
Epoch 140/500
208/208 [==============================] - 1s 6ms/step - loss: 5.1738e-04 -
accuracy: 0.9998 - val_loss: 0.3248 - val_accuracy: 0.9407
Epoch 141/500
208/208 [==============================] - 1s 6ms/step - loss: 7.4829e-04 -
accuracy: 0.9997 - val_loss: 0.3043 - val_accuracy: 0.9430
Epoch 142/500
208/208 [==============================] - 1s 6ms/step - loss: 3.1014e-04 -
accuracy: 0.9999 - val_loss: 0.3382 - val_accuracy: 0.9358
Epoch 143/500
208/208 [==============================] - 1s 5ms/step - loss: 2.4693e-04 -
accuracy: 0.9999 - val_loss: 0.3847 - val_accuracy: 0.9244
Epoch 144/500
208/208 [==============================] - 1s 4ms/step - loss: 3.5457e-04 -
accuracy: 0.9999 - val_loss: 0.6997 - val_accuracy: 0.8662
Epoch 145/500
208/208 [==============================] - 1s 4ms/step - loss: 3.5310e-04 -
accuracy: 0.9999 - val_loss: 0.3875 - val_accuracy: 0.9275
Epoch 146/500
208/208 [==============================] - 1s 4ms/step - loss: 2.3220e-04 -
accuracy: 0.9999 - val_loss: 0.4593 - val_accuracy: 0.9113
Epoch 147/500
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208/208 [==============================] - 1s 4ms/step - loss: 2.3067e-04 -
accuracy: 1.0000 - val_loss: 0.4036 - val_accuracy: 0.9254
Epoch 148/500
208/208 [==============================] - 1s 4ms/step - loss: 4.3818e-04 -
accuracy: 0.9999 - val_loss: 0.4430 - val_accuracy: 0.9174
Epoch 149/500
208/208 [==============================] - 1s 4ms/step - loss: 4.8967e-04 -
accuracy: 1.0000 - val_loss: 0.4218 - val_accuracy: 0.9177
Epoch 150/500
208/208 [==============================] - 1s 4ms/step - loss: 1.6907e-04 -
accuracy: 1.0000 - val_loss: 0.4048 - val_accuracy: 0.9235
Epoch 151/500
208/208 [==============================] - 1s 4ms/step - loss: 9.7574e-04 -
accuracy: 0.9998 - val_loss: 0.3003 - val_accuracy: 0.9364
Epoch 152/500
208/208 [==============================] - 1s 4ms/step - loss: 2.3271e-04 -
accuracy: 0.9999 - val_loss: 0.3249 - val_accuracy: 0.9312
Epoch 153/500
208/208 [==============================] - 1s 4ms/step - loss: 3.2458e-04 -
accuracy: 0.9999 - val_loss: 0.2966 - val_accuracy: 0.9408
Epoch 154/500
208/208 [==============================] - 1s 4ms/step - loss: 3.1653e-04 -
accuracy: 0.9999 - val_loss: 0.2779 - val_accuracy: 0.9468
Epoch 155/500
208/208 [==============================] - 1s 4ms/step - loss: 1.6109e-04 -
accuracy: 1.0000 - val_loss: 0.3736 - val_accuracy: 0.9241
Epoch 156/500
208/208 [==============================] - 1s 5ms/step - loss: 3.4059e-04 -
accuracy: 0.9998 - val_loss: 0.5927 - val_accuracy: 0.8817
Epoch 157/500
208/208 [==============================] - 1s 5ms/step - loss: 2.3435e-04 -
accuracy: 1.0000 - val_loss: 0.3829 - val_accuracy: 0.9259
Epoch 158/500
208/208 [==============================] - 1s 6ms/step - loss: 1.5307e-04 -
accuracy: 1.0000 - val_loss: 0.4317 - val_accuracy: 0.9152
Epoch 159/500
208/208 [==============================] - 1s 5ms/step - loss: 1.2304e-04 -
accuracy: 1.0000 - val_loss: 0.4302 - val_accuracy: 0.9172
Epoch 160/500
208/208 [==============================] - 1s 5ms/step - loss: 6.1107e-04 -
accuracy: 0.9998 - val_loss: 0.3522 - val_accuracy: 0.9309
Epoch 161/500
208/208 [==============================] - 1s 4ms/step - loss: 2.4006e-04 -
accuracy: 1.0000 - val_loss: 0.4245 - val_accuracy: 0.9189
Epoch 162/500
208/208 [==============================] - 1s 4ms/step - loss: 1.9535e-04 -
accuracy: 1.0000 - val_loss: 0.4006 - val_accuracy: 0.9239
Epoch 163/500
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208/208 [==============================] - 1s 4ms/step - loss: 2.7029e-04 -
accuracy: 0.9999 - val_loss: 0.3378 - val_accuracy: 0.9388
Epoch 164/500
208/208 [==============================] - 1s 4ms/step - loss: 2.0584e-04 -
accuracy: 0.9999 - val_loss: 0.3912 - val_accuracy: 0.9236
Epoch 165/500
208/208 [==============================] - 1s 4ms/step - loss: 4.1129e-04 -
accuracy: 0.9998 - val_loss: 0.4035 - val_accuracy: 0.9220
Epoch 166/500
208/208 [==============================] - 1s 4ms/step - loss: 1.6637e-04 -
accuracy: 1.0000 - val_loss: 0.4109 - val_accuracy: 0.9211
Epoch 167/500
208/208 [==============================] - 1s 4ms/step - loss: 1.7168e-04 -
accuracy: 1.0000 - val_loss: 0.4143 - val_accuracy: 0.9218
Epoch 168/500
208/208 [==============================] - 1s 4ms/step - loss: 3.2821e-04 -
accuracy: 0.9999 - val_loss: 0.4875 - val_accuracy: 0.9091
Epoch 169/500
208/208 [==============================] - 1s 4ms/step - loss: 2.3327e-04 -
accuracy: 0.9999 - val_loss: 0.5769 - val_accuracy: 0.8902
Epoch 170/500
208/208 [==============================] - 1s 4ms/step - loss: 1.6464e-04 -
accuracy: 0.9999 - val_loss: 0.3729 - val_accuracy: 0.9353
Epoch 171/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0960e-04 -
accuracy: 1.0000 - val_loss: 0.4298 - val_accuracy: 0.9235
Epoch 172/500
208/208 [==============================] - 1s 5ms/step - loss: 3.1403e-04 -
accuracy: 0.9999 - val_loss: 0.4352 - val_accuracy: 0.9217
Epoch 173/500
208/208 [==============================] - 1s 5ms/step - loss: 1.5187e-04 -
accuracy: 1.0000 - val_loss: 0.5559 - val_accuracy: 0.8937
Epoch 174/500
208/208 [==============================] - 1s 5ms/step - loss: 1.5016e-04 -
accuracy: 1.0000 - val_loss: 0.4806 - val_accuracy: 0.9109
Epoch 175/500
208/208 [==============================] - 1s 6ms/step - loss: 5.8240e-04 -
accuracy: 0.9998 - val_loss: 0.4267 - val_accuracy: 0.9266
Epoch 176/500
208/208 [==============================] - 1s 5ms/step - loss: 3.3658e-04 -
accuracy: 0.9999 - val_loss: 0.4834 - val_accuracy: 0.9131
Epoch 177/500
208/208 [==============================] - 1s 4ms/step - loss: 3.0948e-04 -
accuracy: 0.9999 - val_loss: 0.3756 - val_accuracy: 0.9378
Epoch 178/500
208/208 [==============================] - 1s 4ms/step - loss: 1.4128e-04 -
accuracy: 1.0000 - val_loss: 0.4056 - val_accuracy: 0.9321
Epoch 179/500
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208/208 [==============================] - 1s 4ms/step - loss: 1.7552e-04 -
accuracy: 0.9999 - val_loss: 0.4179 - val_accuracy: 0.9300
Epoch 180/500
208/208 [==============================] - 1s 4ms/step - loss: 9.1419e-05 -
accuracy: 1.0000 - val_loss: 0.4512 - val_accuracy: 0.9223
Epoch 181/500
208/208 [==============================] - 1s 4ms/step - loss: 2.7720e-04 -
accuracy: 0.9999 - val_loss: 0.5069 - val_accuracy: 0.9088
Epoch 182/500
208/208 [==============================] - 1s 4ms/step - loss: 3.3360e-04 -
accuracy: 0.9999 - val_loss: 0.3674 - val_accuracy: 0.9392
Epoch 183/500
208/208 [==============================] - 1s 4ms/step - loss: 7.7936e-04 -
accuracy: 0.9998 - val_loss: 0.3933 - val_accuracy: 0.9250
Epoch 184/500
208/208 [==============================] - 1s 4ms/step - loss: 2.4875e-04 -
accuracy: 0.9999 - val_loss: 0.4406 - val_accuracy: 0.9220
Epoch 185/500
208/208 [==============================] - 1s 4ms/step - loss: 1.5184e-04 -
accuracy: 1.0000 - val_loss: 0.5400 - val_accuracy: 0.9008
Epoch 186/500
208/208 [==============================] - 1s 4ms/step - loss: 3.0612e-04 -
accuracy: 0.9999 - val_loss: 0.4269 - val_accuracy: 0.9224
Epoch 187/500
208/208 [==============================] - 1s 4ms/step - loss: 1.2796e-04 -
accuracy: 1.0000 - val_loss: 0.4521 - val_accuracy: 0.9180
Epoch 188/500
208/208 [==============================] - 1s 4ms/step - loss: 9.8732e-05 -
accuracy: 1.0000 - val_loss: 0.4393 - val_accuracy: 0.9202
Epoch 189/500
208/208 [==============================] - 1s 6ms/step - loss: 1.1308e-04 -
accuracy: 1.0000 - val_loss: 0.4402 - val_accuracy: 0.9204
Epoch 190/500
208/208 [==============================] - 1s 5ms/step - loss: 1.1170e-04 -
accuracy: 1.0000 - val_loss: 0.4340 - val_accuracy: 0.9226
Epoch 191/500
208/208 [==============================] - 1s 5ms/step - loss: 8.0715e-05 -
accuracy: 1.0000 - val_loss: 0.4356 - val_accuracy: 0.9217
Epoch 192/500
208/208 [==============================] - 1s 6ms/step - loss: 1.5353e-04 -
accuracy: 1.0000 - val_loss: 0.4413 - val_accuracy: 0.9235
Epoch 193/500
208/208 [==============================] - 1s 6ms/step - loss: 8.3531e-05 -
accuracy: 1.0000 - val_loss: 0.4337 - val_accuracy: 0.9233
Epoch 194/500
208/208 [==============================] - 1s 4ms/step - loss: 8.1100e-05 -
accuracy: 1.0000 - val_loss: 0.4087 - val_accuracy: 0.9292
Epoch 195/500
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208/208 [==============================] - 1s 4ms/step - loss: 1.0343e-04 -
accuracy: 1.0000 - val_loss: 0.4931 - val_accuracy: 0.9072
Epoch 196/500
208/208 [==============================] - 1s 4ms/step - loss: 1.2036e-04 -
accuracy: 1.0000 - val_loss: 1.0474 - val_accuracy: 0.8334
Epoch 197/500
208/208 [==============================] - 1s 4ms/step - loss: 5.1925e-04 -
accuracy: 0.9999 - val_loss: 0.4287 - val_accuracy: 0.9222
Epoch 198/500
208/208 [==============================] - 1s 4ms/step - loss: 8.4558e-05 -
accuracy: 1.0000 - val_loss: 0.4378 - val_accuracy: 0.9226
Epoch 199/500
208/208 [==============================] - 1s 4ms/step - loss: 6.2221e-05 -
accuracy: 1.0000 - val_loss: 0.4446 - val_accuracy: 0.9202
Epoch 200/500
208/208 [==============================] - 1s 4ms/step - loss: 6.7274e-05 -
accuracy: 1.0000 - val_loss: 0.4603 - val_accuracy: 0.9180
Epoch 201/500
208/208 [==============================] - 1s 4ms/step - loss: 1.4490e-04 -
accuracy: 1.0000 - val_loss: 0.4168 - val_accuracy: 0.9304
Epoch 202/500
208/208 [==============================] - 1s 4ms/step - loss: 1.9065e-04 -
accuracy: 0.9999 - val_loss: 0.4356 - val_accuracy: 0.9251
Epoch 203/500
208/208 [==============================] - 1s 4ms/step - loss: 1.1998e-04 -
accuracy: 1.0000 - val_loss: 0.5327 - val_accuracy: 0.9035
Epoch 204/500
208/208 [==============================] - 1s 4ms/step - loss: 6.3665e-05 -
accuracy: 1.0000 - val_loss: 0.4014 - val_accuracy: 0.9351
Epoch 205/500
208/208 [==============================] - 1s 5ms/step - loss: 7.8327e-05 -
accuracy: 1.0000 - val_loss: 0.4279 - val_accuracy: 0.9309
Epoch 206/500
208/208 [==============================] - 1s 6ms/step - loss: 1.6594e-04 -
accuracy: 0.9999 - val_loss: 0.5907 - val_accuracy: 0.8894
Epoch 207/500
208/208 [==============================] - 1s 6ms/step - loss: 2.2323e-04 -
accuracy: 0.9999 - val_loss: 0.3795 - val_accuracy: 0.9321
Epoch 208/500
208/208 [==============================] - 1s 5ms/step - loss: 6.2754e-05 -
accuracy: 1.0000 - val_loss: 0.5633 - val_accuracy: 0.8943
Epoch 209/500
208/208 [==============================] - 1s 5ms/step - loss: 2.0658e-04 -
accuracy: 0.9999 - val_loss: 0.4105 - val_accuracy: 0.9263
Epoch 210/500
208/208 [==============================] - 1s 5ms/step - loss: 1.5668e-04 -
accuracy: 0.9999 - val_loss: 0.4325 - val_accuracy: 0.9236
Epoch 211/500
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208/208 [==============================] - 1s 4ms/step - loss: 3.6204e-04 -
accuracy: 0.9999 - val_loss: 0.4711 - val_accuracy: 0.9146
Epoch 212/500
208/208 [==============================] - 1s 4ms/step - loss: 6.5928e-05 -
accuracy: 1.0000 - val_loss: 0.4568 - val_accuracy: 0.9176
Epoch 213/500
208/208 [==============================] - 1s 4ms/step - loss: 1.7479e-04 -
accuracy: 1.0000 - val_loss: 0.3664 - val_accuracy: 0.9358
Epoch 214/500
208/208 [==============================] - 1s 4ms/step - loss: 7.7567e-05 -
accuracy: 1.0000 - val_loss: 0.3845 - val_accuracy: 0.9329
Epoch 215/500
208/208 [==============================] - 1s 4ms/step - loss: 1.3622e-04 -
accuracy: 0.9999 - val_loss: 0.4374 - val_accuracy: 0.9251
Epoch 216/500
208/208 [==============================] - 1s 4ms/step - loss: 6.4505e-05 -
accuracy: 1.0000 - val_loss: 0.4441 - val_accuracy: 0.9211
Epoch 217/500
208/208 [==============================] - 1s 4ms/step - loss: 6.7635e-05 -
accuracy: 1.0000 - val_loss: 0.4753 - val_accuracy: 0.9190
Epoch 218/500
208/208 [==============================] - 1s 4ms/step - loss: 5.3516e-05 -
accuracy: 1.0000 - val_loss: 0.4786 - val_accuracy: 0.9202
Epoch 219/500
208/208 [==============================] - 1s 4ms/step - loss: 4.5440e-05 -
accuracy: 1.0000 - val_loss: 0.4549 - val_accuracy: 0.9233
Epoch 220/500
208/208 [==============================] - 1s 4ms/step - loss: 4.6076e-05 -
accuracy: 1.0000 - val_loss: 0.4361 - val_accuracy: 0.9314
Epoch 221/500
208/208 [==============================] - 1s 5ms/step - loss: 4.4927e-05 -
accuracy: 1.0000 - val_loss: 0.4290 - val_accuracy: 0.9370
Epoch 222/500
208/208 [==============================] - 1s 5ms/step - loss: 4.7030e-04 -
accuracy: 0.9999 - val_loss: 0.4014 - val_accuracy: 0.9272
Epoch 223/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0016 -
accuracy: 0.9996 - val_loss: 0.3956 - val_accuracy: 0.9317
Epoch 224/500
208/208 [==============================] - 1s 6ms/step - loss: 1.4354e-04 -
accuracy: 1.0000 - val_loss: 0.4071 - val_accuracy: 0.9290
Epoch 225/500
208/208 [==============================] - 1s 6ms/step - loss: 5.1260e-05 -
accuracy: 1.0000 - val_loss: 0.3996 - val_accuracy: 0.9302
Epoch 226/500
208/208 [==============================] - 1s 5ms/step - loss: 8.0096e-05 -
accuracy: 1.0000 - val_loss: 0.3936 - val_accuracy: 0.9313
Epoch 227/500
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208/208 [==============================] - 1s 4ms/step - loss: 4.4647e-05 -
accuracy: 1.0000 - val_loss: 0.4171 - val_accuracy: 0.9269
Epoch 228/500
208/208 [==============================] - 1s 4ms/step - loss: 4.7081e-05 -
accuracy: 1.0000 - val_loss: 0.4323 - val_accuracy: 0.9252
Epoch 229/500
208/208 [==============================] - 1s 4ms/step - loss: 6.7106e-05 -
accuracy: 1.0000 - val_loss: 0.4340 - val_accuracy: 0.9255
Epoch 230/500
208/208 [==============================] - 1s 4ms/step - loss: 5.2650e-05 -
accuracy: 1.0000 - val_loss: 0.4358 - val_accuracy: 0.9260
Epoch 231/500
208/208 [==============================] - 1s 4ms/step - loss: 3.5235e-05 -
accuracy: 1.0000 - val_loss: 0.4616 - val_accuracy: 0.9214
Epoch 232/500
208/208 [==============================] - 1s 4ms/step - loss: 3.1105e-04 -
accuracy: 0.9999 - val_loss: 0.4053 - val_accuracy: 0.9325
Epoch 233/500
208/208 [==============================] - 1s 4ms/step - loss: 1.8489e-04 -
accuracy: 1.0000 - val_loss: 0.4161 - val_accuracy: 0.9297
Epoch 234/500
208/208 [==============================] - 1s 4ms/step - loss: 3.7897e-04 -
accuracy: 0.9999 - val_loss: 0.4338 - val_accuracy: 0.9238
Epoch 235/500
208/208 [==============================] - 1s 4ms/step - loss: 3.5143e-05 -
accuracy: 1.0000 - val_loss: 0.4320 - val_accuracy: 0.9254
Epoch 236/500
208/208 [==============================] - 1s 4ms/step - loss: 3.5552e-05 -
accuracy: 1.0000 - val_loss: 0.4591 - val_accuracy: 0.9202
Epoch 237/500
208/208 [==============================] - 1s 4ms/step - loss: 4.6787e-05 -
accuracy: 1.0000 - val_loss: 0.4387 - val_accuracy: 0.9269
Epoch 238/500
208/208 [==============================] - 1s 6ms/step - loss: 1.1007e-04 -
accuracy: 1.0000 - val_loss: 0.4182 - val_accuracy: 0.9323
Epoch 239/500
208/208 [==============================] - 1s 6ms/step - loss: 4.9917e-05 -
accuracy: 1.0000 - val_loss: 0.4494 - val_accuracy: 0.9248
Epoch 240/500
208/208 [==============================] - 1s 5ms/step - loss: 2.7234e-05 -
accuracy: 1.0000 - val_loss: 0.4828 - val_accuracy: 0.9202
Epoch 241/500
208/208 [==============================] - 1s 5ms/step - loss: 3.0544e-05 -
accuracy: 1.0000 - val_loss: 0.4535 - val_accuracy: 0.9246
Epoch 242/500
208/208 [==============================] - 1s 7ms/step - loss: 3.9993e-05 -
accuracy: 1.0000 - val_loss: 0.4918 - val_accuracy: 0.9189
Epoch 243/500
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208/208 [==============================] - 1s 4ms/step - loss: 3.8687e-05 -
accuracy: 1.0000 - val_loss: 0.4953 - val_accuracy: 0.9194
Epoch 244/500
208/208 [==============================] - 1s 4ms/step - loss: 9.6548e-05 -
accuracy: 1.0000 - val_loss: 0.4782 - val_accuracy: 0.9206
Epoch 245/500
208/208 [==============================] - 1s 4ms/step - loss: 3.0692e-04 -
accuracy: 0.9999 - val_loss: 0.4981 - val_accuracy: 0.9202
Epoch 246/500
208/208 [==============================] - 1s 4ms/step - loss: 3.8737e-05 -
accuracy: 1.0000 - val_loss: 0.5202 - val_accuracy: 0.9165
Epoch 247/500
208/208 [==============================] - 1s 4ms/step - loss: 9.4215e-05 -
accuracy: 1.0000 - val_loss: 0.5329 - val_accuracy: 0.9130
Epoch 248/500
208/208 [==============================] - 1s 4ms/step - loss: 2.6193e-04 -
accuracy: 0.9999 - val_loss: 0.4798 - val_accuracy: 0.9280
Epoch 249/500
208/208 [==============================] - 1s 4ms/step - loss: 4.0307e-05 -
accuracy: 1.0000 - val_loss: 0.5141 - val_accuracy: 0.9211
Epoch 250/500
208/208 [==============================] - 1s 4ms/step - loss: 5.4095e-05 -
accuracy: 1.0000 - val_loss: 0.5055 - val_accuracy: 0.9215
Epoch 251/500
208/208 [==============================] - 1s 4ms/step - loss: 3.4631e-05 -
accuracy: 1.0000 - val_loss: 0.6236 - val_accuracy: 0.8950
Epoch 252/500
208/208 [==============================] - 1s 4ms/step - loss: 7.8643e-05 -
accuracy: 1.0000 - val_loss: 0.5383 - val_accuracy: 0.9170
Epoch 253/500
208/208 [==============================] - 1s 4ms/step - loss: 3.2581e-05 -
accuracy: 1.0000 - val_loss: 0.5092 - val_accuracy: 0.9238
Epoch 254/500
208/208 [==============================] - 1s 6ms/step - loss: 2.4105e-05 -
accuracy: 1.0000 - val_loss: 0.5285 - val_accuracy: 0.9200
Epoch 255/500
208/208 [==============================] - 1s 5ms/step - loss: 3.5174e-05 -
accuracy: 1.0000 - val_loss: 0.5252 - val_accuracy: 0.9230
Epoch 256/500
208/208 [==============================] - 1s 6ms/step - loss: 2.6965e-05 -
accuracy: 1.0000 - val_loss: 0.5536 - val_accuracy: 0.9162
Epoch 257/500
208/208 [==============================] - 1s 5ms/step - loss: 2.2666e-05 -
accuracy: 1.0000 - val_loss: 0.5013 - val_accuracy: 0.9287
Epoch 258/500
208/208 [==============================] - 1s 5ms/step - loss: 1.4122e-04 -
accuracy: 1.0000 - val_loss: 0.5492 - val_accuracy: 0.9176
Epoch 259/500
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208/208 [==============================] - 1s 5ms/step - loss: 5.5410e-04 -
accuracy: 0.9998 - val_loss: 0.4358 - val_accuracy: 0.9396
Epoch 260/500
208/208 [==============================] - 1s 4ms/step - loss: 5.1069e-05 -
accuracy: 1.0000 - val_loss: 0.4922 - val_accuracy: 0.9261
Epoch 261/500
208/208 [==============================] - 1s 4ms/step - loss: 5.0940e-05 -
accuracy: 1.0000 - val_loss: 0.4872 - val_accuracy: 0.9317
Epoch 262/500
208/208 [==============================] - 1s 4ms/step - loss: 2.5970e-05 -
accuracy: 1.0000 - val_loss: 0.4962 - val_accuracy: 0.9287
Epoch 263/500
208/208 [==============================] - 1s 4ms/step - loss: 2.8450e-05 -
accuracy: 1.0000 - val_loss: 0.5146 - val_accuracy: 0.9252
Epoch 264/500
208/208 [==============================] - 1s 4ms/step - loss: 2.7121e-05 -
accuracy: 1.0000 - val_loss: 0.5154 - val_accuracy: 0.9236
Epoch 265/500
208/208 [==============================] - 1s 4ms/step - loss: 2.5171e-05 -
accuracy: 1.0000 - val_loss: 0.5357 - val_accuracy: 0.9185
Epoch 266/500
208/208 [==============================] - 1s 4ms/step - loss: 8.6073e-05 -
accuracy: 1.0000 - val_loss: 0.5296 - val_accuracy: 0.9234
Epoch 267/500
208/208 [==============================] - 1s 4ms/step - loss: 5.5919e-04 -
accuracy: 0.9998 - val_loss: 0.5152 - val_accuracy: 0.9188
Epoch 268/500
208/208 [==============================] - 1s 4ms/step - loss: 3.6245e-05 -
accuracy: 1.0000 - val_loss: 0.4964 - val_accuracy: 0.9261
Epoch 269/500
208/208 [==============================] - 1s 4ms/step - loss: 2.2613e-05 -
accuracy: 1.0000 - val_loss: 0.5037 - val_accuracy: 0.9224
Epoch 270/500
208/208 [==============================] - 1s 5ms/step - loss: 2.2956e-05 -
accuracy: 1.0000 - val_loss: 0.5503 - val_accuracy: 0.9133
Epoch 271/500
208/208 [==============================] - 1s 6ms/step - loss: 2.2602e-05 -
accuracy: 1.0000 - val_loss: 0.5428 - val_accuracy: 0.9159
Epoch 272/500
208/208 [==============================] - 1s 6ms/step - loss: 1.1614e-04 -
accuracy: 0.9999 - val_loss: 0.5547 - val_accuracy: 0.9131
Epoch 273/500
208/208 [==============================] - 1s 5ms/step - loss: 5.0052e-05 -
accuracy: 1.0000 - val_loss: 0.5024 - val_accuracy: 0.9285
Epoch 274/500
208/208 [==============================] - 1s 6ms/step - loss: 2.1906e-05 -
accuracy: 1.0000 - val_loss: 0.5478 - val_accuracy: 0.9195
Epoch 275/500
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208/208 [==============================] - 1s 5ms/step - loss: 2.8773e-05 -
accuracy: 1.0000 - val_loss: 0.5424 - val_accuracy: 0.9221
Epoch 276/500
208/208 [==============================] - 1s 4ms/step - loss: 1.6592e-04 -
accuracy: 0.9999 - val_loss: 0.4902 - val_accuracy: 0.9330
Epoch 277/500
208/208 [==============================] - 1s 4ms/step - loss: 8.7081e-05 -
accuracy: 1.0000 - val_loss: 1.6108 - val_accuracy: 0.7984
Epoch 278/500
208/208 [==============================] - 1s 4ms/step - loss: 8.6017e-04 -
accuracy: 0.9997 - val_loss: 0.5862 - val_accuracy: 0.9020
Epoch 279/500
208/208 [==============================] - 1s 4ms/step - loss: 5.9440e-05 -
accuracy: 1.0000 - val_loss: 0.4470 - val_accuracy: 0.9285
Epoch 280/500
208/208 [==============================] - 1s 4ms/step - loss: 2.8929e-05 -
accuracy: 1.0000 - val_loss: 0.4648 - val_accuracy: 0.9260
Epoch 281/500
208/208 [==============================] - 1s 4ms/step - loss: 2.9489e-05 -
accuracy: 1.0000 - val_loss: 0.4681 - val_accuracy: 0.9261
Epoch 282/500
208/208 [==============================] - 1s 4ms/step - loss: 2.3468e-05 -
accuracy: 1.0000 - val_loss: 0.4281 - val_accuracy: 0.9366
Epoch 283/500
208/208 [==============================] - 1s 4ms/step - loss: 2.0968e-05 -
accuracy: 1.0000 - val_loss: 0.4635 - val_accuracy: 0.9277
Epoch 284/500
208/208 [==============================] - 1s 4ms/step - loss: 2.6267e-05 -
accuracy: 1.0000 - val_loss: 0.4404 - val_accuracy: 0.9346
Epoch 285/500
208/208 [==============================] - 1s 4ms/step - loss: 1.9253e-05 -
accuracy: 1.0000 - val_loss: 0.4644 - val_accuracy: 0.9281
Epoch 286/500
208/208 [==============================] - 1s 4ms/step - loss: 1.8613e-05 -
accuracy: 1.0000 - val_loss: 0.4753 - val_accuracy: 0.9267
Epoch 287/500
208/208 [==============================] - 1s 6ms/step - loss: 1.7282e-05 -
accuracy: 1.0000 - val_loss: 0.4853 - val_accuracy: 0.9251
Epoch 288/500
208/208 [==============================] - 1s 5ms/step - loss: 1.7602e-05 -
accuracy: 1.0000 - val_loss: 0.4907 - val_accuracy: 0.9242
Epoch 289/500
208/208 [==============================] - 1s 5ms/step - loss: 1.5640e-05 -
accuracy: 1.0000 - val_loss: 0.4721 - val_accuracy: 0.9271
Epoch 290/500
208/208 [==============================] - 1s 5ms/step - loss: 1.5749e-04 -
accuracy: 1.0000 - val_loss: 0.5100 - val_accuracy: 0.9182
Epoch 291/500
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208/208 [==============================] - 1s 5ms/step - loss: 1.6555e-05 -
accuracy: 1.0000 - val_loss: 0.4546 - val_accuracy: 0.9310
Epoch 292/500
208/208 [==============================] - 1s 5ms/step - loss: 1.5805e-05 -
accuracy: 1.0000 - val_loss: 0.4533 - val_accuracy: 0.9332
Epoch 293/500
208/208 [==============================] - 1s 4ms/step - loss: 1.7780e-05 -
accuracy: 1.0000 - val_loss: 0.4867 - val_accuracy: 0.9250
Epoch 294/500
208/208 [==============================] - 1s 4ms/step - loss: 3.1695e-05 -
accuracy: 1.0000 - val_loss: 0.4603 - val_accuracy: 0.9306
Epoch 295/500
208/208 [==============================] - 1s 5ms/step - loss: 0.0014 -
accuracy: 0.9995 - val_loss: 0.3902 - val_accuracy: 0.9377
Epoch 296/500
208/208 [==============================] - 1s 4ms/step - loss: 2.8970e-05 -
accuracy: 1.0000 - val_loss: 0.4150 - val_accuracy: 0.9351
Epoch 297/500
208/208 [==============================] - 1s 4ms/step - loss: 2.0044e-05 -
accuracy: 1.0000 - val_loss: 0.4469 - val_accuracy: 0.9285
Epoch 298/500
208/208 [==============================] - 1s 4ms/step - loss: 2.0062e-05 -
accuracy: 1.0000 - val_loss: 0.4434 - val_accuracy: 0.9304
Epoch 299/500
208/208 [==============================] - 1s 4ms/step - loss: 1.4935e-05 -
accuracy: 1.0000 - val_loss: 0.4263 - val_accuracy: 0.9371
Epoch 300/500
208/208 [==============================] - 1s 4ms/step - loss: 1.9595e-05 -
accuracy: 1.0000 - val_loss: 0.4643 - val_accuracy: 0.9282
Epoch 301/500
208/208 [==============================] - 1s 4ms/step - loss: 1.3726e-05 -
accuracy: 1.0000 - val_loss: 0.4568 - val_accuracy: 0.9312
Epoch 302/500
208/208 [==============================] - 1s 4ms/step - loss: 1.7889e-05 -
accuracy: 1.0000 - val_loss: 0.4838 - val_accuracy: 0.9254
Epoch 303/500
208/208 [==============================] - 1s 4ms/step - loss: 1.4870e-05 -
accuracy: 1.0000 - val_loss: 0.4680 - val_accuracy: 0.9299
Epoch 304/500
208/208 [==============================] - 1s 5ms/step - loss: 1.2489e-05 -
accuracy: 1.0000 - val_loss: 0.4974 - val_accuracy: 0.9242
Epoch 305/500
208/208 [==============================] - 1s 5ms/step - loss: 1.1865e-04 -
accuracy: 1.0000 - val_loss: 0.5369 - val_accuracy: 0.9115
Epoch 306/500
208/208 [==============================] - 1s 5ms/step - loss: 2.1917e-05 -
accuracy: 1.0000 - val_loss: 0.4696 - val_accuracy: 0.9275
Epoch 307/500
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208/208 [==============================] - 1s 5ms/step - loss: 2.4779e-04 -
accuracy: 0.9999 - val_loss: 0.4311 - val_accuracy: 0.9346
Epoch 308/500
208/208 [==============================] - 1s 5ms/step - loss: 2.3597e-05 -
accuracy: 1.0000 - val_loss: 0.4430 - val_accuracy: 0.9325
Epoch 309/500
208/208 [==============================] - 1s 5ms/step - loss: 2.2529e-05 -
accuracy: 1.0000 - val_loss: 0.4517 - val_accuracy: 0.9319
Epoch 310/500
208/208 [==============================] - 1s 4ms/step - loss: 1.3737e-05 -
accuracy: 1.0000 - val_loss: 0.4324 - val_accuracy: 0.9389
Epoch 311/500
208/208 [==============================] - 1s 4ms/step - loss: 1.7731e-05 -
accuracy: 1.0000 - val_loss: 0.4430 - val_accuracy: 0.9392
Epoch 312/500
208/208 [==============================] - 1s 4ms/step - loss: 1.8423e-05 -
accuracy: 1.0000 - val_loss: 0.4699 - val_accuracy: 0.9332
Epoch 313/500
208/208 [==============================] - 1s 4ms/step - loss: 1.1917e-05 -
accuracy: 1.0000 - val_loss: 0.4900 - val_accuracy: 0.9278
Epoch 314/500
208/208 [==============================] - 1s 4ms/step - loss: 4.1246e-05 -
accuracy: 1.0000 - val_loss: 0.5234 - val_accuracy: 0.9233
Epoch 315/500
208/208 [==============================] - 1s 4ms/step - loss: 1.4337e-05 -
accuracy: 1.0000 - val_loss: 0.5220 - val_accuracy: 0.9235
Epoch 316/500
208/208 [==============================] - 1s 4ms/step - loss: 1.3568e-05 -
accuracy: 1.0000 - val_loss: 0.5171 - val_accuracy: 0.9266
Epoch 317/500
208/208 [==============================] - 1s 4ms/step - loss: 9.7823e-05 -
accuracy: 1.0000 - val_loss: 0.4851 - val_accuracy: 0.9288
Epoch 318/500
208/208 [==============================] - 1s 4ms/step - loss: 2.6926e-04 -
accuracy: 0.9999 - val_loss: 0.5161 - val_accuracy: 0.9238
Epoch 319/500
208/208 [==============================] - 1s 4ms/step - loss: 1.5226e-05 -
accuracy: 1.0000 - val_loss: 0.4671 - val_accuracy: 0.9389
Epoch 320/500
208/208 [==============================] - 1s 4ms/step - loss: 3.7336e-04 -
accuracy: 0.9999 - val_loss: 0.5189 - val_accuracy: 0.9225
Epoch 321/500
208/208 [==============================] - 1s 6ms/step - loss: 1.2521e-05 -
accuracy: 1.0000 - val_loss: 0.5368 - val_accuracy: 0.9194
Epoch 322/500
208/208 [==============================] - 1s 6ms/step - loss: 1.3182e-05 -
accuracy: 1.0000 - val_loss: 0.5341 - val_accuracy: 0.9195
Epoch 323/500
```

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208/208 [==============================] - 1s 6ms/step - loss: 1.0909e-05 -
accuracy: 1.0000 - val_loss: 0.4939 - val_accuracy: 0.9294
Epoch 324/500
208/208 [==============================] - 1s 5ms/step - loss: 1.1495e-05 -
accuracy: 1.0000 - val_loss: 0.5222 - val_accuracy: 0.9239
Epoch 325/500
208/208 [==============================] - 1s 6ms/step - loss: 1.0839e-05 -
accuracy: 1.0000 - val_loss: 0.4973 - val_accuracy: 0.9272
Epoch 326/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0135e-05 -
accuracy: 1.0000 - val_loss: 0.5023 - val_accuracy: 0.9303
Epoch 327/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0994e-05 -
accuracy: 1.0000 - val_loss: 0.5356 - val_accuracy: 0.9261
Epoch 328/500
208/208 [==============================] - 1s 4ms/step - loss: 1.2071e-05 -
accuracy: 1.0000 - val_loss: 0.5341 - val_accuracy: 0.9262
Epoch 329/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0451e-05 -
accuracy: 1.0000 - val_loss: 0.5491 - val_accuracy: 0.9238
Epoch 330/500
208/208 [==============================] - 1s 4ms/step - loss: 2.4891e-04 -
accuracy: 0.9999 - val_loss: 0.4013 - val_accuracy: 0.9331
Epoch 331/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0012 -
accuracy: 0.9997 - val_loss: 0.3931 - val_accuracy: 0.9377
Epoch 332/500
208/208 [==============================] - 1s 4ms/step - loss: 1.9176e-05 -
accuracy: 1.0000 - val_loss: 0.3433 - val_accuracy: 0.9473
Epoch 333/500
208/208 [==============================] - 1s 4ms/step - loss: 1.3533e-05 -
accuracy: 1.0000 - val_loss: 0.3662 - val_accuracy: 0.9429
Epoch 334/500
208/208 [==============================] - 1s 4ms/step - loss: 1.3054e-05 -
accuracy: 1.0000 - val_loss: 0.3579 - val_accuracy: 0.9454
Epoch 335/500
208/208 [==============================] - 1s 4ms/step - loss: 1.1700e-05 -
accuracy: 1.0000 - val_loss: 0.3736 - val_accuracy: 0.9423
Epoch 336/500
208/208 [==============================] - 1s 4ms/step - loss: 1.2772e-05 -
accuracy: 1.0000 - val_loss: 0.3675 - val_accuracy: 0.9440
Epoch 337/500
208/208 [==============================] - 1s 6ms/step - loss: 1.1632e-05 -
accuracy: 1.0000 - val_loss: 0.3725 - val_accuracy: 0.9431
Epoch 338/500
208/208 [==============================] - 1s 5ms/step - loss: 1.1267e-05 -
accuracy: 1.0000 - val_loss: 0.3943 - val_accuracy: 0.9389
Epoch 339/500
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208/208 [==============================] - 1s 5ms/step - loss: 1.0851e-05 -
accuracy: 1.0000 - val_loss: 0.4055 - val_accuracy: 0.9370
Epoch 340/500
208/208 [==============================] - 1s 6ms/step - loss: 1.0035e-05 -
accuracy: 1.0000 - val_loss: 0.3969 - val_accuracy: 0.9394
Epoch 341/500
208/208 [==============================] - 1s 6ms/step - loss: 1.1010e-05 -
accuracy: 1.0000 - val_loss: 0.4114 - val_accuracy: 0.9372
Epoch 342/500
208/208 [==============================] - 1s 5ms/step - loss: 1.4679e-05 -
accuracy: 1.0000 - val_loss: 0.4155 - val_accuracy: 0.9365
Epoch 343/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0693e-05 -
accuracy: 1.0000 - val_loss: 0.4267 - val_accuracy: 0.9353
Epoch 344/500
208/208 [==============================] - 1s 4ms/step - loss: 1.5768e-05 -
accuracy: 1.0000 - val_loss: 0.4163 - val_accuracy: 0.9374
Epoch 345/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0011 -
accuracy: 0.9998 - val_loss: 0.3256 - val_accuracy: 0.9481
Epoch 346/500
208/208 [==============================] - 1s 4ms/step - loss: 1.6424e-05 -
accuracy: 1.0000 - val_loss: 0.3051 - val_accuracy: 0.9548
Epoch 347/500
208/208 [==============================] - 1s 4ms/step - loss: 1.4969e-05 -
accuracy: 1.0000 - val_loss: 0.3318 - val_accuracy: 0.9501
Epoch 348/500
208/208 [==============================] - 1s 4ms/step - loss: 1.2801e-05 -
accuracy: 1.0000 - val_loss: 0.3388 - val_accuracy: 0.9493
Epoch 349/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0185e-05 -
accuracy: 1.0000 - val_loss: 0.3668 - val_accuracy: 0.9426
Epoch 350/500
208/208 [==============================] - 1s 4ms/step - loss: 1.1183e-05 -
accuracy: 1.0000 - val_loss: 0.3622 - val_accuracy: 0.9444
Epoch 351/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0213e-05 -
accuracy: 1.0000 - val_loss: 0.3801 - val_accuracy: 0.9412
Epoch 352/500
208/208 [==============================] - 1s 4ms/step - loss: 9.9076e-06 -
accuracy: 1.0000 - val_loss: 0.3604 - val_accuracy: 0.9491
Epoch 353/500
208/208 [==============================] - 1s 5ms/step - loss: 1.0144e-05 -
accuracy: 1.0000 - val_loss: 0.3971 - val_accuracy: 0.9393
Epoch 354/500
208/208 [==============================] - 1s 6ms/step - loss: 8.8678e-06 -
accuracy: 1.0000 - val_loss: 0.4024 - val_accuracy: 0.9382
Epoch 355/500
```

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208/208 [==============================] - 1s 5ms/step - loss: 9.0688e-06 -
accuracy: 1.0000 - val_loss: 0.4216 - val_accuracy: 0.9361
Epoch 356/500
208/208 [==============================] - 1s 6ms/step - loss: 1.0268e-05 -
accuracy: 1.0000 - val_loss: 0.4216 - val_accuracy: 0.9370
Epoch 357/500
208/208 [==============================] - 1s 6ms/step - loss: 1.0694e-05 -
accuracy: 1.0000 - val_loss: 0.4281 - val_accuracy: 0.9360
Epoch 358/500
208/208 [==============================] - 1s 6ms/step - loss: 8.5255e-06 -
accuracy: 1.0000 - val_loss: 0.4214 - val_accuracy: 0.9402
Epoch 359/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0058e-05 -
accuracy: 1.0000 - val_loss: 0.4614 - val_accuracy: 0.9324
Epoch 360/500
208/208 [==============================] - 1s 4ms/step - loss: 2.4493e-05 -
accuracy: 1.0000 - val_loss: 0.4249 - val_accuracy: 0.9424
Epoch 361/500
208/208 [==============================] - 1s 4ms/step - loss: 4.9696e-04 -
accuracy: 0.9999 - val_loss: 0.5365 - val_accuracy: 0.9229
Epoch 362/500
208/208 [==============================] - 1s 4ms/step - loss: 8.3075e-04 -
accuracy: 0.9998 - val_loss: 0.5329 - val_accuracy: 0.9269
Epoch 363/500
208/208 [==============================] - 1s 5ms/step - loss: 2.4155e-04 -
accuracy: 1.0000 - val_loss: 0.4936 - val_accuracy: 0.9347
Epoch 364/500
208/208 [==============================] - 1s 4ms/step - loss: 2.5633e-04 -
accuracy: 0.9999 - val_loss: 0.4214 - val_accuracy: 0.9404
Epoch 365/500
208/208 [==============================] - 1s 4ms/step - loss: 1.9746e-05 -
accuracy: 1.0000 - val_loss: 0.4388 - val_accuracy: 0.9385
Epoch 366/500
208/208 [==============================] - 1s 4ms/step - loss: 1.1669e-05 -
accuracy: 1.0000 - val_loss: 0.4320 - val_accuracy: 0.9400
Epoch 367/500
208/208 [==============================] - 1s 4ms/step - loss: 8.8451e-06 -
accuracy: 1.0000 - val_loss: 0.4441 - val_accuracy: 0.9377
Epoch 368/500
208/208 [==============================] - 1s 4ms/step - loss: 9.2506e-06 -
accuracy: 1.0000 - val_loss: 0.4468 - val_accuracy: 0.9373
Epoch 369/500
208/208 [==============================] - 1s 4ms/step - loss: 8.8644e-06 -
accuracy: 1.0000 - val_loss: 0.4340 - val_accuracy: 0.9411
Epoch 370/500
208/208 [==============================] - 1s 6ms/step - loss: 8.9285e-06 -
accuracy: 1.0000 - val_loss: 0.4507 - val_accuracy: 0.9371
Epoch 371/500
```

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208/208 [==============================] - 1s 5ms/step - loss: 7.8223e-06 -
accuracy: 1.0000 - val_loss: 0.4575 - val_accuracy: 0.9362
Epoch 372/500
208/208 [==============================] - 1s 5ms/step - loss: 7.6860e-06 -
accuracy: 1.0000 - val_loss: 0.4755 - val_accuracy: 0.9334
Epoch 373/500
208/208 [==============================] - 1s 5ms/step - loss: 8.2585e-06 -
accuracy: 1.0000 - val_loss: 0.4910 - val_accuracy: 0.9317
Epoch 374/500
208/208 [==============================] - 1s 6ms/step - loss: 8.0445e-06 -
accuracy: 1.0000 - val_loss: 0.4822 - val_accuracy: 0.9335
Epoch 375/500
208/208 [==============================] - 1s 5ms/step - loss: 7.7050e-06 -
accuracy: 1.0000 - val_loss: 0.5094 - val_accuracy: 0.9304
Epoch 376/500
208/208 [==============================] - 1s 4ms/step - loss: 7.4303e-06 -
accuracy: 1.0000 - val_loss: 0.5241 - val_accuracy: 0.9273
Epoch 377/500
208/208 [==============================] - 1s 4ms/step - loss: 6.8434e-06 -
accuracy: 1.0000 - val_loss: 0.5327 - val_accuracy: 0.9264
Epoch 378/500
208/208 [==============================] - 1s 4ms/step - loss: 6.6344e-06 -
accuracy: 1.0000 - val_loss: 0.5032 - val_accuracy: 0.9362
Epoch 379/500
208/208 [==============================] - 1s 4ms/step - loss: 8.1021e-06 -
accuracy: 1.0000 - val_loss: 0.5349 - val_accuracy: 0.9292
Epoch 380/500
208/208 [==============================] - 1s 4ms/step - loss: 1.1450e-05 -
accuracy: 1.0000 - val_loss: 0.5495 - val_accuracy: 0.9269
Epoch 381/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0073e-05 -
accuracy: 1.0000 - val_loss: 0.5624 - val_accuracy: 0.9247
Epoch 382/500
208/208 [==============================] - 1s 4ms/step - loss: 4.8445e-04 -
accuracy: 0.9998 - val_loss: 0.4170 - val_accuracy: 0.9362
Epoch 383/500
208/208 [==============================] - 1s 4ms/step - loss: 1.6929e-05 -
accuracy: 1.0000 - val_loss: 0.4533 - val_accuracy: 0.9311
Epoch 384/500
208/208 [==============================] - 1s 4ms/step - loss: 9.5324e-06 -
accuracy: 1.0000 - val_loss: 0.4667 - val_accuracy: 0.9296
Epoch 385/500
208/208 [==============================] - 1s 4ms/step - loss: 7.1195e-06 -
accuracy: 1.0000 - val_loss: 0.4844 - val_accuracy: 0.9284
Epoch 386/500
208/208 [==============================] - 1s 4ms/step - loss: 6.8943e-06 -
accuracy: 1.0000 - val_loss: 0.4956 - val_accuracy: 0.9275
Epoch 387/500
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208/208 [==============================] - 1s 5ms/step - loss: 7.2673e-06 -
accuracy: 1.0000 - val_loss: 0.5170 - val_accuracy: 0.9248
Epoch 388/500
208/208 [==============================] - 1s 6ms/step - loss: 6.4568e-06 -
accuracy: 1.0000 - val_loss: 0.5011 - val_accuracy: 0.9282
Epoch 389/500
208/208 [==============================] - 1s 7ms/step - loss: 6.2745e-06 -
accuracy: 1.0000 - val_loss: 0.5254 - val_accuracy: 0.9248
Epoch 390/500
208/208 [==============================] - 1s 5ms/step - loss: 7.1631e-06 -
accuracy: 1.0000 - val_loss: 0.5691 - val_accuracy: 0.9174
Epoch 391/500
208/208 [==============================] - 1s 5ms/step - loss: 6.2256e-06 -
accuracy: 1.0000 - val_loss: 0.5416 - val_accuracy: 0.9235
Epoch 392/500
208/208 [==============================] - 1s 4ms/step - loss: 5.6622e-06 -
accuracy: 1.0000 - val_loss: 0.5443 - val_accuracy: 0.9230
Epoch 393/500
208/208 [==============================] - 1s 4ms/step - loss: 5.6962e-06 -
accuracy: 1.0000 - val_loss: 0.5314 - val_accuracy: 0.9260
Epoch 394/500
208/208 [==============================] - 1s 5ms/step - loss: 5.9902e-06 -
accuracy: 1.0000 - val_loss: 0.6281 - val_accuracy: 0.9104
Epoch 395/500
208/208 [==============================] - 1s 5ms/step - loss: 8.9468e-05 -
accuracy: 1.0000 - val_loss: 3.3520 - val_accuracy: 0.7192
Epoch 396/500
208/208 [==============================] - 1s 4ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.4420 - val_accuracy: 0.9392
Epoch 397/500
208/208 [==============================] - 1s 4ms/step - loss: 1.6348e-05 -
accuracy: 1.0000 - val_loss: 0.4278 - val_accuracy: 0.9410
Epoch 398/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0012e-05 -
accuracy: 1.0000 - val_loss: 0.4270 - val_accuracy: 0.9408
Epoch 399/500
208/208 [==============================] - 1s 4ms/step - loss: 9.5759e-06 -
accuracy: 1.0000 - val_loss: 0.4199 - val_accuracy: 0.9426
Epoch 400/500
208/208 [==============================] - 1s 4ms/step - loss: 7.9473e-06 -
accuracy: 1.0000 - val_loss: 0.4403 - val_accuracy: 0.9389
Epoch 401/500
208/208 [==============================] - 1s 4ms/step - loss: 8.3978e-06 -
accuracy: 1.0000 - val_loss: 0.4475 - val_accuracy: 0.9376
Epoch 402/500
208/208 [==============================] - 1s 4ms/step - loss: 8.2527e-06 -
accuracy: 1.0000 - val_loss: 0.4513 - val_accuracy: 0.9374
Epoch 403/500
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208/208 [==============================] - 1s 5ms/step - loss: 7.3747e-06 -
accuracy: 1.0000 - val_loss: 0.4451 - val_accuracy: 0.9387
Epoch 404/500
208/208 [==============================] - 1s 6ms/step - loss: 7.3285e-06 -
accuracy: 1.0000 - val_loss: 0.4584 - val_accuracy: 0.9366
Epoch 405/500
208/208 [==============================] - 1s 5ms/step - loss: 6.5988e-06 -
accuracy: 1.0000 - val_loss: 0.4602 - val_accuracy: 0.9363
Epoch 406/500
208/208 [==============================] - 1s 5ms/step - loss: 6.8701e-06 -
accuracy: 1.0000 - val_loss: 0.4582 - val_accuracy: 0.9370
Epoch 407/500
208/208 [==============================] - 1s 5ms/step - loss: 6.6124e-06 -
accuracy: 1.0000 - val_loss: 0.4710 - val_accuracy: 0.9349
Epoch 408/500
208/208 [==============================] - 1s 5ms/step - loss: 6.4954e-06 -
accuracy: 1.0000 - val_loss: 0.4928 - val_accuracy: 0.9317
Epoch 409/500
208/208 [==============================] - 1s 4ms/step - loss: 7.0846e-06 -
accuracy: 1.0000 - val_loss: 0.4889 - val_accuracy: 0.9322
Epoch 410/500
208/208 [==============================] - 1s 4ms/step - loss: 5.5353e-06 -
accuracy: 1.0000 - val_loss: 0.4833 - val_accuracy: 0.9329
Epoch 411/500
208/208 [==============================] - 1s 4ms/step - loss: 7.0850e-06 -
accuracy: 1.0000 - val_loss: 0.5074 - val_accuracy: 0.9294
Epoch 412/500
208/208 [==============================] - 1s 4ms/step - loss: 5.5500e-06 -
accuracy: 1.0000 - val_loss: 0.4928 - val_accuracy: 0.9322
Epoch 413/500
208/208 [==============================] - 1s 4ms/step - loss: 8.2657e-06 -
accuracy: 1.0000 - val_loss: 0.4616 - val_accuracy: 0.9395
Epoch 414/500
208/208 [==============================] - 1s 4ms/step - loss: 5.9263e-04 -
accuracy: 0.9998 - val_loss: 0.5544 - val_accuracy: 0.9340
Epoch 415/500
208/208 [==============================] - 1s 4ms/step - loss: 7.3571e-05 -
accuracy: 1.0000 - val_loss: 0.6170 - val_accuracy: 0.9242
Epoch 416/500
208/208 [==============================] - 1s 4ms/step - loss: 1.1664e-05 -
accuracy: 1.0000 - val_loss: 0.5515 - val_accuracy: 0.9346
Epoch 417/500
208/208 [==============================] - 1s 4ms/step - loss: 8.5289e-06 -
accuracy: 1.0000 - val_loss: 0.6230 - val_accuracy: 0.9212
Epoch 418/500
208/208 [==============================] - 1s 4ms/step - loss: 8.0594e-06 -
accuracy: 1.0000 - val_loss: 0.6154 - val_accuracy: 0.9226
Epoch 419/500
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208/208 [==============================] - 1s 4ms/step - loss: 6.4462e-06 -
accuracy: 1.0000 - val_loss: 0.6193 - val_accuracy: 0.9220
Epoch 420/500
208/208 [==============================] - 1s 5ms/step - loss: 6.6024e-06 -
accuracy: 1.0000 - val_loss: 0.6103 - val_accuracy: 0.9231
Epoch 421/500
208/208 [==============================] - 1s 5ms/step - loss: 7.3025e-06 -
accuracy: 1.0000 - val_loss: 0.5907 - val_accuracy: 0.9260
Epoch 422/500
208/208 [==============================] - 1s 6ms/step - loss: 6.0614e-06 -
accuracy: 1.0000 - val_loss: 0.6271 - val_accuracy: 0.9204
Epoch 423/500
208/208 [==============================] - 1s 5ms/step - loss: 1.8984e-04 -
accuracy: 1.0000 - val_loss: 0.9574 - val_accuracy: 0.8767
Epoch 424/500
208/208 [==============================] - 1s 5ms/step - loss: 1.5498e-04 -
accuracy: 1.0000 - val_loss: 0.5317 - val_accuracy: 0.9343
Epoch 425/500
208/208 [==============================] - 1s 6ms/step - loss: 7.2924e-06 -
accuracy: 1.0000 - val_loss: 0.5265 - val_accuracy: 0.9371
Epoch 426/500
208/208 [==============================] - 1s 4ms/step - loss: 7.8259e-06 -
accuracy: 1.0000 - val_loss: 0.5479 - val_accuracy: 0.9325
Epoch 427/500
208/208 [==============================] - 1s 4ms/step - loss: 6.1673e-06 -
accuracy: 1.0000 - val_loss: 0.5698 - val_accuracy: 0.9289
Epoch 428/500
208/208 [==============================] - 1s 4ms/step - loss: 6.9858e-06 -
accuracy: 1.0000 - val_loss: 0.5808 - val_accuracy: 0.9273
Epoch 429/500
208/208 [==============================] - 1s 4ms/step - loss: 7.1940e-06 -
accuracy: 1.0000 - val_loss: 0.5579 - val_accuracy: 0.9320
Epoch 430/500
208/208 [==============================] - 1s 4ms/step - loss: 5.4433e-06 -
accuracy: 1.0000 - val_loss: 0.5894 - val_accuracy: 0.9262
Epoch 431/500
208/208 [==============================] - 1s 4ms/step - loss: 1.1630e-05 -
accuracy: 1.0000 - val_loss: 0.5935 - val_accuracy: 0.9264
Epoch 432/500
208/208 [==============================] - 1s 4ms/step - loss: 5.0674e-06 -
accuracy: 1.0000 - val_loss: 0.6125 - val_accuracy: 0.9231
Epoch 433/500
208/208 [==============================] - 1s 4ms/step - loss: 5.0294e-06 -
accuracy: 1.0000 - val_loss: 0.6139 - val_accuracy: 0.9229
Epoch 434/500
208/208 [==============================] - 1s 4ms/step - loss: 1.0614e-05 -
accuracy: 1.0000 - val_loss: 0.6120 - val_accuracy: 0.9234
Epoch 435/500
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208/208 [==============================] - 1s 4ms/step - loss: 5.0254e-04 -
accuracy: 0.9997 - val_loss: 0.6246 - val_accuracy: 0.9203
Epoch 436/500
208/208 [==============================] - 1s 4ms/step - loss: 2.5575e-05 -
accuracy: 1.0000 - val_loss: 0.6035 - val_accuracy: 0.9238
Epoch 437/500
208/208 [==============================] - 1s 6ms/step - loss: 5.7139e-06 -
accuracy: 1.0000 - val_loss: 0.6127 - val_accuracy: 0.9218
Epoch 438/500
208/208 [==============================] - 1s 5ms/step - loss: 5.9469e-06 -
accuracy: 1.0000 - val_loss: 0.6063 - val_accuracy: 0.9235
Epoch 439/500
208/208 [==============================] - 1s 5ms/step - loss: 5.4114e-06 -
accuracy: 1.0000 - val_loss: 0.6075 - val_accuracy: 0.9238
Epoch 440/500
208/208 [==============================] - 1s 5ms/step - loss: 5.1880e-06 -
accuracy: 1.0000 - val_loss: 0.6413 - val_accuracy: 0.9174
Epoch 441/500
208/208 [==============================] - 1s 5ms/step - loss: 2.9778e-04 -
accuracy: 0.9999 - val_loss: 0.4573 - val_accuracy: 0.9449
Epoch 442/500
208/208 [==============================] - 1s 6ms/step - loss: 2.2953e-04 -
accuracy: 0.9999 - val_loss: 0.5793 - val_accuracy: 0.9224
Epoch 443/500
208/208 [==============================] - 1s 4ms/step - loss: 8.3872e-06 -
accuracy: 1.0000 - val_loss: 0.5553 - val_accuracy: 0.9294
Epoch 444/500
208/208 [==============================] - 1s 4ms/step - loss: 5.7822e-06 -
accuracy: 1.0000 - val_loss: 0.5550 - val_accuracy: 0.9294
Epoch 445/500
208/208 [==============================] - 1s 4ms/step - loss: 6.0637e-06 -
accuracy: 1.0000 - val_loss: 0.5668 - val_accuracy: 0.9282
Epoch 446/500
208/208 [==============================] - 1s 4ms/step - loss: 5.4147e-06 -
accuracy: 1.0000 - val_loss: 0.5753 - val_accuracy: 0.9269
Epoch 447/500
208/208 [==============================] - 1s 4ms/step - loss: 5.0947e-06 -
accuracy: 1.0000 - val_loss: 0.5732 - val_accuracy: 0.9269
Epoch 448/500
208/208 [==============================] - 1s 4ms/step - loss: 5.1247e-06 -
accuracy: 1.0000 - val_loss: 0.5865 - val_accuracy: 0.9250
Epoch 449/500
208/208 [==============================] - 1s 5ms/step - loss: 5.4495e-06 -
accuracy: 1.0000 - val_loss: 0.5849 - val_accuracy: 0.9256
Epoch 450/500
208/208 [==============================] - 1s 4ms/step - loss: 4.4613e-06 -
accuracy: 1.0000 - val_loss: 0.5957 - val_accuracy: 0.9235
Epoch 451/500
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208/208 [==============================] - 1s 4ms/step - loss: 4.4358e-06 -
accuracy: 1.0000 - val_loss: 0.5972 - val_accuracy: 0.9238
Epoch 452/500
208/208 [==============================] - 1s 4ms/step - loss: 4.5131e-06 -
accuracy: 1.0000 - val_loss: 0.6113 - val_accuracy: 0.9216
Epoch 453/500
208/208 [==============================] - 1s 4ms/step - loss: 4.7812e-06 -
accuracy: 1.0000 - val_loss: 0.5962 - val_accuracy: 0.9249
Epoch 454/500
208/208 [==============================] - 1s 6ms/step - loss: 4.1766e-06 -
accuracy: 1.0000 - val_loss: 0.6119 - val_accuracy: 0.9214
Epoch 455/500
208/208 [==============================] - 1s 5ms/step - loss: 5.2062e-06 -
accuracy: 1.0000 - val_loss: 0.6125 - val_accuracy: 0.9220
Epoch 456/500
208/208 [==============================] - 1s 6ms/step - loss: 4.2268e-06 -
accuracy: 1.0000 - val_loss: 0.6080 - val_accuracy: 0.9242
Epoch 457/500
208/208 [==============================] - 1s 5ms/step - loss: 5.2481e-06 -
accuracy: 1.0000 - val_loss: 0.6224 - val_accuracy: 0.9220
Epoch 458/500
208/208 [==============================] - 1s 5ms/step - loss: 3.5178e-06 -
accuracy: 1.0000 - val_loss: 0.6315 - val_accuracy: 0.9206
Epoch 459/500
208/208 [==============================] - 1s 6ms/step - loss: 3.8530e-06 -
accuracy: 1.0000 - val_loss: 0.6392 - val_accuracy: 0.9205
Epoch 460/500
208/208 [==============================] - 1s 4ms/step - loss: 3.8915e-06 -
accuracy: 1.0000 - val_loss: 0.6403 - val_accuracy: 0.9207
Epoch 461/500
208/208 [==============================] - 1s 4ms/step - loss: 8.5271e-04 -
accuracy: 0.9998 - val_loss: 0.6309 - val_accuracy: 0.9345
Epoch 462/500
208/208 [==============================] - 1s 4ms/step - loss: 1.9080e-04 -
accuracy: 0.9999 - val_loss: 0.6358 - val_accuracy: 0.9246
Epoch 463/500
208/208 [==============================] - 1s 5ms/step - loss: 1.1426e-05 -
accuracy: 1.0000 - val_loss: 0.6585 - val_accuracy: 0.9209
Epoch 464/500
208/208 [==============================] - 1s 5ms/step - loss: 9.2859e-06 -
accuracy: 1.0000 - val_loss: 0.6565 - val_accuracy: 0.9223
Epoch 465/500
208/208 [==============================] - 1s 4ms/step - loss: 7.3440e-06 -
accuracy: 1.0000 - val_loss: 0.6824 - val_accuracy: 0.9180
Epoch 466/500
208/208 [==============================] - 1s 4ms/step - loss: 7.6778e-06 -
accuracy: 1.0000 - val_loss: 0.6693 - val_accuracy: 0.9222
Epoch 467/500
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208/208 [==============================] - 1s 4ms/step - loss: 6.7409e-06 -
accuracy: 1.0000 - val_loss: 0.6879 - val_accuracy: 0.9182
Epoch 468/500
208/208 [==============================] - 1s 4ms/step - loss: 6.7514e-06 -
accuracy: 1.0000 - val_loss: 0.7014 - val_accuracy: 0.9162
Epoch 469/500
208/208 [==============================] - 1s 4ms/step - loss: 5.5609e-06 -
accuracy: 1.0000 - val_loss: 0.7131 - val_accuracy: 0.9146
Epoch 470/500
208/208 [==============================] - 1s 5ms/step - loss: 5.7437e-06 -
accuracy: 1.0000 - val_loss: 0.7022 - val_accuracy: 0.9177
Epoch 471/500
208/208 [==============================] - 1s 5ms/step - loss: 5.4816e-06 -
accuracy: 1.0000 - val_loss: 0.7251 - val_accuracy: 0.9133
Epoch 472/500
208/208 [==============================] - 1s 5ms/step - loss: 5.1153e-06 -
accuracy: 1.0000 - val_loss: 0.7261 - val_accuracy: 0.9136
Epoch 473/500
208/208 [==============================] - 1s 6ms/step - loss: 5.1058e-06 -
accuracy: 1.0000 - val_loss: 0.7340 - val_accuracy: 0.9128
Epoch 474/500
208/208 [==============================] - 1s 6ms/step - loss: 4.5215e-06 -
accuracy: 1.0000 - val_loss: 0.7146 - val_accuracy: 0.9168
Epoch 475/500
208/208 [==============================] - 1s 7ms/step - loss: 3.8720e-06 -
accuracy: 1.0000 - val_loss: 0.7420 - val_accuracy: 0.9120
Epoch 476/500
208/208 [==============================] - 1s 5ms/step - loss: 4.2609e-04 -
accuracy: 0.9998 - val_loss: 0.7780 - val_accuracy: 0.9106
Epoch 477/500
208/208 [==============================] - 1s 4ms/step - loss: 3.5960e-05 -
accuracy: 1.0000 - val_loss: 0.7628 - val_accuracy: 0.9115
Epoch 478/500
208/208 [==============================] - 1s 4ms/step - loss: 6.3438e-06 -
accuracy: 1.0000 - val_loss: 0.7609 - val_accuracy: 0.9124
Epoch 479/500
208/208 [==============================] - 1s 5ms/step - loss: 5.1125e-06 -
accuracy: 1.0000 - val_loss: 0.7822 - val_accuracy: 0.9095
Epoch 480/500
208/208 [==============================] - 1s 4ms/step - loss: 5.5014e-06 -
accuracy: 1.0000 - val_loss: 0.7763 - val_accuracy: 0.9108
Epoch 481/500
208/208 [==============================] - 1s 5ms/step - loss: 5.2058e-06 -
accuracy: 1.0000 - val_loss: 0.7754 - val_accuracy: 0.9112
Epoch 482/500
208/208 [==============================] - 1s 4ms/step - loss: 4.4050e-06 -
accuracy: 1.0000 - val_loss: 0.7877 - val_accuracy: 0.9093
Epoch 483/500
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208/208 [==============================] - 1s 4ms/step - loss: 3.9739e-06 -
accuracy: 1.0000 - val_loss: 0.8124 - val_accuracy: 0.9040
Epoch 484/500
208/208 [==============================] - 1s 5ms/step - loss: 4.5772e-06 -
accuracy: 1.0000 - val_loss: 0.7375 - val_accuracy: 0.9208
Epoch 485/500
208/208 [==============================] - 1s 4ms/step - loss: 2.7093e-04 -
accuracy: 0.9999 - val_loss: 0.6342 - val_accuracy: 0.9251
Epoch 486/500
208/208 [==============================] - 1s 5ms/step - loss: 5.6422e-06 -
accuracy: 1.0000 - val_loss: 0.6367 - val_accuracy: 0.9252
Epoch 487/500
208/208 [==============================] - 1s 7ms/step - loss: 4.2211e-06 -
accuracy: 1.0000 - val_loss: 0.6501 - val_accuracy: 0.9232
Epoch 488/500
208/208 [==============================] - 1s 5ms/step - loss: 4.6996e-06 -
accuracy: 1.0000 - val_loss: 0.6499 - val_accuracy: 0.9235
Epoch 489/500
208/208 [==============================] - 1s 6ms/step - loss: 3.9575e-06 -
accuracy: 1.0000 - val_loss: 0.6607 - val_accuracy: 0.9219
Epoch 490/500
208/208 [==============================] - 1s 6ms/step - loss: 4.1152e-06 -
accuracy: 1.0000 - val_loss: 0.6541 - val_accuracy: 0.9232
Epoch 491/500
208/208 [==============================] - 1s 6ms/step - loss: 3.9222e-06 -
accuracy: 1.0000 - val_loss: 0.6532 - val_accuracy: 0.9235
Epoch 492/500
208/208 [==============================] - 1s 4ms/step - loss: 3.8054e-06 -
accuracy: 1.0000 - val_loss: 0.6515 - val_accuracy: 0.9239
Epoch 493/500
208/208 [==============================] - 1s 4ms/step - loss: 3.0962e-06 -
accuracy: 1.0000 - val_loss: 0.6672 - val_accuracy: 0.9211
Epoch 494/500
208/208 [==============================] - 1s 4ms/step - loss: 3.1945e-06 -
accuracy: 1.0000 - val_loss: 0.6693 - val_accuracy: 0.9205
Epoch 495/500
208/208 [==============================] - 1s 4ms/step - loss: 3.5129e-06 -
accuracy: 1.0000 - val_loss: 0.6522 - val_accuracy: 0.9245
Epoch 496/500
208/208 [==============================] - 1s 4ms/step - loss: 3.2354e-06 -
accuracy: 1.0000 - val_loss: 0.6636 - val_accuracy: 0.9219
Epoch 497/500
208/208 [==============================] - 1s 4ms/step - loss: 2.9559e-06 -
accuracy: 1.0000 - val_loss: 0.6610 - val_accuracy: 0.9232
Epoch 498/500
208/208 [==============================] - 1s 4ms/step - loss: 3.0412e-06 -
accuracy: 1.0000 - val_loss: 0.6714 - val_accuracy: 0.9207
Epoch 499/500
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208/208 [==============================] - 1s 4ms/step - loss: 3.3519e-06 -
accuracy: 1.0000 - val_loss: 0.6849 - val_accuracy: 0.9182
Epoch 500/500
208/208 [==============================] - 1s 4ms/step - loss: 3.0077e-06 -
accuracy: 1.0000 - val_loss: 0.6915 - val_accuracy: 0.9174
466/466 [==============================] - 1s 3ms/step - loss: 0.1378 -
accuracy: 0.9743
Epoch 1/500
104/104 [==============================] - 1s 6ms/step - loss: 0.8588 -
accuracy: 0.7405 - val_loss: 1.3902 - val_accuracy: 0.5082
Epoch 2/500
104/104 [==============================] - 0s 4ms/step - loss: 0.3417 -
accuracy: 0.9265 - val_loss: 1.0323 - val_accuracy: 0.6236
Epoch 3/500
104/104 [==============================] - 0s 4ms/step - loss: 0.2285 -
accuracy: 0.9514 - val_loss: 0.8471 - val_accuracy: 0.6920
Epoch 4/500
104/104 [==============================] - 0s 4ms/step - loss: 0.1714 -
accuracy: 0.9624 - val_loss: 0.7746 - val_accuracy: 0.7181
Epoch 5/500
104/104 [==============================] - 0s 4ms/step - loss: 0.1352 -
accuracy: 0.9700 - val_loss: 0.7192 - val_accuracy: 0.7389
Epoch 6/500
104/104 [==============================] - 0s 4ms/step - loss: 0.1107 -
accuracy: 0.9756 - val_loss: 0.7648 - val_accuracy: 0.7363
Epoch 7/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0935 -
accuracy: 0.9797 - val_loss: 0.7136 - val_accuracy: 0.7500
Epoch 8/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0809 -
accuracy: 0.9820 - val_loss: 0.6125 - val_accuracy: 0.7763
Epoch 9/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0713 -
accuracy: 0.9838 - val_loss: 0.6620 - val_accuracy: 0.7677
Epoch 10/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0638 -
accuracy: 0.9857 - val_loss: 0.5806 - val_accuracy: 0.7883
Epoch 11/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0577 -
accuracy: 0.9865 - val_loss: 0.4879 - val_accuracy: 0.8143
Epoch 12/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0524 -
accuracy: 0.9878 - val_loss: 0.4664 - val_accuracy: 0.8206
Epoch 13/500
104/104 [==============================] - 1s 7ms/step - loss: 0.0483 -
accuracy: 0.9885 - val_loss: 0.4525 - val_accuracy: 0.8278
Epoch 14/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0444 -
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accuracy: 0.9892 - val_loss: 0.3940 - val_accuracy: 0.8455
Epoch 15/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0413 -
accuracy: 0.9898 - val_loss: 0.4386 - val_accuracy: 0.8342
Epoch 16/500
104/104 [==============================] - 1s 7ms/step - loss: 0.0386 -
accuracy: 0.9907 - val_loss: 0.4403 - val_accuracy: 0.8352
Epoch 17/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0357 -
accuracy: 0.9912 - val_loss: 0.4345 - val_accuracy: 0.8384
Epoch 18/500
104/104 [==============================] - 1s 5ms/step - loss: 0.0334 -
accuracy: 0.9917 - val_loss: 0.3488 - val_accuracy: 0.8628
Epoch 19/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0313 -
accuracy: 0.9923 - val_loss: 0.3667 - val_accuracy: 0.8580
Epoch 20/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0295 -
accuracy: 0.9924 - val_loss: 0.3539 - val_accuracy: 0.8636
Epoch 21/500
104/104 [==============================] - 1s 5ms/step - loss: 0.0278 -
accuracy: 0.9931 - val_loss: 0.2819 - val_accuracy: 0.8868
Epoch 22/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0264 -
accuracy: 0.9937 - val_loss: 0.3207 - val_accuracy: 0.8766
Epoch 23/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0247 -
accuracy: 0.9938 - val_loss: 0.3477 - val_accuracy: 0.8691
Epoch 24/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0234 -
accuracy: 0.9944 - val_loss: 0.3563 - val_accuracy: 0.8685
Epoch 25/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0221 -
accuracy: 0.9947 - val_loss: 0.3693 - val_accuracy: 0.8659
Epoch 26/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0210 -
accuracy: 0.9950 - val_loss: 0.2942 - val_accuracy: 0.8877
Epoch 27/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0200 -
accuracy: 0.9953 - val_loss: 0.2539 - val_accuracy: 0.9006
Epoch 28/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0190 -
accuracy: 0.9956 - val_loss: 0.2921 - val_accuracy: 0.8888
Epoch 29/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0183 -
accuracy: 0.9958 - val_loss: 0.3373 - val_accuracy: 0.8780
Epoch 30/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0172 -
```

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accuracy: 0.9962 - val_loss: 0.3093 - val_accuracy: 0.8869
Epoch 31/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0165 -
accuracy: 0.9961 - val_loss: 0.2664 - val_accuracy: 0.8993
Epoch 32/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0159 -
accuracy: 0.9962 - val_loss: 0.2739 - val_accuracy: 0.8983
Epoch 33/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0151 -
accuracy: 0.9965 - val_loss: 0.2015 - val_accuracy: 0.9227
Epoch 34/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0146 -
accuracy: 0.9965 - val_loss: 0.3239 - val_accuracy: 0.8842
Epoch 35/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0141 -
accuracy: 0.9966 - val_loss: 0.2314 - val_accuracy: 0.9120
Epoch 36/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0131 -
accuracy: 0.9971 - val_loss: 0.2364 - val_accuracy: 0.9109
Epoch 37/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0129 -
accuracy: 0.9972 - val_loss: 0.1713 - val_accuracy: 0.9313
Epoch 38/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0123 -
accuracy: 0.9974 - val_loss: 0.2230 - val_accuracy: 0.9165
Epoch 39/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0118 -
accuracy: 0.9974 - val_loss: 0.2595 - val_accuracy: 0.9054
Epoch 40/500
104/104 [==============================] - 1s 5ms/step - loss: 0.0114 -
accuracy: 0.9975 - val_loss: 0.2289 - val_accuracy: 0.9152
Epoch 41/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0109 -
accuracy: 0.9977 - val_loss: 0.1569 - val_accuracy: 0.9362
Epoch 42/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0106 -
accuracy: 0.9976 - val_loss: 0.1855 - val_accuracy: 0.9278
Epoch 43/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0100 -
accuracy: 0.9979 - val_loss: 0.2401 - val_accuracy: 0.9122
Epoch 44/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0098 -
accuracy: 0.9978 - val_loss: 0.2407 - val_accuracy: 0.9124
Epoch 45/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0097 -
accuracy: 0.9978 - val_loss: 0.3115 - val_accuracy: 0.8937
Epoch 46/500
104/104 [==============================] - 1s 7ms/step - loss: 0.0091 -
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accuracy: 0.9980 - val_loss: 0.2288 - val_accuracy: 0.9142
Epoch 47/500
104/104 [==============================] - 1s 5ms/step - loss: 0.0090 -
accuracy: 0.9980 - val_loss: 0.3196 - val_accuracy: 0.8913
Epoch 48/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0087 -
accuracy: 0.9982 - val_loss: 0.2785 - val_accuracy: 0.9028
Epoch 49/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0083 -
accuracy: 0.9981 - val_loss: 0.3478 - val_accuracy: 0.8848
Epoch 50/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0081 -
accuracy: 0.9984 - val_loss: 0.1975 - val_accuracy: 0.9245
Epoch 51/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0077 -
accuracy: 0.9983 - val_loss: 0.2355 - val_accuracy: 0.9128
Epoch 52/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0075 -
accuracy: 0.9984 - val_loss: 0.2420 - val_accuracy: 0.9122
Epoch 53/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0072 -
accuracy: 0.9985 - val_loss: 0.2530 - val_accuracy: 0.9085
Epoch 54/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0070 -
accuracy: 0.9985 - val_loss: 0.1448 - val_accuracy: 0.9476
Epoch 55/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0068 -
accuracy: 0.9985 - val_loss: 0.1910 - val_accuracy: 0.9295
Epoch 56/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0067 -
accuracy: 0.9987 - val_loss: 0.2097 - val_accuracy: 0.9227
Epoch 57/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0064 -
accuracy: 0.9988 - val_loss: 0.2877 - val_accuracy: 0.9015
Epoch 58/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0062 -
accuracy: 0.9986 - val_loss: 0.2390 - val_accuracy: 0.9131
Epoch 59/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0059 -
accuracy: 0.9989 - val_loss: 0.1824 - val_accuracy: 0.9357
Epoch 60/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0058 -
accuracy: 0.9987 - val_loss: 0.2080 - val_accuracy: 0.9260
Epoch 61/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0055 -
accuracy: 0.9989 - val_loss: 0.1901 - val_accuracy: 0.9331
Epoch 62/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0053 -
```

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accuracy: 0.9990 - val_loss: 0.2448 - val_accuracy: 0.9144
Epoch 63/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0054 -
accuracy: 0.9988 - val_loss: 0.2203 - val_accuracy: 0.9235
Epoch 64/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0052 -
accuracy: 0.9990 - val_loss: 0.2216 - val_accuracy: 0.9234
Epoch 65/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0049 -
accuracy: 0.9990 - val_loss: 0.2093 - val_accuracy: 0.9280
Epoch 66/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0047 -
accuracy: 0.9990 - val_loss: 0.3468 - val_accuracy: 0.8901
Epoch 67/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0048 -
accuracy: 0.9991 - val_loss: 0.2283 - val_accuracy: 0.9224
Epoch 68/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0045 -
accuracy: 0.9992 - val_loss: 0.1799 - val_accuracy: 0.9413
Epoch 69/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0043 -
accuracy: 0.9991 - val_loss: 0.2363 - val_accuracy: 0.9205
Epoch 70/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0043 -
accuracy: 0.9991 - val_loss: 0.2418 - val_accuracy: 0.9192
Epoch 71/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0042 -
accuracy: 0.9991 - val_loss: 0.1956 - val_accuracy: 0.9396
Epoch 72/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0042 -
accuracy: 0.9991 - val_loss: 0.2773 - val_accuracy: 0.9091
Epoch 73/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0042 -
accuracy: 0.9991 - val_loss: 0.1976 - val_accuracy: 0.9387
Epoch 74/500
104/104 [==============================] - 1s 5ms/step - loss: 0.0039 -
accuracy: 0.9993 - val_loss: 0.2153 - val_accuracy: 0.9322
Epoch 75/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0038 -
accuracy: 0.9993 - val_loss: 0.2273 - val_accuracy: 0.9262
Epoch 76/500
104/104 [==============================] - 1s 7ms/step - loss: 0.0038 -
accuracy: 0.9993 - val_loss: 0.2075 - val_accuracy: 0.9374
Epoch 77/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0036 -
accuracy: 0.9993 - val_loss: 0.2055 - val_accuracy: 0.9382
Epoch 78/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0034 -
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accuracy: 0.9994 - val_loss: 0.3363 - val_accuracy: 0.8971
Epoch 79/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0034 -
accuracy: 0.9994 - val_loss: 0.2769 - val_accuracy: 0.9146
Epoch 80/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0031 -
accuracy: 0.9995 - val_loss: 0.2396 - val_accuracy: 0.9267
Epoch 81/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0031 -
accuracy: 0.9993 - val_loss: 0.2428 - val_accuracy: 0.9268
Epoch 82/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0030 -
accuracy: 0.9995 - val_loss: 0.2821 - val_accuracy: 0.9125
Epoch 83/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0029 -
accuracy: 0.9994 - val_loss: 0.3037 - val_accuracy: 0.9077
Epoch 84/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0029 -
accuracy: 0.9995 - val_loss: 0.2937 - val_accuracy: 0.9122
Epoch 85/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0029 -
accuracy: 0.9995 - val_loss: 0.2583 - val_accuracy: 0.9235
Epoch 86/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0027 -
accuracy: 0.9994 - val_loss: 0.2612 - val_accuracy: 0.9238
Epoch 87/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0029 -
accuracy: 0.9993 - val_loss: 0.2284 - val_accuracy: 0.9368
Epoch 88/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0026 -
accuracy: 0.9995 - val_loss: 0.2738 - val_accuracy: 0.9205
Epoch 89/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0025 -
accuracy: 0.9995 - val_loss: 0.2338 - val_accuracy: 0.9383
Epoch 90/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0025 -
accuracy: 0.9995 - val_loss: 0.2962 - val_accuracy: 0.9138
Epoch 91/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0024 -
accuracy: 0.9996 - val_loss: 0.2640 - val_accuracy: 0.9285
Epoch 92/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0023 -
accuracy: 0.9995 - val_loss: 0.3409 - val_accuracy: 0.9032
Epoch 93/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0024 -
accuracy: 0.9995 - val_loss: 0.2705 - val_accuracy: 0.9269
Epoch 94/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0023 -
```

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accuracy: 0.9995 - val_loss: 0.3500 - val_accuracy: 0.9024
Epoch 95/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0023 -
accuracy: 0.9995 - val_loss: 0.2891 - val_accuracy: 0.9216
Epoch 96/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0024 -
accuracy: 0.9995 - val_loss: 0.3163 - val_accuracy: 0.9131
Epoch 97/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0021 -
accuracy: 0.9996 - val_loss: 0.2570 - val_accuracy: 0.9325
Epoch 98/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0020 -
accuracy: 0.9997 - val_loss: 0.3424 - val_accuracy: 0.9049
Epoch 99/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0019 -
accuracy: 0.9996 - val_loss: 0.2498 - val_accuracy: 0.9354
Epoch 100/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0020 -
accuracy: 0.9997 - val_loss: 0.2931 - val_accuracy: 0.9231
Epoch 101/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0019 -
accuracy: 0.9997 - val_loss: 0.2968 - val_accuracy: 0.9222
Epoch 102/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0019 -
accuracy: 0.9996 - val_loss: 0.3381 - val_accuracy: 0.9118
Epoch 103/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0020 -
accuracy: 0.9996 - val_loss: 0.2365 - val_accuracy: 0.9425
Epoch 104/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0017 -
accuracy: 0.9998 - val_loss: 0.2762 - val_accuracy: 0.9287
Epoch 105/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0018 -
accuracy: 0.9996 - val_loss: 0.2523 - val_accuracy: 0.9379
Epoch 106/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0017 -
accuracy: 0.9997 - val_loss: 0.2963 - val_accuracy: 0.9240
Epoch 107/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0016 -
accuracy: 0.9997 - val_loss: 0.3499 - val_accuracy: 0.9067
Epoch 108/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0015 -
accuracy: 0.9998 - val_loss: 0.2875 - val_accuracy: 0.9278
Epoch 109/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0016 -
accuracy: 0.9998 - val_loss: 0.3040 - val_accuracy: 0.9242
Epoch 110/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0018 -
```

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accuracy: 0.9996 - val_loss: 0.3541 - val_accuracy: 0.9085
Epoch 111/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0015 -
accuracy: 0.9997 - val_loss: 0.3642 - val_accuracy: 0.9057
Epoch 112/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0016 -
accuracy: 0.9997 - val_loss: 0.3364 - val_accuracy: 0.9147
Epoch 113/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0016 -
accuracy: 0.9997 - val_loss: 0.2829 - val_accuracy: 0.9337
Epoch 114/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0014 -
accuracy: 0.9998 - val_loss: 0.2964 - val_accuracy: 0.9318
Epoch 115/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0014 -
accuracy: 0.9997 - val_loss: 0.3391 - val_accuracy: 0.9148
Epoch 116/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0015 -
accuracy: 0.9997 - val_loss: 0.3022 - val_accuracy: 0.9312
Epoch 117/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0014 -
accuracy: 0.9997 - val_loss: 0.3498 - val_accuracy: 0.9123
Epoch 118/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.3852 - val_accuracy: 0.9030
Epoch 119/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0013 -
accuracy: 0.9997 - val_loss: 0.3507 - val_accuracy: 0.9137
Epoch 120/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0012 -
accuracy: 0.9998 - val_loss: 0.3807 - val_accuracy: 0.9045
Epoch 121/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0012 -
accuracy: 0.9998 - val_loss: 0.3356 - val_accuracy: 0.9198
Epoch 122/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0013 -
accuracy: 0.9998 - val_loss: 0.3614 - val_accuracy: 0.9137
Epoch 123/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0012 -
accuracy: 0.9998 - val_loss: 0.3825 - val_accuracy: 0.9097
Epoch 124/500
104/104 [==============================] - 0s 4ms/step - loss: 9.9695e-04 -
accuracy: 0.9998 - val_loss: 0.3536 - val_accuracy: 0.9168
Epoch 125/500
104/104 [==============================] - 1s 5ms/step - loss: 9.9415e-04 -
accuracy: 0.9999 - val_loss: 0.3906 - val_accuracy: 0.9057
Epoch 126/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0010 -
```

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accuracy: 0.9998 - val_loss: 0.4239 - val_accuracy: 0.8974
Epoch 127/500
104/104 [==============================] - 0s 5ms/step - loss: 9.5689e-04 -
accuracy: 0.9999 - val_loss: 0.3475 - val_accuracy: 0.9199
Epoch 128/500
104/104 [==============================] - 0s 4ms/step - loss: 0.0011 -
accuracy: 0.9998 - val_loss: 0.3422 - val_accuracy: 0.9211
Epoch 129/500
104/104 [==============================] - 0s 5ms/step - loss: 9.6340e-04 -
accuracy: 0.9999 - val_loss: 0.3791 - val_accuracy: 0.9099
Epoch 130/500
104/104 [==============================] - 0s 5ms/step - loss: 0.0011 -
accuracy: 0.9998 - val_loss: 0.4064 - val_accuracy: 0.9005
Epoch 131/500
104/104 [==============================] - 1s 5ms/step - loss: 9.3979e-04 -
accuracy: 0.9998 - val_loss: 0.3553 - val_accuracy: 0.9195
Epoch 132/500
104/104 [==============================] - 0s 5ms/step - loss: 8.6748e-04 -
accuracy: 0.9998 - val_loss: 0.3538 - val_accuracy: 0.9198
Epoch 133/500
104/104 [==============================] - 0s 5ms/step - loss: 7.6309e-04 -
accuracy: 0.9999 - val_loss: 0.3593 - val_accuracy: 0.9159
Epoch 134/500
104/104 [==============================] - 0s 5ms/step - loss: 9.0361e-04 -
accuracy: 0.9998 - val_loss: 0.4133 - val_accuracy: 0.9005
Epoch 135/500
104/104 [==============================] - 0s 5ms/step - loss: 8.4611e-04 -
accuracy: 0.9998 - val_loss: 0.3424 - val_accuracy: 0.9268
Epoch 136/500
104/104 [==============================] - 1s 7ms/step - loss: 8.4733e-04 -
accuracy: 0.9998 - val_loss: 0.3866 - val_accuracy: 0.9130
Epoch 137/500
104/104 [==============================] - 1s 6ms/step - loss: 7.8912e-04 -
accuracy: 0.9999 - val_loss: 0.3983 - val_accuracy: 0.9104
Epoch 138/500
104/104 [==============================] - 1s 6ms/step - loss: 8.7751e-04 -
accuracy: 0.9998 - val_loss: 0.3508 - val_accuracy: 0.9226
Epoch 139/500
104/104 [==============================] - 1s 7ms/step - loss: 9.5376e-04 -
accuracy: 0.9998 - val_loss: 0.3903 - val_accuracy: 0.9090
Epoch 140/500
104/104 [==============================] - 1s 6ms/step - loss: 7.8588e-04 -
accuracy: 0.9999 - val_loss: 0.3726 - val_accuracy: 0.9145
Epoch 141/500
104/104 [==============================] - 1s 6ms/step - loss: 8.2977e-04 -
accuracy: 0.9998 - val_loss: 0.3813 - val_accuracy: 0.9125
Epoch 142/500
104/104 [==============================] - 1s 6ms/step - loss: 7.0287e-04 -
```

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accuracy: 0.9999 - val_loss: 0.3500 - val_accuracy: 0.9228
Epoch 143/500
104/104 [==============================] - 1s 6ms/step - loss: 6.7838e-04 -
accuracy: 0.9999 - val_loss: 0.3513 - val_accuracy: 0.9247
Epoch 144/500
104/104 [==============================] - 1s 5ms/step - loss: 6.8833e-04 -
accuracy: 0.9999 - val_loss: 0.5050 - val_accuracy: 0.8820
Epoch 145/500
104/104 [==============================] - 1s 6ms/step - loss: 7.7573e-04 -
accuracy: 0.9998 - val_loss: 0.3991 - val_accuracy: 0.9094
Epoch 146/500
104/104 [==============================] - 0s 4ms/step - loss: 6.3194e-04 -
accuracy: 0.9999 - val_loss: 0.3734 - val_accuracy: 0.9162
Epoch 147/500
104/104 [==============================] - 0s 4ms/step - loss: 6.2271e-04 -
accuracy: 0.9999 - val_loss: 0.4410 - val_accuracy: 0.8981
Epoch 148/500
104/104 [==============================] - 0s 4ms/step - loss: 7.3563e-04 -
accuracy: 0.9999 - val_loss: 0.4466 - val_accuracy: 0.8957
Epoch 149/500
104/104 [==============================] - 0s 5ms/step - loss: 6.1928e-04 -
accuracy: 0.9999 - val_loss: 0.4115 - val_accuracy: 0.9062
Epoch 150/500
104/104 [==============================] - 0s 5ms/step - loss: 6.9023e-04 -
accuracy: 0.9999 - val_loss: 0.4077 - val_accuracy: 0.9082
Epoch 151/500
104/104 [==============================] - 0s 4ms/step - loss: 6.0513e-04 -
accuracy: 0.9999 - val_loss: 0.4369 - val_accuracy: 0.8989
Epoch 152/500
104/104 [==============================] - 0s 5ms/step - loss: 8.2910e-04 -
accuracy: 0.9998 - val_loss: 0.4004 - val_accuracy: 0.9077
Epoch 153/500
104/104 [==============================] - 0s 5ms/step - loss: 5.3192e-04 -
accuracy: 0.9999 - val_loss: 0.4739 - val_accuracy: 0.8880
Epoch 154/500
104/104 [==============================] - 0s 4ms/step - loss: 5.9357e-04 -
accuracy: 0.9999 - val_loss: 0.3174 - val_accuracy: 0.9270
Epoch 155/500
104/104 [==============================] - 1s 5ms/step - loss: 5.8701e-04 -
accuracy: 0.9999 - val_loss: 0.3479 - val_accuracy: 0.9218
Epoch 156/500
104/104 [==============================] - 0s 4ms/step - loss: 5.0981e-04 -
accuracy: 0.9999 - val_loss: 0.4201 - val_accuracy: 0.9026
Epoch 157/500
104/104 [==============================] - 0s 4ms/step - loss: 6.2777e-04 -
accuracy: 0.9999 - val_loss: 0.3294 - val_accuracy: 0.9302
Epoch 158/500
104/104 [==============================] - 0s 5ms/step - loss: 5.7049e-04 -
```

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accuracy: 0.9999 - val_loss: 0.4027 - val_accuracy: 0.9100
Epoch 159/500
104/104 [==============================] - 0s 4ms/step - loss: 4.6694e-04 -
accuracy: 0.9999 - val_loss: 0.4268 - val_accuracy: 0.9029
Epoch 160/500
104/104 [==============================] - 0s 4ms/step - loss: 4.9861e-04 -
accuracy: 0.9999 - val_loss: 0.3814 - val_accuracy: 0.9162
Epoch 161/500
104/104 [==============================] - 0s 5ms/step - loss: 4.6802e-04 -
accuracy: 0.9999 - val_loss: 0.3879 - val_accuracy: 0.9158
Epoch 162/500
104/104 [==============================] - 0s 4ms/step - loss: 4.9268e-04 -
accuracy: 0.9999 - val_loss: 0.3465 - val_accuracy: 0.9230
Epoch 163/500
104/104 [==============================] - 0s 5ms/step - loss: 5.1166e-04 -
accuracy: 0.9999 - val_loss: 0.3540 - val_accuracy: 0.9238
Epoch 164/500
104/104 [==============================] - 0s 4ms/step - loss: 4.8923e-04 -
accuracy: 0.9999 - val_loss: 0.4049 - val_accuracy: 0.9100
Epoch 165/500
104/104 [==============================] - 0s 4ms/step - loss: 5.4522e-04 -
accuracy: 0.9999 - val_loss: 0.3887 - val_accuracy: 0.9161
Epoch 166/500
104/104 [==============================] - 0s 4ms/step - loss: 6.3575e-04 -
accuracy: 0.9999 - val_loss: 0.3816 - val_accuracy: 0.9179
Epoch 167/500
104/104 [==============================] - 1s 5ms/step - loss: 3.9256e-04 -
accuracy: 0.9999 - val_loss: 0.4096 - val_accuracy: 0.9097
Epoch 168/500
104/104 [==============================] - 1s 6ms/step - loss: 3.6213e-04 -
accuracy: 0.9999 - val_loss: 0.4422 - val_accuracy: 0.9005
Epoch 169/500
104/104 [==============================] - 1s 7ms/step - loss: 3.4311e-04 -
accuracy: 1.0000 - val_loss: 0.3588 - val_accuracy: 0.9233
Epoch 170/500
104/104 [==============================] - 1s 7ms/step - loss: 4.6280e-04 -
accuracy: 0.9999 - val_loss: 0.4029 - val_accuracy: 0.9149
Epoch 171/500
104/104 [==============================] - 1s 6ms/step - loss: 3.4965e-04 -
accuracy: 0.9999 - val_loss: 0.3928 - val_accuracy: 0.9187
Epoch 172/500
104/104 [==============================] - 1s 6ms/step - loss: 4.4242e-04 -
accuracy: 0.9999 - val_loss: 0.4423 - val_accuracy: 0.9027
Epoch 173/500
104/104 [==============================] - 1s 7ms/step - loss: 4.2500e-04 -
accuracy: 0.9999 - val_loss: 0.4419 - val_accuracy: 0.9025
Epoch 174/500
104/104 [==============================] - 1s 6ms/step - loss: 4.8421e-04 -
```

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accuracy: 0.9999 - val_loss: 0.3526 - val_accuracy: 0.9275
Epoch 175/500
104/104 [==============================] - 1s 6ms/step - loss: 4.7686e-04 -
accuracy: 0.9999 - val_loss: 0.3720 - val_accuracy: 0.9248
Epoch 176/500
104/104 [==============================] - 1s 6ms/step - loss: 4.7416e-04 -
accuracy: 0.9999 - val_loss: 0.3431 - val_accuracy: 0.9303
Epoch 177/500
104/104 [==============================] - 0s 5ms/step - loss: 3.5868e-04 -
accuracy: 0.9999 - val_loss: 0.4041 - val_accuracy: 0.9156
Epoch 178/500
104/104 [==============================] - 0s 4ms/step - loss: 3.1248e-04 -
accuracy: 1.0000 - val_loss: 0.4031 - val_accuracy: 0.9141
Epoch 179/500
104/104 [==============================] - 0s 5ms/step - loss: 4.9829e-04 -
accuracy: 0.9998 - val_loss: 0.3437 - val_accuracy: 0.9287
Epoch 180/500
104/104 [==============================] - 0s 5ms/step - loss: 3.0191e-04 -
accuracy: 1.0000 - val_loss: 0.4334 - val_accuracy: 0.9023
Epoch 181/500
104/104 [==============================] - 0s 4ms/step - loss: 3.1682e-04 -
accuracy: 1.0000 - val_loss: 0.4924 - val_accuracy: 0.8902
Epoch 182/500
104/104 [==============================] - 0s 5ms/step - loss: 3.1245e-04 -
accuracy: 0.9999 - val_loss: 0.3821 - val_accuracy: 0.9185
Epoch 183/500
104/104 [==============================] - 0s 5ms/step - loss: 3.4873e-04 -
accuracy: 0.9999 - val_loss: 0.3763 - val_accuracy: 0.9227
Epoch 184/500
104/104 [==============================] - 0s 4ms/step - loss: 3.4198e-04 -
accuracy: 0.9999 - val_loss: 0.4959 - val_accuracy: 0.8904
Epoch 185/500
104/104 [==============================] - 0s 4ms/step - loss: 3.7788e-04 -
accuracy: 0.9999 - val_loss: 0.3581 - val_accuracy: 0.9285
Epoch 186/500
104/104 [==============================] - 0s 4ms/step - loss: 2.6202e-04 -
accuracy: 1.0000 - val_loss: 0.4031 - val_accuracy: 0.9164
Epoch 187/500
104/104 [==============================] - 0s 5ms/step - loss: 4.0591e-04 -
accuracy: 0.9999 - val_loss: 0.3851 - val_accuracy: 0.9205
Epoch 188/500
104/104 [==============================] - 0s 4ms/step - loss: 2.7240e-04 -
accuracy: 1.0000 - val_loss: 0.4629 - val_accuracy: 0.9002
Epoch 189/500
104/104 [==============================] - 0s 4ms/step - loss: 2.5572e-04 -
accuracy: 1.0000 - val_loss: 0.4021 - val_accuracy: 0.9174
Epoch 190/500
104/104 [==============================] - 0s 4ms/step - loss: 4.0559e-04 -
```

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accuracy: 0.9999 - val_loss: 0.4445 - val_accuracy: 0.9033
Epoch 191/500
104/104 [==============================] - 0s 5ms/step - loss: 5.4030e-04 -
accuracy: 0.9998 - val_loss: 0.3994 - val_accuracy: 0.9185
Epoch 192/500
104/104 [==============================] - 0s 4ms/step - loss: 3.1177e-04 -
accuracy: 0.9999 - val_loss: 0.4353 - val_accuracy: 0.9086
Epoch 193/500
104/104 [==============================] - 0s 5ms/step - loss: 2.8524e-04 -
accuracy: 1.0000 - val_loss: 0.4158 - val_accuracy: 0.9159
Epoch 194/500
104/104 [==============================] - 0s 5ms/step - loss: 2.6121e-04 -
accuracy: 1.0000 - val_loss: 0.5261 - val_accuracy: 0.8878
Epoch 195/500
104/104 [==============================] - 0s 5ms/step - loss: 4.2241e-04 -
accuracy: 0.9999 - val_loss: 0.5199 - val_accuracy: 0.8900
Epoch 196/500
104/104 [==============================] - 0s 5ms/step - loss: 3.2191e-04 -
accuracy: 0.9999 - val_loss: 0.4188 - val_accuracy: 0.9162
Epoch 197/500
104/104 [==============================] - 1s 5ms/step - loss: 2.2976e-04 -
accuracy: 1.0000 - val_loss: 0.4614 - val_accuracy: 0.9050
Epoch 198/500
104/104 [==============================] - 1s 7ms/step - loss: 2.4364e-04 -
accuracy: 1.0000 - val_loss: 0.4009 - val_accuracy: 0.9202
Epoch 199/500
104/104 [==============================] - 1s 6ms/step - loss: 3.9819e-04 -
accuracy: 1.0000 - val_loss: 0.4915 - val_accuracy: 0.8955
Epoch 200/500
104/104 [==============================] - 1s 6ms/step - loss: 3.6138e-04 -
accuracy: 0.9999 - val_loss: 0.4662 - val_accuracy: 0.9052
Epoch 201/500
104/104 [==============================] - 1s 7ms/step - loss: 2.6890e-04 -
accuracy: 0.9999 - val_loss: 0.4617 - val_accuracy: 0.9071
Epoch 202/500
104/104 [==============================] - 1s 7ms/step - loss: 3.2705e-04 -
accuracy: 0.9999 - val_loss: 0.4634 - val_accuracy: 0.9059
Epoch 203/500
104/104 [==============================] - 1s 6ms/step - loss: 2.2210e-04 -
accuracy: 1.0000 - val_loss: 0.4707 - val_accuracy: 0.9018
Epoch 204/500
104/104 [==============================] - 1s 7ms/step - loss: 1.7855e-04 -
accuracy: 1.0000 - val_loss: 0.5879 - val_accuracy: 0.8742
Epoch 205/500
104/104 [==============================] - 1s 6ms/step - loss: 2.5488e-04 -
accuracy: 0.9999 - val_loss: 0.4051 - val_accuracy: 0.9152
Epoch 206/500
104/104 [==============================] - 1s 6ms/step - loss: 2.3241e-04 -
```

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accuracy: 0.9999 - val_loss: 0.4608 - val_accuracy: 0.9019
Epoch 207/500
104/104 [==============================] - 1s 5ms/step - loss: 1.5424e-04 -
accuracy: 1.0000 - val_loss: 0.4020 - val_accuracy: 0.9186
Epoch 208/500
104/104 [==============================] - 0s 5ms/step - loss: 2.0732e-04 -
accuracy: 1.0000 - val_loss: 0.4019 - val_accuracy: 0.9189
Epoch 209/500
104/104 [==============================] - 0s 5ms/step - loss: 2.6085e-04 -
accuracy: 0.9999 - val_loss: 0.4094 - val_accuracy: 0.9158
Epoch 210/500
104/104 [==============================] - 0s 4ms/step - loss: 2.0615e-04 -
accuracy: 1.0000 - val_loss: 0.4563 - val_accuracy: 0.9044
Epoch 211/500
104/104 [==============================] - 0s 5ms/step - loss: 2.5825e-04 -
accuracy: 0.9999 - val_loss: 0.4393 - val_accuracy: 0.9115
Epoch 212/500
104/104 [==============================] - 0s 4ms/step - loss: 1.7374e-04 -
accuracy: 1.0000 - val_loss: 0.4469 - val_accuracy: 0.9101
Epoch 213/500
104/104 [==============================] - 0s 4ms/step - loss: 1.4159e-04 -
accuracy: 1.0000 - val_loss: 0.4560 - val_accuracy: 0.9066
Epoch 214/500
104/104 [==============================] - 0s 4ms/step - loss: 1.6960e-04 -
accuracy: 1.0000 - val_loss: 0.5331 - val_accuracy: 0.8865
Epoch 215/500
104/104 [==============================] - 0s 4ms/step - loss: 2.8686e-04 -
accuracy: 0.9999 - val_loss: 0.4973 - val_accuracy: 0.8994
Epoch 216/500
104/104 [==============================] - 0s 4ms/step - loss: 3.2272e-04 -
accuracy: 0.9999 - val_loss: 0.4988 - val_accuracy: 0.8992
Epoch 217/500
104/104 [==============================] - 0s 5ms/step - loss: 2.3734e-04 -
accuracy: 0.9999 - val_loss: 0.4903 - val_accuracy: 0.8988
Epoch 218/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5875e-04 -
accuracy: 1.0000 - val_loss: 0.4595 - val_accuracy: 0.9053
Epoch 219/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5643e-04 -
accuracy: 1.0000 - val_loss: 0.4423 - val_accuracy: 0.9086
Epoch 220/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5969e-04 -
accuracy: 1.0000 - val_loss: 0.5314 - val_accuracy: 0.8854
Epoch 221/500
104/104 [==============================] - 0s 5ms/step - loss: 2.2836e-04 -
accuracy: 0.9999 - val_loss: 0.4160 - val_accuracy: 0.9126
Epoch 222/500
104/104 [==============================] - 0s 5ms/step - loss: 2.0889e-04 -
```

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accuracy: 0.9999 - val_loss: 0.4819 - val_accuracy: 0.8981
Epoch 223/500
104/104 [==============================] - 0s 5ms/step - loss: 1.3639e-04 -
accuracy: 1.0000 - val_loss: 0.3850 - val_accuracy: 0.9238
Epoch 224/500
104/104 [==============================] - 0s 5ms/step - loss: 1.6982e-04 -
accuracy: 1.0000 - val_loss: 0.4421 - val_accuracy: 0.9074
Epoch 225/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5175e-04 -
accuracy: 1.0000 - val_loss: 0.4569 - val_accuracy: 0.9060
Epoch 226/500
104/104 [==============================] - 0s 5ms/step - loss: 1.1800e-04 -
accuracy: 1.0000 - val_loss: 0.4537 - val_accuracy: 0.9071
Epoch 227/500
104/104 [==============================] - 0s 5ms/step - loss: 1.2055e-04 -
accuracy: 1.0000 - val_loss: 0.4770 - val_accuracy: 0.9012
Epoch 228/500
104/104 [==============================] - 1s 6ms/step - loss: 4.1856e-04 -
accuracy: 0.9999 - val_loss: 0.3476 - val_accuracy: 0.9245
Epoch 229/500
104/104 [==============================] - 1s 6ms/step - loss: 1.2614e-04 -
accuracy: 1.0000 - val_loss: 0.4339 - val_accuracy: 0.9037
Epoch 230/500
104/104 [==============================] - 1s 6ms/step - loss: 1.2808e-04 -
accuracy: 1.0000 - val_loss: 0.3651 - val_accuracy: 0.9228
Epoch 231/500
104/104 [==============================] - 1s 6ms/step - loss: 1.4661e-04 -
accuracy: 1.0000 - val_loss: 0.4074 - val_accuracy: 0.9122
Epoch 232/500
104/104 [==============================] - 1s 6ms/step - loss: 2.1100e-04 -
accuracy: 0.9999 - val_loss: 0.4213 - val_accuracy: 0.9120
Epoch 233/500
104/104 [==============================] - 1s 6ms/step - loss: 1.2222e-04 -
accuracy: 1.0000 - val_loss: 0.4287 - val_accuracy: 0.9123
Epoch 234/500
104/104 [==============================] - 1s 6ms/step - loss: 1.1664e-04 -
accuracy: 1.0000 - val_loss: 0.4491 - val_accuracy: 0.9080
Epoch 235/500
104/104 [==============================] - 1s 6ms/step - loss: 1.8254e-04 -
accuracy: 0.9999 - val_loss: 0.4829 - val_accuracy: 0.9014
Epoch 236/500
104/104 [==============================] - 1s 6ms/step - loss: 1.4732e-04 -
accuracy: 1.0000 - val_loss: 0.4592 - val_accuracy: 0.9063
Epoch 237/500
104/104 [==============================] - 1s 6ms/step - loss: 0.0012 -
accuracy: 0.9998 - val_loss: 0.2475 - val_accuracy: 0.9464
Epoch 238/500
104/104 [==============================] - 1s 5ms/step - loss: 2.2661e-04 -
```

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accuracy: 1.0000 - val_loss: 0.3489 - val_accuracy: 0.9238
Epoch 239/500
104/104 [==============================] - 0s 5ms/step - loss: 1.1271e-04 -
accuracy: 1.0000 - val_loss: 0.3558 - val_accuracy: 0.9231
Epoch 240/500
104/104 [==============================] - 0s 4ms/step - loss: 1.2099e-04 -
accuracy: 1.0000 - val_loss: 0.3399 - val_accuracy: 0.9295
Epoch 241/500
104/104 [==============================] - 0s 4ms/step - loss: 1.8705e-04 -
accuracy: 0.9999 - val_loss: 0.3496 - val_accuracy: 0.9275
Epoch 242/500
104/104 [==============================] - 0s 4ms/step - loss: 9.2671e-05 -
accuracy: 1.0000 - val_loss: 0.3717 - val_accuracy: 0.9220
Epoch 243/500
104/104 [==============================] - 0s 5ms/step - loss: 1.0745e-04 -
accuracy: 1.0000 - val_loss: 0.3860 - val_accuracy: 0.9209
Epoch 244/500
104/104 [==============================] - 0s 5ms/step - loss: 1.6559e-04 -
accuracy: 1.0000 - val_loss: 0.4018 - val_accuracy: 0.9179
Epoch 245/500
104/104 [==============================] - 0s 5ms/step - loss: 1.1687e-04 -
accuracy: 1.0000 - val_loss: 0.4273 - val_accuracy: 0.9103
Epoch 246/500
104/104 [==============================] - 1s 5ms/step - loss: 8.8419e-05 -
accuracy: 1.0000 - val_loss: 0.4160 - val_accuracy: 0.9141
Epoch 247/500
104/104 [==============================] - 0s 5ms/step - loss: 1.0715e-04 -
accuracy: 1.0000 - val_loss: 0.4686 - val_accuracy: 0.9037
Epoch 248/500
104/104 [==============================] - 0s 5ms/step - loss: 1.4554e-04 -
accuracy: 1.0000 - val_loss: 0.4480 - val_accuracy: 0.9089
Epoch 249/500
104/104 [==============================] - 0s 5ms/step - loss: 1.7158e-04 -
accuracy: 1.0000 - val_loss: 0.4780 - val_accuracy: 0.9060
Epoch 250/500
104/104 [==============================] - 0s 5ms/step - loss: 2.5045e-04 -
accuracy: 0.9999 - val_loss: 0.4396 - val_accuracy: 0.9154
Epoch 251/500
104/104 [==============================] - 0s 5ms/step - loss: 1.7066e-04 -
accuracy: 1.0000 - val_loss: 0.4520 - val_accuracy: 0.9118
Epoch 252/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5370e-04 -
accuracy: 1.0000 - val_loss: 0.4793 - val_accuracy: 0.9069
Epoch 253/500
104/104 [==============================] - 0s 5ms/step - loss: 1.2852e-04 -
accuracy: 1.0000 - val_loss: 0.5386 - val_accuracy: 0.8965
Epoch 254/500
104/104 [==============================] - 0s 4ms/step - loss: 1.0463e-04 -
```

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accuracy: 1.0000 - val_loss: 0.5053 - val_accuracy: 0.9035
Epoch 255/500
104/104 [==============================] - 0s 5ms/step - loss: 7.5748e-05 -
accuracy: 1.0000 - val_loss: 0.5170 - val_accuracy: 0.9002
Epoch 256/500
104/104 [==============================] - 0s 4ms/step - loss: 6.6193e-05 -
accuracy: 1.0000 - val_loss: 0.4559 - val_accuracy: 0.9148
Epoch 257/500
104/104 [==============================] - 0s 5ms/step - loss: 1.0362e-04 -
accuracy: 1.0000 - val_loss: 0.4892 - val_accuracy: 0.9044
Epoch 258/500
104/104 [==============================] - 1s 6ms/step - loss: 1.3473e-04 -
accuracy: 1.0000 - val_loss: 0.4451 - val_accuracy: 0.9162
Epoch 259/500
104/104 [==============================] - 1s 6ms/step - loss: 2.1653e-04 -
accuracy: 0.9999 - val_loss: 0.4304 - val_accuracy: 0.9171
Epoch 260/500
104/104 [==============================] - 1s 6ms/step - loss: 1.5097e-04 -
accuracy: 1.0000 - val_loss: 0.4794 - val_accuracy: 0.9074
Epoch 261/500
104/104 [==============================] - 1s 6ms/step - loss: 8.1685e-05 -
accuracy: 1.0000 - val_loss: 0.5120 - val_accuracy: 0.8986
Epoch 262/500
104/104 [==============================] - 1s 6ms/step - loss: 1.0790e-04 -
accuracy: 1.0000 - val_loss: 0.5279 - val_accuracy: 0.8985
Epoch 263/500
104/104 [==============================] - 1s 7ms/step - loss: 1.3400e-04 -
accuracy: 1.0000 - val_loss: 0.5470 - val_accuracy: 0.8912
Epoch 264/500
104/104 [==============================] - 1s 6ms/step - loss: 8.2833e-05 -
accuracy: 1.0000 - val_loss: 0.6256 - val_accuracy: 0.8745
Epoch 265/500
104/104 [==============================] - 1s 7ms/step - loss: 1.5443e-04 -
accuracy: 0.9999 - val_loss: 0.4522 - val_accuracy: 0.9153
Epoch 266/500
104/104 [==============================] - 1s 6ms/step - loss: 1.1728e-04 -
accuracy: 1.0000 - val_loss: 0.4553 - val_accuracy: 0.9082
Epoch 267/500
104/104 [==============================] - 1s 7ms/step - loss: 1.1239e-04 -
accuracy: 1.0000 - val_loss: 0.4708 - val_accuracy: 0.9062
Epoch 268/500
104/104 [==============================] - 1s 6ms/step - loss: 6.9775e-05 -
accuracy: 1.0000 - val_loss: 0.5703 - val_accuracy: 0.8835
Epoch 269/500
104/104 [==============================] - 0s 5ms/step - loss: 1.1056e-04 -
accuracy: 1.0000 - val_loss: 0.4512 - val_accuracy: 0.9106
Epoch 270/500
104/104 [==============================] - 1s 5ms/step - loss: 1.0596e-04 -
```

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accuracy: 1.0000 - val_loss: 0.5045 - val_accuracy: 0.8985
Epoch 271/500
104/104 [==============================] - 0s 4ms/step - loss: 5.9132e-05 -
accuracy: 1.0000 - val_loss: 0.4642 - val_accuracy: 0.9114
Epoch 272/500
104/104 [==============================] - 0s 5ms/step - loss: 7.0206e-05 -
accuracy: 1.0000 - val_loss: 0.4707 - val_accuracy: 0.9085
Epoch 273/500
104/104 [==============================] - 0s 4ms/step - loss: 6.1801e-05 -
accuracy: 1.0000 - val_loss: 0.5063 - val_accuracy: 0.9048
Epoch 274/500
104/104 [==============================] - 0s 5ms/step - loss: 4.5964e-05 -
accuracy: 1.0000 - val_loss: 0.5654 - val_accuracy: 0.8922
Epoch 275/500
104/104 [==============================] - 0s 4ms/step - loss: 5.7406e-05 -
accuracy: 1.0000 - val_loss: 0.4804 - val_accuracy: 0.9114
Epoch 276/500
104/104 [==============================] - 0s 4ms/step - loss: 9.5631e-05 -
accuracy: 1.0000 - val_loss: 0.5158 - val_accuracy: 0.9064
Epoch 277/500
104/104 [==============================] - 0s 5ms/step - loss: 2.4992e-04 -
accuracy: 0.9999 - val_loss: 0.5877 - val_accuracy: 0.8821
Epoch 278/500
104/104 [==============================] - 0s 5ms/step - loss: 5.3655e-04 -
accuracy: 0.9998 - val_loss: 0.5102 - val_accuracy: 0.8903
Epoch 279/500
104/104 [==============================] - 0s 5ms/step - loss: 2.8316e-04 -
accuracy: 1.0000 - val_loss: 0.3950 - val_accuracy: 0.9160
Epoch 280/500
104/104 [==============================] - 0s 4ms/step - loss: 7.2084e-05 -
accuracy: 1.0000 - val_loss: 0.3970 - val_accuracy: 0.9177
Epoch 281/500
104/104 [==============================] - 0s 5ms/step - loss: 6.4752e-05 -
accuracy: 1.0000 - val_loss: 0.4284 - val_accuracy: 0.9108
Epoch 282/500
104/104 [==============================] - 0s 5ms/step - loss: 6.0413e-05 -
accuracy: 1.0000 - val_loss: 0.4404 - val_accuracy: 0.9100
Epoch 283/500
104/104 [==============================] - 0s 5ms/step - loss: 4.8549e-05 -
accuracy: 1.0000 - val_loss: 0.4452 - val_accuracy: 0.9087
Epoch 284/500
104/104 [==============================] - 0s 4ms/step - loss: 5.0113e-05 -
accuracy: 1.0000 - val_loss: 0.4442 - val_accuracy: 0.9094
Epoch 285/500
104/104 [==============================] - 0s 5ms/step - loss: 4.5177e-05 -
accuracy: 1.0000 - val_loss: 0.4577 - val_accuracy: 0.9069
Epoch 286/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5318e-04 -
```

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accuracy: 1.0000 - val_loss: 0.4429 - val_accuracy: 0.9102
Epoch 287/500
104/104 [==============================] - 0s 5ms/step - loss: 3.8344e-05 -
accuracy: 1.0000 - val_loss: 0.4755 - val_accuracy: 0.9040
Epoch 288/500
104/104 [==============================] - 0s 4ms/step - loss: 6.4363e-05 -
accuracy: 1.0000 - val_loss: 0.4667 - val_accuracy: 0.9065
Epoch 289/500
104/104 [==============================] - 1s 6ms/step - loss: 1.1530e-04 -
accuracy: 1.0000 - val_loss: 0.4306 - val_accuracy: 0.9162
Epoch 290/500
104/104 [==============================] - 1s 6ms/step - loss: 4.7742e-05 -
accuracy: 1.0000 - val_loss: 0.4553 - val_accuracy: 0.9105
Epoch 291/500
104/104 [==============================] - 1s 6ms/step - loss: 4.0383e-05 -
accuracy: 1.0000 - val_loss: 0.4847 - val_accuracy: 0.9034
Epoch 292/500
104/104 [==============================] - 1s 6ms/step - loss: 3.7825e-05 -
accuracy: 1.0000 - val_loss: 0.5073 - val_accuracy: 0.8997
Epoch 293/500
104/104 [==============================] - 1s 6ms/step - loss: 3.9073e-05 -
accuracy: 1.0000 - val_loss: 0.5024 - val_accuracy: 0.9000
Epoch 294/500
104/104 [==============================] - 1s 7ms/step - loss: 3.5580e-05 -
accuracy: 1.0000 - val_loss: 0.4983 - val_accuracy: 0.9009
Epoch 295/500
104/104 [==============================] - 1s 6ms/step - loss: 3.2461e-05 -
accuracy: 1.0000 - val_loss: 0.4709 - val_accuracy: 0.9082
Epoch 296/500
104/104 [==============================] - 1s 6ms/step - loss: 3.7826e-05 -
accuracy: 1.0000 - val_loss: 0.4858 - val_accuracy: 0.9042
Epoch 297/500
104/104 [==============================] - 1s 7ms/step - loss: 5.0473e-05 -
accuracy: 1.0000 - val_loss: 0.4478 - val_accuracy: 0.9128
Epoch 298/500
104/104 [==============================] - 1s 6ms/step - loss: 9.1597e-05 -
accuracy: 1.0000 - val_loss: 0.4462 - val_accuracy: 0.9113
Epoch 299/500
104/104 [==============================] - 1s 6ms/step - loss: 3.0589e-05 -
accuracy: 1.0000 - val_loss: 0.4749 - val_accuracy: 0.9067
Epoch 300/500
104/104 [==============================] - 1s 5ms/step - loss: 4.9017e-04 -
accuracy: 0.9998 - val_loss: 0.4892 - val_accuracy: 0.9034
Epoch 301/500
104/104 [==============================] - 0s 5ms/step - loss: 2.0876e-04 -
accuracy: 0.9999 - val_loss: 0.4810 - val_accuracy: 0.9057
Epoch 302/500
104/104 [==============================] - 0s 5ms/step - loss: 1.4506e-04 -
```

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accuracy: 1.0000 - val_loss: 0.5117 - val_accuracy: 0.9008
Epoch 303/500
104/104 [==============================] - 0s 5ms/step - loss: 4.0891e-05 -
accuracy: 1.0000 - val_loss: 0.5221 - val_accuracy: 0.8992
Epoch 304/500
104/104 [==============================] - 0s 5ms/step - loss: 5.7726e-05 -
accuracy: 1.0000 - val_loss: 0.5415 - val_accuracy: 0.8946
Epoch 305/500
104/104 [==============================] - 0s 5ms/step - loss: 8.7168e-05 -
accuracy: 1.0000 - val_loss: 0.4280 - val_accuracy: 0.9131
Epoch 306/500
104/104 [==============================] - 0s 4ms/step - loss: 4.3809e-05 -
accuracy: 1.0000 - val_loss: 0.5019 - val_accuracy: 0.8958
Epoch 307/500
104/104 [==============================] - 1s 5ms/step - loss: 3.1879e-05 -
accuracy: 1.0000 - val_loss: 0.4710 - val_accuracy: 0.9041
Epoch 308/500
104/104 [==============================] - 1s 5ms/step - loss: 6.3616e-05 -
accuracy: 1.0000 - val_loss: 0.4760 - val_accuracy: 0.9051
Epoch 309/500
104/104 [==============================] - 0s 5ms/step - loss: 1.7617e-04 -
accuracy: 0.9999 - val_loss: 0.5188 - val_accuracy: 0.8974
Epoch 310/500
104/104 [==============================] - 0s 5ms/step - loss: 2.9499e-05 -
accuracy: 1.0000 - val_loss: 0.4847 - val_accuracy: 0.9028
Epoch 311/500
104/104 [==============================] - 0s 5ms/step - loss: 3.2529e-05 -
accuracy: 1.0000 - val_loss: 0.4741 - val_accuracy: 0.9039
Epoch 312/500
104/104 [==============================] - 0s 4ms/step - loss: 1.7526e-04 -
accuracy: 0.9999 - val_loss: 0.4661 - val_accuracy: 0.9053
Epoch 313/500
104/104 [==============================] - 0s 4ms/step - loss: 4.5892e-05 -
accuracy: 1.0000 - val_loss: 0.4371 - val_accuracy: 0.9118
Epoch 314/500
104/104 [==============================] - 0s 5ms/step - loss: 3.1993e-05 -
accuracy: 1.0000 - val_loss: 0.4445 - val_accuracy: 0.9112
Epoch 315/500
104/104 [==============================] - 0s 5ms/step - loss: 3.6611e-05 -
accuracy: 1.0000 - val_loss: 0.4913 - val_accuracy: 0.9011
Epoch 316/500
104/104 [==============================] - 0s 4ms/step - loss: 5.7613e-05 -
accuracy: 1.0000 - val_loss: 0.4614 - val_accuracy: 0.9077
Epoch 317/500
104/104 [==============================] - 0s 4ms/step - loss: 3.6140e-05 -
accuracy: 1.0000 - val_loss: 0.4757 - val_accuracy: 0.9065
Epoch 318/500
104/104 [==============================] - 0s 5ms/step - loss: 2.8699e-05 -
```

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accuracy: 1.0000 - val_loss: 0.4974 - val_accuracy: 0.9023
Epoch 319/500
104/104 [==============================] - 0s 5ms/step - loss: 3.9529e-05 -
accuracy: 1.0000 - val_loss: 0.4716 - val_accuracy: 0.9059
Epoch 320/500
104/104 [==============================] - 0s 4ms/step - loss: 3.8210e-05 -
accuracy: 1.0000 - val_loss: 0.4471 - val_accuracy: 0.9152
Epoch 321/500
104/104 [==============================] - 1s 7ms/step - loss: 3.7751e-05 -
accuracy: 1.0000 - val_loss: 0.4771 - val_accuracy: 0.9092
Epoch 322/500
104/104 [==============================] - 1s 6ms/step - loss: 3.3965e-05 -
accuracy: 1.0000 - val_loss: 0.4698 - val_accuracy: 0.9112
Epoch 323/500
104/104 [==============================] - 1s 6ms/step - loss: 9.3731e-05 -
accuracy: 1.0000 - val_loss: 0.5126 - val_accuracy: 0.9028
Epoch 324/500
104/104 [==============================] - 1s 7ms/step - loss: 2.6964e-05 -
accuracy: 1.0000 - val_loss: 0.5224 - val_accuracy: 0.8997
Epoch 325/500
104/104 [==============================] - 1s 6ms/step - loss: 3.5207e-05 -
accuracy: 1.0000 - val_loss: 0.4953 - val_accuracy: 0.9037
Epoch 326/500
104/104 [==============================] - 1s 6ms/step - loss: 2.5883e-04 -
accuracy: 0.9999 - val_loss: 0.3956 - val_accuracy: 0.9223
Epoch 327/500
104/104 [==============================] - 1s 6ms/step - loss: 1.2673e-04 -
accuracy: 1.0000 - val_loss: 0.6188 - val_accuracy: 0.8793
Epoch 328/500
104/104 [==============================] - 1s 6ms/step - loss: 3.8478e-05 -
accuracy: 1.0000 - val_loss: 0.4758 - val_accuracy: 0.9075
Epoch 329/500
104/104 [==============================] - 1s 6ms/step - loss: 2.6751e-05 -
accuracy: 1.0000 - val_loss: 0.4953 - val_accuracy: 0.9043
Epoch 330/500
104/104 [==============================] - 1s 7ms/step - loss: 2.6366e-05 -
accuracy: 1.0000 - val_loss: 0.4940 - val_accuracy: 0.9063
Epoch 331/500
104/104 [==============================] - 0s 5ms/step - loss: 2.8038e-05 -
accuracy: 1.0000 - val_loss: 0.4699 - val_accuracy: 0.9130
Epoch 332/500
104/104 [==============================] - 0s 5ms/step - loss: 2.6185e-05 -
accuracy: 1.0000 - val_loss: 0.5349 - val_accuracy: 0.8988
Epoch 333/500
104/104 [==============================] - 0s 5ms/step - loss: 4.0399e-05 -
accuracy: 1.0000 - val_loss: 0.5220 - val_accuracy: 0.9017
Epoch 334/500
104/104 [==============================] - 0s 4ms/step - loss: 2.1829e-05 -
```

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accuracy: 1.0000 - val_loss: 0.5121 - val_accuracy: 0.9065
Epoch 335/500
104/104 [==============================] - 0s 4ms/step - loss: 2.5172e-05 -
accuracy: 1.0000 - val_loss: 0.5426 - val_accuracy: 0.9011
Epoch 336/500
104/104 [==============================] - 1s 5ms/step - loss: 2.4437e-05 -
accuracy: 1.0000 - val_loss: 0.5230 - val_accuracy: 0.9057
Epoch 337/500
104/104 [==============================] - 1s 6ms/step - loss: 2.8524e-05 -
accuracy: 1.0000 - val_loss: 0.5622 - val_accuracy: 0.8966
Epoch 338/500
104/104 [==============================] - 0s 4ms/step - loss: 2.7200e-05 -
accuracy: 1.0000 - val_loss: 0.5361 - val_accuracy: 0.9022
Epoch 339/500
104/104 [==============================] - 1s 5ms/step - loss: 2.0697e-05 -
accuracy: 1.0000 - val_loss: 0.5320 - val_accuracy: 0.9030
Epoch 340/500
104/104 [==============================] - 0s 5ms/step - loss: 2.2669e-05 -
accuracy: 1.0000 - val_loss: 0.5444 - val_accuracy: 0.8992
Epoch 341/500
104/104 [==============================] - 0s 4ms/step - loss: 2.0338e-05 -
accuracy: 1.0000 - val_loss: 0.5428 - val_accuracy: 0.9003
Epoch 342/500
104/104 [==============================] - 0s 4ms/step - loss: 2.4167e-05 -
accuracy: 1.0000 - val_loss: 0.5237 - val_accuracy: 0.9043
Epoch 343/500
104/104 [==============================] - 0s 5ms/step - loss: 2.4241e-05 -
accuracy: 1.0000 - val_loss: 0.5820 - val_accuracy: 0.8918
Epoch 344/500
104/104 [==============================] - 0s 5ms/step - loss: 3.4390e-05 -
accuracy: 1.0000 - val_loss: 0.5667 - val_accuracy: 0.8934
Epoch 345/500
104/104 [==============================] - 0s 5ms/step - loss: 2.3078e-05 -
accuracy: 1.0000 - val_loss: 0.5170 - val_accuracy: 0.9043
Epoch 346/500
104/104 [==============================] - 0s 5ms/step - loss: 2.2557e-05 -
accuracy: 1.0000 - val_loss: 0.5524 - val_accuracy: 0.8989
Epoch 347/500
104/104 [==============================] - 1s 5ms/step - loss: 2.1170e-04 -
accuracy: 0.9999 - val_loss: 0.3003 - val_accuracy: 0.9392
Epoch 348/500
104/104 [==============================] - 1s 7ms/step - loss: 1.9980e-04 -
accuracy: 0.9999 - val_loss: 0.3316 - val_accuracy: 0.9368
Epoch 349/500
104/104 [==============================] - 0s 5ms/step - loss: 3.9757e-05 -
accuracy: 1.0000 - val_loss: 0.3884 - val_accuracy: 0.9246
Epoch 350/500
104/104 [==============================] - 1s 6ms/step - loss: 2.3424e-05 -
```

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accuracy: 1.0000 - val_loss: 0.4446 - val_accuracy: 0.9108
Epoch 351/500
104/104 [==============================] - 1s 6ms/step - loss: 2.2050e-05 -
accuracy: 1.0000 - val_loss: 0.4183 - val_accuracy: 0.9195
Epoch 352/500
104/104 [==============================] - 1s 6ms/step - loss: 1.4847e-04 -
accuracy: 0.9999 - val_loss: 0.3589 - val_accuracy: 0.9305
Epoch 353/500
104/104 [==============================] - 1s 6ms/step - loss: 2.0842e-04 -
accuracy: 0.9999 - val_loss: 0.3987 - val_accuracy: 0.9202
Epoch 354/500
104/104 [==============================] - 1s 7ms/step - loss: 3.2081e-04 -
accuracy: 0.9999 - val_loss: 0.4018 - val_accuracy: 0.9228
Epoch 355/500
104/104 [==============================] - 1s 6ms/step - loss: 2.7536e-05 -
accuracy: 1.0000 - val_loss: 0.4021 - val_accuracy: 0.9226
Epoch 356/500
104/104 [==============================] - 1s 7ms/step - loss: 2.4778e-05 -
accuracy: 1.0000 - val_loss: 0.4079 - val_accuracy: 0.9205
Epoch 357/500
104/104 [==============================] - 1s 7ms/step - loss: 2.0428e-05 -
accuracy: 1.0000 - val_loss: 0.4562 - val_accuracy: 0.9117
Epoch 358/500
104/104 [==============================] - 1s 6ms/step - loss: 3.8276e-05 -
accuracy: 1.0000 - val_loss: 0.4343 - val_accuracy: 0.9172
Epoch 359/500
104/104 [==============================] - 1s 6ms/step - loss: 1.5632e-04 -
accuracy: 1.0000 - val_loss: 0.4083 - val_accuracy: 0.9200
Epoch 360/500
104/104 [==============================] - 1s 5ms/step - loss: 2.5151e-04 -
accuracy: 1.0000 - val_loss: 0.3941 - val_accuracy: 0.9253
Epoch 361/500
104/104 [==============================] - 0s 5ms/step - loss: 1.9401e-05 -
accuracy: 1.0000 - val_loss: 0.4151 - val_accuracy: 0.9216
Epoch 362/500
104/104 [==============================] - 0s 4ms/step - loss: 2.1557e-05 -
accuracy: 1.0000 - val_loss: 0.4276 - val_accuracy: 0.9202
Epoch 363/500
104/104 [==============================] - 0s 4ms/step - loss: 1.9427e-05 -
accuracy: 1.0000 - val_loss: 0.4312 - val_accuracy: 0.9213
Epoch 364/500
104/104 [==============================] - 0s 5ms/step - loss: 1.9464e-05 -
accuracy: 1.0000 - val_loss: 0.4522 - val_accuracy: 0.9179
Epoch 365/500
104/104 [==============================] - 0s 5ms/step - loss: 1.7248e-05 -
accuracy: 1.0000 - val_loss: 0.4660 - val_accuracy: 0.9162
Epoch 366/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5553e-05 -
```

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accuracy: 1.0000 - val_loss: 0.4470 - val_accuracy: 0.9209
Epoch 367/500
104/104 [==============================] - 0s 5ms/step - loss: 1.8178e-05 -
accuracy: 1.0000 - val_loss: 0.4718 - val_accuracy: 0.9149
Epoch 368/500
104/104 [==============================] - 0s 4ms/step - loss: 1.7015e-05 -
accuracy: 1.0000 - val_loss: 0.4863 - val_accuracy: 0.9134
Epoch 369/500
104/104 [==============================] - 0s 5ms/step - loss: 1.6116e-05 -
accuracy: 1.0000 - val_loss: 0.4973 - val_accuracy: 0.9116
Epoch 370/500
104/104 [==============================] - 0s 4ms/step - loss: 1.9354e-05 -
accuracy: 1.0000 - val_loss: 0.4941 - val_accuracy: 0.9125
Epoch 371/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5485e-05 -
accuracy: 1.0000 - val_loss: 0.4949 - val_accuracy: 0.9125
Epoch 372/500
104/104 [==============================] - 1s 5ms/step - loss: 6.1477e-05 -
accuracy: 1.0000 - val_loss: 0.5067 - val_accuracy: 0.9103
Epoch 373/500
104/104 [==============================] - 0s 5ms/step - loss: 6.6005e-04 -
accuracy: 0.9997 - val_loss: 0.5477 - val_accuracy: 0.9058
Epoch 374/500
104/104 [==============================] - 0s 4ms/step - loss: 6.1588e-05 -
accuracy: 1.0000 - val_loss: 0.5571 - val_accuracy: 0.9042
Epoch 375/500
104/104 [==============================] - 0s 5ms/step - loss: 2.6502e-05 -
accuracy: 1.0000 - val_loss: 0.5418 - val_accuracy: 0.9082
Epoch 376/500
104/104 [==============================] - 0s 4ms/step - loss: 1.8267e-05 -
accuracy: 1.0000 - val_loss: 0.5557 - val_accuracy: 0.9057
Epoch 377/500
104/104 [==============================] - 0s 4ms/step - loss: 1.6751e-05 -
accuracy: 1.0000 - val_loss: 0.5386 - val_accuracy: 0.9099
Epoch 378/500
104/104 [==============================] - 0s 5ms/step - loss: 1.7313e-05 -
accuracy: 1.0000 - val_loss: 0.5234 - val_accuracy: 0.9130
Epoch 379/500
104/104 [==============================] - 1s 5ms/step - loss: 1.5877e-05 -
accuracy: 1.0000 - val_loss: 0.5311 - val_accuracy: 0.9110
Epoch 380/500
104/104 [==============================] - 0s 5ms/step - loss: 1.4933e-05 -
accuracy: 1.0000 - val_loss: 0.5624 - val_accuracy: 0.9050
Epoch 381/500
104/104 [==============================] - 1s 7ms/step - loss: 1.5050e-05 -
accuracy: 1.0000 - val_loss: 0.5936 - val_accuracy: 0.9005
Epoch 382/500
104/104 [==============================] - 1s 6ms/step - loss: 1.9296e-05 -
```

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accuracy: 1.0000 - val_loss: 0.5411 - val_accuracy: 0.9106
Epoch 383/500
104/104 [==============================] - 1s 7ms/step - loss: 1.5701e-05 -
accuracy: 1.0000 - val_loss: 0.5795 - val_accuracy: 0.9034
Epoch 384/500
104/104 [==============================] - 1s 6ms/step - loss: 1.4198e-05 -
accuracy: 1.0000 - val_loss: 0.5679 - val_accuracy: 0.9057
Epoch 385/500
104/104 [==============================] - 1s 6ms/step - loss: 1.4299e-05 -
accuracy: 1.0000 - val_loss: 0.5486 - val_accuracy: 0.9091
Epoch 386/500
104/104 [==============================] - 1s 6ms/step - loss: 1.4772e-05 -
accuracy: 1.0000 - val_loss: 0.5651 - val_accuracy: 0.9075
Epoch 387/500
104/104 [==============================] - 1s 6ms/step - loss: 2.9124e-05 -
accuracy: 1.0000 - val_loss: 0.6219 - val_accuracy: 0.8977
Epoch 388/500
104/104 [==============================] - 1s 6ms/step - loss: 1.8715e-05 -
accuracy: 1.0000 - val_loss: 0.5900 - val_accuracy: 0.9044
Epoch 389/500
104/104 [==============================] - 1s 5ms/step - loss: 1.4406e-05 -
accuracy: 1.0000 - val_loss: 0.5841 - val_accuracy: 0.9060
Epoch 390/500
104/104 [==============================] - 1s 6ms/step - loss: 1.9643e-05 -
accuracy: 1.0000 - val_loss: 0.5749 - val_accuracy: 0.9071
Epoch 391/500
104/104 [==============================] - 1s 6ms/step - loss: 1.7127e-05 -
accuracy: 1.0000 - val_loss: 0.5691 - val_accuracy: 0.9081
Epoch 392/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5481e-05 -
accuracy: 1.0000 - val_loss: 0.5871 - val_accuracy: 0.9036
Epoch 393/500
104/104 [==============================] - 0s 4ms/step - loss: 1.3131e-05 -
accuracy: 1.0000 - val_loss: 0.5756 - val_accuracy: 0.9054
Epoch 394/500
104/104 [==============================] - 0s 5ms/step - loss: 1.3369e-05 -
accuracy: 1.0000 - val_loss: 0.6121 - val_accuracy: 0.8994
Epoch 395/500
104/104 [==============================] - 0s 5ms/step - loss: 3.3451e-04 -
accuracy: 0.9999 - val_loss: 0.4312 - val_accuracy: 0.9236
Epoch 396/500
104/104 [==============================] - 0s 4ms/step - loss: 8.1858e-04 -
accuracy: 0.9998 - val_loss: 0.5541 - val_accuracy: 0.9065
Epoch 397/500
104/104 [==============================] - 0s 4ms/step - loss: 9.2767e-05 -
accuracy: 1.0000 - val_loss: 0.5882 - val_accuracy: 0.9034
Epoch 398/500
104/104 [==============================] - 0s 4ms/step - loss: 1.2514e-04 -
```

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accuracy: 1.0000 - val_loss: 0.5759 - val_accuracy: 0.9042
Epoch 399/500
104/104 [==============================] - 0s 4ms/step - loss: 1.5906e-05 -
accuracy: 1.0000 - val_loss: 0.5642 - val_accuracy: 0.9063
Epoch 400/500
104/104 [==============================] - 0s 4ms/step - loss: 1.5648e-05 -
accuracy: 1.0000 - val_loss: 0.5587 - val_accuracy: 0.9071
Epoch 401/500
104/104 [==============================] - 0s 5ms/step - loss: 1.6037e-05 -
accuracy: 1.0000 - val_loss: 0.5636 - val_accuracy: 0.9060
Epoch 402/500
104/104 [==============================] - 0s 5ms/step - loss: 1.5441e-05 -
accuracy: 1.0000 - val_loss: 0.5652 - val_accuracy: 0.9057
Epoch 403/500
104/104 [==============================] - 0s 4ms/step - loss: 1.4539e-05 -
accuracy: 1.0000 - val_loss: 0.5536 - val_accuracy: 0.9082
Epoch 404/500
104/104 [==============================] - 0s 5ms/step - loss: 1.2917e-05 -
accuracy: 1.0000 - val_loss: 0.5603 - val_accuracy: 0.9063
Epoch 405/500
104/104 [==============================] - 0s 5ms/step - loss: 1.1715e-05 -
accuracy: 1.0000 - val_loss: 0.5627 - val_accuracy: 0.9063
Epoch 406/500
104/104 [==============================] - 0s 5ms/step - loss: 1.3227e-05 -
accuracy: 1.0000 - val_loss: 0.5589 - val_accuracy: 0.9074
Epoch 407/500
104/104 [==============================] - 0s 5ms/step - loss: 1.2040e-05 -
accuracy: 1.0000 - val_loss: 0.5630 - val_accuracy: 0.9063
Epoch 408/500
104/104 [==============================] - 0s 5ms/step - loss: 1.1654e-05 -
accuracy: 1.0000 - val_loss: 0.5661 - val_accuracy: 0.9060
Epoch 409/500
104/104 [==============================] - 0s 5ms/step - loss: 1.1385e-05 -
accuracy: 1.0000 - val_loss: 0.5746 - val_accuracy: 0.9051
Epoch 410/500
104/104 [==============================] - 0s 4ms/step - loss: 1.2904e-05 -
accuracy: 1.0000 - val_loss: 0.5605 - val_accuracy: 0.9079
Epoch 411/500
104/104 [==============================] - 1s 5ms/step - loss: 1.3214e-05 -
accuracy: 1.0000 - val_loss: 0.5716 - val_accuracy: 0.9057
Epoch 412/500
104/104 [==============================] - 1s 5ms/step - loss: 1.8949e-05 -
accuracy: 1.0000 - val_loss: 0.5693 - val_accuracy: 0.9059
Epoch 413/500
104/104 [==============================] - 1s 6ms/step - loss: 1.2584e-05 -
accuracy: 1.0000 - val_loss: 0.5832 - val_accuracy: 0.9029
Epoch 414/500
104/104 [==============================] - 1s 7ms/step - loss: 2.7610e-05 -
```

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accuracy: 1.0000 - val_loss: 0.5776 - val_accuracy: 0.9032
Epoch 415/500
104/104 [==============================] - 1s 6ms/step - loss: 1.1204e-05 -
accuracy: 1.0000 - val_loss: 0.5737 - val_accuracy: 0.9052
Epoch 416/500
104/104 [==============================] - 1s 6ms/step - loss: 1.8493e-05 -
accuracy: 1.0000 - val_loss: 0.5802 - val_accuracy: 0.9042
Epoch 417/500
104/104 [==============================] - 1s 7ms/step - loss: 2.7198e-04 -
accuracy: 0.9999 - val_loss: 0.5285 - val_accuracy: 0.9137
Epoch 418/500
104/104 [==============================] - 1s 7ms/step - loss: 1.3669e-05 -
accuracy: 1.0000 - val_loss: 0.5821 - val_accuracy: 0.9026
Epoch 419/500
104/104 [==============================] - 1s 6ms/step - loss: 1.4210e-05 -
accuracy: 1.0000 - val_loss: 0.5763 - val_accuracy: 0.9034
Epoch 420/500
104/104 [==============================] - 1s 6ms/step - loss: 1.1784e-05 -
accuracy: 1.0000 - val_loss: 0.5704 - val_accuracy: 0.9051
Epoch 421/500
104/104 [==============================] - 1s 7ms/step - loss: 1.0570e-05 -
accuracy: 1.0000 - val_loss: 0.5883 - val_accuracy: 0.9023
Epoch 422/500
104/104 [==============================] - 1s 6ms/step - loss: 1.3112e-05 -
accuracy: 1.0000 - val_loss: 0.5888 - val_accuracy: 0.9022
Epoch 423/500
104/104 [==============================] - 0s 5ms/step - loss: 9.8555e-06 -
accuracy: 1.0000 - val_loss: 0.5845 - val_accuracy: 0.9028
Epoch 424/500
104/104 [==============================] - 1s 5ms/step - loss: 1.2061e-05 -
accuracy: 1.0000 - val_loss: 0.5874 - val_accuracy: 0.9032
Epoch 425/500
104/104 [==============================] - 0s 5ms/step - loss: 4.8758e-05 -
accuracy: 1.0000 - val_loss: 0.6047 - val_accuracy: 0.8995
Epoch 426/500
104/104 [==============================] - 1s 5ms/step - loss: 3.9438e-04 -
accuracy: 0.9998 - val_loss: 0.6349 - val_accuracy: 0.8967
Epoch 427/500
104/104 [==============================] - 0s 5ms/step - loss: 5.4882e-05 -
accuracy: 1.0000 - val_loss: 0.6220 - val_accuracy: 0.8995
Epoch 428/500
104/104 [==============================] - 1s 5ms/step - loss: 5.7354e-05 -
accuracy: 1.0000 - val_loss: 0.6580 - val_accuracy: 0.8940
Epoch 429/500
104/104 [==============================] - 0s 4ms/step - loss: 1.0569e-05 -
accuracy: 1.0000 - val_loss: 0.6511 - val_accuracy: 0.8949
Epoch 430/500
104/104 [==============================] - 0s 4ms/step - loss: 1.0200e-05 -
```

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accuracy: 1.0000 - val_loss: 0.6272 - val_accuracy: 0.8992
Epoch 431/500
104/104 [==============================] - 0s 4ms/step - loss: 1.0084e-05 -
accuracy: 1.0000 - val_loss: 0.6227 - val_accuracy: 0.9007
Epoch 432/500
104/104 [==============================] - 0s 5ms/step - loss: 1.0121e-05 -
accuracy: 1.0000 - val_loss: 0.6293 - val_accuracy: 0.8987
Epoch 433/500
104/104 [==============================] - 0s 5ms/step - loss: 1.0730e-05 -
accuracy: 1.0000 - val_loss: 0.6242 - val_accuracy: 0.8984
Epoch 434/500
104/104 [==============================] - 1s 5ms/step - loss: 9.6951e-06 -
accuracy: 1.0000 - val_loss: 0.6376 - val_accuracy: 0.8964
Epoch 435/500
104/104 [==============================] - 0s 4ms/step - loss: 9.1949e-06 -
accuracy: 1.0000 - val_loss: 0.6298 - val_accuracy: 0.8983
Epoch 436/500
104/104 [==============================] - 0s 4ms/step - loss: 1.1501e-05 -
accuracy: 1.0000 - val_loss: 0.6294 - val_accuracy: 0.8989
Epoch 437/500
104/104 [==============================] - 0s 5ms/step - loss: 1.0271e-05 -
accuracy: 1.0000 - val_loss: 0.6190 - val_accuracy: 0.9001
Epoch 438/500
104/104 [==============================] - 0s 5ms/step - loss: 9.7642e-06 -
accuracy: 1.0000 - val_loss: 0.6493 - val_accuracy: 0.8940
Epoch 439/500
104/104 [==============================] - 1s 5ms/step - loss: 9.3958e-06 -
accuracy: 1.0000 - val_loss: 0.6123 - val_accuracy: 0.9005
Epoch 440/500
104/104 [==============================] - 0s 4ms/step - loss: 9.3859e-06 -
accuracy: 1.0000 - val_loss: 0.6119 - val_accuracy: 0.9003
Epoch 441/500
104/104 [==============================] - 0s 5ms/step - loss: 1.3062e-05 -
accuracy: 1.0000 - val_loss: 0.5908 - val_accuracy: 0.9049
Epoch 442/500
104/104 [==============================] - 0s 5ms/step - loss: 1.0030e-05 -
accuracy: 1.0000 - val_loss: 0.6658 - val_accuracy: 0.8904
Epoch 443/500
104/104 [==============================] - 1s 7ms/step - loss: 9.8916e-06 -
accuracy: 1.0000 - val_loss: 0.6298 - val_accuracy: 0.8978
Epoch 444/500
104/104 [==============================] - 1s 7ms/step - loss: 9.3295e-06 -
accuracy: 1.0000 - val_loss: 0.6240 - val_accuracy: 0.8985
Epoch 445/500
104/104 [==============================] - 1s 7ms/step - loss: 1.0425e-05 -
accuracy: 1.0000 - val_loss: 0.6527 - val_accuracy: 0.8931
Epoch 446/500
104/104 [==============================] - 1s 6ms/step - loss: 1.5404e-05 -
```

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accuracy: 1.0000 - val_loss: 0.8763 - val_accuracy: 0.8561
Epoch 447/500
104/104 [==============================] - 1s 6ms/step - loss: 1.4888e-05 -
accuracy: 1.0000 - val_loss: 0.6791 - val_accuracy: 0.8912
Epoch 448/500
104/104 [==============================] - 1s 6ms/step - loss: 1.0077e-05 -
accuracy: 1.0000 - val_loss: 0.6812 - val_accuracy: 0.8894
Epoch 449/500
104/104 [==============================] - 1s 6ms/step - loss: 9.4337e-06 -
accuracy: 1.0000 - val_loss: 0.6523 - val_accuracy: 0.8940
Epoch 450/500
104/104 [==============================] - 1s 7ms/step - loss: 1.0068e-04 -
accuracy: 1.0000 - val_loss: 0.6538 - val_accuracy: 0.8937
Epoch 451/500
104/104 [==============================] - 1s 7ms/step - loss: 6.0281e-05 -
accuracy: 1.0000 - val_loss: 0.5626 - val_accuracy: 0.9100
Epoch 452/500
104/104 [==============================] - 1s 7ms/step - loss: 1.5947e-05 -
accuracy: 1.0000 - val_loss: 0.5912 - val_accuracy: 0.9029
Epoch 453/500
104/104 [==============================] - 1s 6ms/step - loss: 1.1963e-05 -
accuracy: 1.0000 - val_loss: 0.5847 - val_accuracy: 0.9034
Epoch 454/500
104/104 [==============================] - 1s 5ms/step - loss: 9.9574e-06 -
accuracy: 1.0000 - val_loss: 0.5832 - val_accuracy: 0.9027
Epoch 455/500
104/104 [==============================] - 0s 5ms/step - loss: 8.0899e-06 -
accuracy: 1.0000 - val_loss: 0.5885 - val_accuracy: 0.9013
Epoch 456/500
104/104 [==============================] - 0s 5ms/step - loss: 7.9837e-05 -
accuracy: 1.0000 - val_loss: 0.5709 - val_accuracy: 0.9063
Epoch 457/500
104/104 [==============================] - 0s 4ms/step - loss: 1.2371e-05 -
accuracy: 1.0000 - val_loss: 0.5664 - val_accuracy: 0.9045
Epoch 458/500
104/104 [==============================] - 0s 5ms/step - loss: 8.3968e-06 -
accuracy: 1.0000 - val_loss: 0.5814 - val_accuracy: 0.9014
Epoch 459/500
104/104 [==============================] - 0s 4ms/step - loss: 9.4617e-06 -
accuracy: 1.0000 - val_loss: 0.5730 - val_accuracy: 0.9033
Epoch 460/500
104/104 [==============================] - 0s 5ms/step - loss: 8.3387e-06 -
accuracy: 1.0000 - val_loss: 0.5665 - val_accuracy: 0.9041
Epoch 461/500
104/104 [==============================] - 0s 5ms/step - loss: 9.3696e-06 -
accuracy: 1.0000 - val_loss: 0.5774 - val_accuracy: 0.9015
Epoch 462/500
104/104 [==============================] - 0s 4ms/step - loss: 7.5574e-06 -
```

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accuracy: 1.0000 - val_loss: 0.5751 - val_accuracy: 0.9014
Epoch 463/500
104/104 [==============================] - 0s 4ms/step - loss: 7.4894e-06 -
accuracy: 1.0000 - val_loss: 0.5736 - val_accuracy: 0.9029
Epoch 464/500
104/104 [==============================] - 1s 5ms/step - loss: 7.3899e-06 -
accuracy: 1.0000 - val_loss: 0.5546 - val_accuracy: 0.9071
Epoch 465/500
104/104 [==============================] - 0s 4ms/step - loss: 9.0954e-06 -
accuracy: 1.0000 - val_loss: 0.5653 - val_accuracy: 0.9047
Epoch 466/500
104/104 [==============================] - 0s 5ms/step - loss: 7.1716e-06 -
accuracy: 1.0000 - val_loss: 0.5693 - val_accuracy: 0.9046
Epoch 467/500
104/104 [==============================] - 0s 5ms/step - loss: 6.9268e-06 -
accuracy: 1.0000 - val_loss: 0.5893 - val_accuracy: 0.9011
Epoch 468/500
104/104 [==============================] - 0s 5ms/step - loss: 8.0179e-06 -
accuracy: 1.0000 - val_loss: 0.5836 - val_accuracy: 0.9014
Epoch 469/500
104/104 [==============================] - 0s 5ms/step - loss: 8.3290e-06 -
accuracy: 1.0000 - val_loss: 0.5857 - val_accuracy: 0.9014
Epoch 470/500
104/104 [==============================] - 0s 5ms/step - loss: 7.5237e-06 -
accuracy: 1.0000 - val_loss: 0.5936 - val_accuracy: 0.9004
Epoch 471/500
104/104 [==============================] - 0s 5ms/step - loss: 2.7372e-04 -
accuracy: 0.9999 - val_loss: 0.6407 - val_accuracy: 0.8952
Epoch 472/500
104/104 [==============================] - 0s 5ms/step - loss: 5.5701e-04 -
accuracy: 0.9998 - val_loss: 0.5947 - val_accuracy: 0.9009
Epoch 473/500
104/104 [==============================] - 0s 5ms/step - loss: 2.0903e-05 -
accuracy: 1.0000 - val_loss: 0.6195 - val_accuracy: 0.9020
Epoch 474/500
104/104 [==============================] - 1s 6ms/step - loss: 1.4028e-05 -
accuracy: 1.0000 - val_loss: 0.6072 - val_accuracy: 0.9049
Epoch 475/500
104/104 [==============================] - 1s 7ms/step - loss: 1.0064e-05 -
accuracy: 1.0000 - val_loss: 0.6334 - val_accuracy: 0.8998
Epoch 476/500
104/104 [==============================] - 1s 6ms/step - loss: 9.4393e-06 -
accuracy: 1.0000 - val_loss: 0.6464 - val_accuracy: 0.8980
Epoch 477/500
104/104 [==============================] - 1s 6ms/step - loss: 9.1097e-06 -
accuracy: 1.0000 - val_loss: 0.6370 - val_accuracy: 0.8991
Epoch 478/500
104/104 [==============================] - 1s 6ms/step - loss: 8.5989e-06 -
```

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accuracy: 1.0000 - val_loss: 0.6323 - val_accuracy: 0.8998
Epoch 479/500
104/104 [==============================] - 1s 6ms/step - loss: 8.5297e-06 -
accuracy: 1.0000 - val_loss: 0.6511 - val_accuracy: 0.8968
Epoch 480/500
104/104 [==============================] - 1s 6ms/step - loss: 7.7583e-06 -
accuracy: 1.0000 - val_loss: 0.6545 - val_accuracy: 0.8955
Epoch 481/500
104/104 [==============================] - 1s 6ms/step - loss: 9.5257e-06 -
accuracy: 1.0000 - val_loss: 0.6306 - val_accuracy: 0.8998
Epoch 482/500
104/104 [==============================] - 1s 7ms/step - loss: 7.6894e-06 -
accuracy: 1.0000 - val_loss: 0.6002 - val_accuracy: 0.9054
Epoch 483/500
104/104 [==============================] - 1s 6ms/step - loss: 9.4370e-06 -
accuracy: 1.0000 - val_loss: 0.6368 - val_accuracy: 0.8987
Epoch 484/500
104/104 [==============================] - 1s 7ms/step - loss: 7.0601e-06 -
accuracy: 1.0000 - val_loss: 0.6478 - val_accuracy: 0.8971
Epoch 485/500
104/104 [==============================] - 1s 6ms/step - loss: 8.6655e-06 -
accuracy: 1.0000 - val_loss: 0.6318 - val_accuracy: 0.8990
Epoch 486/500
104/104 [==============================] - 0s 5ms/step - loss: 7.2620e-06 -
accuracy: 1.0000 - val_loss: 0.5863 - val_accuracy: 0.9087
Epoch 487/500
104/104 [==============================] - 1s 5ms/step - loss: 1.0719e-05 -
accuracy: 1.0000 - val_loss: 0.6370 - val_accuracy: 0.9000
Epoch 488/500
104/104 [==============================] - 1s 5ms/step - loss: 7.7897e-06 -
accuracy: 1.0000 - val_loss: 0.6711 - val_accuracy: 0.8925
Epoch 489/500
104/104 [==============================] - 0s 5ms/step - loss: 6.9373e-06 -
accuracy: 1.0000 - val_loss: 0.6478 - val_accuracy: 0.8968
Epoch 490/500
104/104 [==============================] - 0s 5ms/step - loss: 7.7986e-06 -
accuracy: 1.0000 - val_loss: 0.6443 - val_accuracy: 0.8968
Epoch 491/500
104/104 [==============================] - 0s 5ms/step - loss: 6.6494e-06 -
accuracy: 1.0000 - val_loss: 0.6312 - val_accuracy: 0.8991
Epoch 492/500
104/104 [==============================] - 1s 5ms/step - loss: 7.5537e-06 -
accuracy: 1.0000 - val_loss: 0.6654 - val_accuracy: 0.8936
Epoch 493/500
104/104 [==============================] - 1s 5ms/step - loss: 6.7762e-06 -
accuracy: 1.0000 - val_loss: 0.6067 - val_accuracy: 0.9030
Epoch 494/500
104/104 [==============================] - 1s 5ms/step - loss: 6.3136e-06 -
```

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accuracy: 1.0000 - val_loss: 0.6367 - val_accuracy: 0.8972
Epoch 495/500
104/104 [==============================] - 1s 5ms/step - loss: 6.3274e-06 -
accuracy: 1.0000 - val_loss: 0.6449 - val_accuracy: 0.8952
Epoch 496/500
104/104 [==============================] - 0s 5ms/step - loss: 8.7492e-06 -
accuracy: 1.0000 - val_loss: 0.6421 - val_accuracy: 0.8955
Epoch 497/500
104/104 [==============================] - 0s 5ms/step - loss: 6.2295e-06 -
accuracy: 1.0000 - val_loss: 0.6412 - val_accuracy: 0.8961
Epoch 498/500
104/104 [==============================] - 0s 5ms/step - loss: 5.7883e-06 -
accuracy: 1.0000 - val_loss: 0.6320 - val_accuracy: 0.8971
Epoch 499/500
104/104 [==============================] - 1s 5ms/step - loss: 6.8619e-06 -
accuracy: 1.0000 - val_loss: 0.5770 - val_accuracy: 0.9072
Epoch 500/500
104/104 [==============================] - 1s 5ms/step - loss: 6.2861e-06 -
accuracy: 1.0000 - val_loss: 0.5987 - val_accuracy: 0.9034
466/466 [==============================] - 1s 3ms/step - loss: 0.1783 -
accuracy: 0.9710
Epoch 1/500
52/52 [==============================] - 2s 11ms/step - loss: 1.1445 - accuracy:
0.6402 - val_loss: 2.0175 - val_accuracy: 0.2973
Epoch 2/500
52/52 [==============================] - 0s 7ms/step - loss: 0.5350 - accuracy:
0.8675 - val_loss: 1.3981 - val_accuracy: 0.5001
Epoch 3/500
52/52 [==============================] - 0s 7ms/step - loss: 0.3618 - accuracy:
0.9245 - val_loss: 1.1627 - val_accuracy: 0.5723
Epoch 4/500
52/52 [==============================] - 0s 7ms/step - loss: 0.2774 - accuracy:
0.9436 - val_loss: 1.0332 - val_accuracy: 0.6181
Epoch 5/500
52/52 [==============================] - 0s 6ms/step - loss: 0.2263 - accuracy:
0.9538 - val_loss: 0.9956 - val_accuracy: 0.6371
Epoch 6/500
52/52 [==============================] - 0s 6ms/step - loss: 0.1914 - accuracy:
0.9600 - val_loss: 0.9194 - val_accuracy: 0.6669
Epoch 7/500
52/52 [==============================] - 0s 8ms/step - loss: 0.1652 - accuracy:
0.9653 - val_loss: 0.8399 - val_accuracy: 0.6954
Epoch 8/500
52/52 [==============================] - 0s 7ms/step - loss: 0.1450 - accuracy:
0.9687 - val_loss: 0.8362 - val_accuracy: 0.7008
Epoch 9/500
52/52 [==============================] - 0s 6ms/step - loss: 0.1289 - accuracy:
0.9723 - val_loss: 0.7740 - val_accuracy: 0.7224
```

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Epoch 10/500
52/52 [==============================] - 0s 6ms/step - loss: 0.1157 - accuracy:
0.9748 - val_loss: 0.7583 - val_accuracy: 0.7288
Epoch 11/500
52/52 [==============================] - 0s 6ms/step - loss: 0.1049 - accuracy:
0.9771 - val_loss: 0.7339 - val_accuracy: 0.7384
Epoch 12/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0955 - accuracy:
0.9788 - val_loss: 0.6398 - val_accuracy: 0.7620
Epoch 13/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0879 - accuracy:
0.9808 - val_loss: 0.6826 - val_accuracy: 0.7537
Epoch 14/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0813 - accuracy:
0.9825 - val_loss: 0.6861 - val_accuracy: 0.7547
Epoch 15/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0756 - accuracy:
0.9834 - val_loss: 0.6201 - val_accuracy: 0.7722
Epoch 16/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0705 - accuracy:
0.9841 - val_loss: 0.6398 - val_accuracy: 0.7691
Epoch 17/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0660 - accuracy:
0.9853 - val_loss: 0.6025 - val_accuracy: 0.7789
Epoch 18/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0621 - accuracy:
0.9862 - val_loss: 0.4784 - val_accuracy: 0.8089
Epoch 19/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0587 - accuracy:
0.9872 - val_loss: 0.5693 - val_accuracy: 0.7894
Epoch 20/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0555 - accuracy:
0.9875 - val_loss: 0.5763 - val_accuracy: 0.7890
Epoch 21/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0527 - accuracy:
0.9880 - val_loss: 0.5560 - val_accuracy: 0.7934
Epoch 22/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0500 - accuracy:
0.9886 - val_loss: 0.4847 - val_accuracy: 0.8122
Epoch 23/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0476 - accuracy:
0.9889 - val_loss: 0.5049 - val_accuracy: 0.8076
Epoch 24/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0455 - accuracy:
0.9896 - val_loss: 0.4188 - val_accuracy: 0.8333
Epoch 25/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0434 - accuracy:
0.9899 - val_loss: 0.5211 - val_accuracy: 0.8068
```

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Epoch 26/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0416 - accuracy:
0.9904 - val_loss: 0.4210 - val_accuracy: 0.8345
Epoch 27/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0398 - accuracy:
0.9910 - val_loss: 0.4988 - val_accuracy: 0.8131
Epoch 28/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0381 - accuracy:
0.9911 - val_loss: 0.4378 - val_accuracy: 0.8334
Epoch 29/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0366 - accuracy:
0.9914 - val_loss: 0.4213 - val_accuracy: 0.8374
Epoch 30/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0352 - accuracy:
0.9918 - val_loss: 0.4327 - val_accuracy: 0.8358
Epoch 31/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0337 - accuracy:
0.9919 - val_loss: 0.3502 - val_accuracy: 0.8577
Epoch 32/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0325 - accuracy:
0.9925 - val_loss: 0.4573 - val_accuracy: 0.8308
Epoch 33/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0314 - accuracy:
0.9924 - val_loss: 0.4787 - val_accuracy: 0.8262
Epoch 34/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0301 - accuracy:
0.9929 - val_loss: 0.3699 - val_accuracy: 0.8551
Epoch 35/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0291 - accuracy:
0.9931 - val_loss: 0.3466 - val_accuracy: 0.8614
Epoch 36/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0280 - accuracy:
0.9933 - val_loss: 0.4219 - val_accuracy: 0.8428
Epoch 37/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0271 - accuracy:
0.9937 - val_loss: 0.3802 - val_accuracy: 0.8539
Epoch 38/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0262 - accuracy:
0.9939 - val_loss: 0.3447 - val_accuracy: 0.8652
Epoch 39/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0252 - accuracy:
0.9941 - val_loss: 0.3477 - val_accuracy: 0.8647
Epoch 40/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0245 - accuracy:
0.9943 - val_loss: 0.3775 - val_accuracy: 0.8561
Epoch 41/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0237 - accuracy:
0.9946 - val_loss: 0.3421 - val_accuracy: 0.8680
```

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Epoch 42/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0231 - accuracy:
0.9945 - val_loss: 0.3972 - val_accuracy: 0.8517
Epoch 43/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0223 - accuracy:
0.9949 - val_loss: 0.3992 - val_accuracy: 0.8523
Epoch 44/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0216 - accuracy:
0.9950 - val_loss: 0.3098 - val_accuracy: 0.8799
Epoch 45/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0210 - accuracy:
0.9955 - val_loss: 0.3650 - val_accuracy: 0.8636
Epoch 46/500
52/52 [==============================] - 0s 10ms/step - loss: 0.0204 - accuracy:
0.9954 - val_loss: 0.2497 - val_accuracy: 0.8998
Epoch 47/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0198 - accuracy:
0.9958 - val_loss: 0.2720 - val_accuracy: 0.8917
Epoch 48/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0192 - accuracy:
0.9959 - val_loss: 0.3431 - val_accuracy: 0.8722
Epoch 49/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0187 - accuracy:
0.9958 - val_loss: 0.2617 - val_accuracy: 0.8968
Epoch 50/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0182 - accuracy:
0.9961 - val_loss: 0.2654 - val_accuracy: 0.8962
Epoch 51/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0179 - accuracy:
0.9960 - val_loss: 0.2825 - val_accuracy: 0.8907
Epoch 52/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0175 - accuracy:
0.9960 - val_loss: 0.2814 - val_accuracy: 0.8917
Epoch 53/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0169 - accuracy:
0.9961 - val_loss: 0.2962 - val_accuracy: 0.8878
Epoch 54/500
52/52 [==============================] - 0s 9ms/step - loss: 0.0163 - accuracy:
0.9965 - val_loss: 0.2803 - val_accuracy: 0.8927
Epoch 55/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0159 - accuracy:
0.9965 - val_loss: 0.2356 - val_accuracy: 0.9065
Epoch 56/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0155 - accuracy:
0.9967 - val_loss: 0.3584 - val_accuracy: 0.8716
Epoch 57/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0151 - accuracy:
0.9967 - val_loss: 0.2979 - val_accuracy: 0.8891
```

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Epoch 58/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0148 - accuracy:
0.9968 - val_loss: 0.3521 - val_accuracy: 0.8744
Epoch 59/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0145 - accuracy:
0.9967 - val_loss: 0.3124 - val_accuracy: 0.8855
Epoch 60/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0140 - accuracy:
0.9970 - val_loss: 0.2492 - val_accuracy: 0.9045
Epoch 61/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0137 - accuracy:
0.9970 - val_loss: 0.2913 - val_accuracy: 0.8922
Epoch 62/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0134 - accuracy:
0.9970 - val_loss: 0.2887 - val_accuracy: 0.8923
Epoch 63/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0130 - accuracy:
0.9972 - val_loss: 0.1948 - val_accuracy: 0.9234
Epoch 64/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0129 - accuracy:
0.9973 - val_loss: 0.3106 - val_accuracy: 0.8886
Epoch 65/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0125 - accuracy:
0.9973 - val_loss: 0.2142 - val_accuracy: 0.9168
Epoch 66/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0121 - accuracy:
0.9974 - val_loss: 0.2833 - val_accuracy: 0.8966
Epoch 67/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0118 - accuracy:
0.9975 - val_loss: 0.2544 - val_accuracy: 0.9040
Epoch 68/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0117 - accuracy:
0.9975 - val_loss: 0.1977 - val_accuracy: 0.9229
Epoch 69/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0115 - accuracy:
0.9976 - val_loss: 0.2263 - val_accuracy: 0.9134
Epoch 70/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0112 - accuracy:
0.9978 - val_loss: 0.2427 - val_accuracy: 0.9083
Epoch 71/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0108 - accuracy:
0.9978 - val_loss: 0.2499 - val_accuracy: 0.9058
Epoch 72/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0106 - accuracy:
0.9980 - val_loss: 0.2062 - val_accuracy: 0.9192
Epoch 73/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0104 - accuracy:
0.9977 - val_loss: 0.2257 - val_accuracy: 0.9142
```

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Epoch 74/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0101 - accuracy:
0.9979 - val_loss: 0.2032 - val_accuracy: 0.9206
Epoch 75/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0099 - accuracy:
0.9979 - val_loss: 0.2535 - val_accuracy: 0.9057
Epoch 76/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0097 - accuracy:
0.9980 - val_loss: 0.1735 - val_accuracy: 0.9293
Epoch 77/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0096 - accuracy:
0.9981 - val_loss: 0.2087 - val_accuracy: 0.9189
Epoch 78/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0093 - accuracy:
0.9981 - val_loss: 0.2423 - val_accuracy: 0.9101
Epoch 79/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0091 - accuracy:
0.9982 - val_loss: 0.2770 - val_accuracy: 0.9004
Epoch 80/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0089 - accuracy:
0.9984 - val_loss: 0.2339 - val_accuracy: 0.9126
Epoch 81/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0088 - accuracy:
0.9981 - val_loss: 0.1990 - val_accuracy: 0.9219
Epoch 82/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0086 - accuracy:
0.9982 - val_loss: 0.2738 - val_accuracy: 0.9016
Epoch 83/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0083 - accuracy:
0.9983 - val_loss: 0.2331 - val_accuracy: 0.9125
Epoch 84/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0083 - accuracy:
0.9983 - val_loss: 0.2051 - val_accuracy: 0.9202
Epoch 85/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0080 - accuracy:
0.9984 - val_loss: 0.2327 - val_accuracy: 0.9129
Epoch 86/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0079 - accuracy:
0.9984 - val_loss: 0.2606 - val_accuracy: 0.9065
Epoch 87/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0078 - accuracy:
0.9984 - val_loss: 0.2423 - val_accuracy: 0.9109
Epoch 88/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0076 - accuracy:
0.9984 - val_loss: 0.2371 - val_accuracy: 0.9125
Epoch 89/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0075 - accuracy:
0.9984 - val_loss: 0.1952 - val_accuracy: 0.9256
```

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Epoch 90/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0072 - accuracy:
0.9985 - val_loss: 0.2059 - val_accuracy: 0.9217
Epoch 91/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0072 - accuracy:
0.9986 - val_loss: 0.2301 - val_accuracy: 0.9152
Epoch 92/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0070 - accuracy:
0.9986 - val_loss: 0.2502 - val_accuracy: 0.9093
Epoch 93/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0069 - accuracy:
0.9985 - val_loss: 0.2929 - val_accuracy: 0.8992
Epoch 94/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0068 - accuracy:
0.9987 - val_loss: 0.2735 - val_accuracy: 0.9035
Epoch 95/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0067 - accuracy:
0.9987 - val_loss: 0.1791 - val_accuracy: 0.9331
Epoch 96/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0065 - accuracy:
0.9986 - val_loss: 0.2652 - val_accuracy: 0.9060
Epoch 97/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0065 - accuracy:
0.9986 - val_loss: 0.1751 - val_accuracy: 0.9362
Epoch 98/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0063 - accuracy:
0.9986 - val_loss: 0.1663 - val_accuracy: 0.9407
Epoch 99/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0062 - accuracy:
0.9987 - val_loss: 0.2583 - val_accuracy: 0.9085
Epoch 100/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0059 - accuracy:
0.9988 - val_loss: 0.2003 - val_accuracy: 0.9275
Epoch 101/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0058 - accuracy:
0.9988 - val_loss: 0.3679 - val_accuracy: 0.8831
Epoch 102/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0059 - accuracy:
0.9987 - val_loss: 0.2502 - val_accuracy: 0.9129
Epoch 103/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0056 - accuracy:
0.9988 - val_loss: 0.1897 - val_accuracy: 0.9334
Epoch 104/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0056 - accuracy:
0.9988 - val_loss: 0.4622 - val_accuracy: 0.8603
Epoch 105/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0056 - accuracy:
0.9989 - val_loss: 0.1882 - val_accuracy: 0.9328
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Epoch 106/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0055 - accuracy:
0.9989 - val_loss: 0.2451 - val_accuracy: 0.9152
Epoch 107/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0052 - accuracy:
0.9990 - val_loss: 0.2393 - val_accuracy: 0.9173
Epoch 108/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0051 - accuracy:
0.9989 - val_loss: 0.2509 - val_accuracy: 0.9146
Epoch 109/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0050 - accuracy:
0.9990 - val_loss: 0.2701 - val_accuracy: 0.9091
Epoch 110/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0049 - accuracy:
0.9991 - val_loss: 0.3166 - val_accuracy: 0.8972
Epoch 111/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0049 - accuracy:
0.9990 - val_loss: 0.2558 - val_accuracy: 0.9136
Epoch 112/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0048 - accuracy:
0.9992 - val_loss: 0.2433 - val_accuracy: 0.9183
Epoch 113/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0047 - accuracy:
0.9990 - val_loss: 0.2538 - val_accuracy: 0.9153
Epoch 114/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0048 - accuracy:
0.9991 - val_loss: 0.2621 - val_accuracy: 0.9129
Epoch 115/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0047 - accuracy:
0.9990 - val_loss: 0.2076 - val_accuracy: 0.9329
Epoch 116/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0045 - accuracy:
0.9992 - val_loss: 0.2284 - val_accuracy: 0.9250
Epoch 117/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0044 - accuracy:
0.9992 - val_loss: 0.2627 - val_accuracy: 0.9137
Epoch 118/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0043 - accuracy:
0.9992 - val_loss: 0.2261 - val_accuracy: 0.9280
Epoch 119/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0041 - accuracy:
0.9992 - val_loss: 0.3158 - val_accuracy: 0.8993
Epoch 120/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0041 - accuracy:
0.9993 - val_loss: 0.2610 - val_accuracy: 0.9153
Epoch 121/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0041 - accuracy:
0.9992 - val_loss: 0.2227 - val_accuracy: 0.9288
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Epoch 122/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0042 - accuracy:
0.9992 - val_loss: 0.2627 - val_accuracy: 0.9156
Epoch 123/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0040 - accuracy:
0.9991 - val_loss: 0.2659 - val_accuracy: 0.9152
Epoch 124/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0039 - accuracy:
0.9993 - val_loss: 0.2722 - val_accuracy: 0.9136
Epoch 125/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0038 - accuracy:
0.9992 - val_loss: 0.3157 - val_accuracy: 0.9014
Epoch 126/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0038 - accuracy:
0.9992 - val_loss: 0.2414 - val_accuracy: 0.9257
Epoch 127/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0037 - accuracy:
0.9992 - val_loss: 0.3227 - val_accuracy: 0.9007
Epoch 128/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0036 - accuracy:
0.9993 - val_loss: 0.2574 - val_accuracy: 0.9232
Epoch 129/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0036 - accuracy:
0.9994 - val_loss: 0.2642 - val_accuracy: 0.9214
Epoch 130/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0035 - accuracy:
0.9994 - val_loss: 0.3500 - val_accuracy: 0.8965
Epoch 131/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0035 - accuracy:
0.9993 - val_loss: 0.3192 - val_accuracy: 0.9044
Epoch 132/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0034 - accuracy:
0.9994 - val_loss: 0.3616 - val_accuracy: 0.8932
Epoch 133/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0034 - accuracy:
0.9994 - val_loss: 0.2757 - val_accuracy: 0.9171
Epoch 134/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0032 - accuracy:
0.9994 - val_loss: 0.3165 - val_accuracy: 0.9053
Epoch 135/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0031 - accuracy:
0.9994 - val_loss: 0.2920 - val_accuracy: 0.9134
Epoch 136/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0030 - accuracy:
0.9995 - val_loss: 0.3000 - val_accuracy: 0.9115
Epoch 137/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0033 - accuracy:
0.9994 - val_loss: 0.3195 - val_accuracy: 0.9066
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Epoch 138/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0031 - accuracy:
0.9995 - val_loss: 0.3178 - val_accuracy: 0.9071
Epoch 139/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0030 - accuracy:
0.9995 - val_loss: 0.3268 - val_accuracy: 0.9050
Epoch 140/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0030 - accuracy:
0.9994 - val_loss: 0.2921 - val_accuracy: 0.9158
Epoch 141/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0028 - accuracy:
0.9996 - val_loss: 0.2608 - val_accuracy: 0.9271
Epoch 142/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0030 - accuracy:
0.9994 - val_loss: 0.2627 - val_accuracy: 0.9276
Epoch 143/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0028 - accuracy:
0.9994 - val_loss: 0.3338 - val_accuracy: 0.9039
Epoch 144/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0028 - accuracy:
0.9996 - val_loss: 0.2712 - val_accuracy: 0.9238
Epoch 145/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0026 - accuracy:
0.9995 - val_loss: 0.2465 - val_accuracy: 0.9353
Epoch 146/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0026 - accuracy:
0.9995 - val_loss: 0.2501 - val_accuracy: 0.9337
Epoch 147/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0027 - accuracy:
0.9994 - val_loss: 0.3671 - val_accuracy: 0.8963
Epoch 148/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0026 - accuracy:
0.9995 - val_loss: 0.2752 - val_accuracy: 0.9244
Epoch 149/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0024 - accuracy:
0.9996 - val_loss: 0.2867 - val_accuracy: 0.9210
Epoch 150/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0024 - accuracy:
0.9996 - val_loss: 0.2936 - val_accuracy: 0.9194
Epoch 151/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0024 - accuracy:
0.9996 - val_loss: 0.3166 - val_accuracy: 0.9118
Epoch 152/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0022 - accuracy:
0.9996 - val_loss: 0.3147 - val_accuracy: 0.9120
Epoch 153/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0023 - accuracy:
0.9996 - val_loss: 0.2667 - val_accuracy: 0.9297
```

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Epoch 154/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0022 - accuracy:
0.9996 - val_loss: 0.2923 - val_accuracy: 0.9212
Epoch 155/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0022 - accuracy:
0.9996 - val_loss: 0.3060 - val_accuracy: 0.9167
Epoch 156/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0023 - accuracy:
0.9996 - val_loss: 0.3172 - val_accuracy: 0.9136
Epoch 157/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0022 - accuracy:
0.9996 - val_loss: 0.2734 - val_accuracy: 0.9315
Epoch 158/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0021 - accuracy:
0.9996 - val_loss: 0.3077 - val_accuracy: 0.9198
Epoch 159/500
52/52 [==============================] - 0s 8ms/step - loss: 0.0024 - accuracy:
0.9995 - val_loss: 0.3514 - val_accuracy: 0.9062
Epoch 160/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0024 - accuracy:
0.9995 - val_loss: 0.2708 - val_accuracy: 0.9322
Epoch 161/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0021 - accuracy:
0.9996 - val_loss: 0.3150 - val_accuracy: 0.9172
Epoch 162/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0019 - accuracy:
0.9997 - val_loss: 0.3331 - val_accuracy: 0.9118
Epoch 163/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0020 - accuracy:
0.9997 - val_loss: 0.3677 - val_accuracy: 0.9025
Epoch 164/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0019 - accuracy:
0.9997 - val_loss: 0.3080 - val_accuracy: 0.9226
Epoch 165/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0018 - accuracy:
0.9997 - val_loss: 0.3390 - val_accuracy: 0.9109
Epoch 166/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0019 - accuracy:
0.9997 - val_loss: 0.3205 - val_accuracy: 0.9186
Epoch 167/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0018 - accuracy:
0.9997 - val_loss: 0.3020 - val_accuracy: 0.9254
Epoch 168/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0018 - accuracy:
0.9998 - val_loss: 0.3371 - val_accuracy: 0.9115
Epoch 169/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0018 - accuracy:
0.9997 - val_loss: 0.2806 - val_accuracy: 0.9303
```

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Epoch 170/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0017 - accuracy:
0.9997 - val_loss: 0.3219 - val_accuracy: 0.9186
Epoch 171/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0016 - accuracy:
0.9997 - val_loss: 0.3144 - val_accuracy: 0.9233
Epoch 172/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0017 - accuracy:
0.9997 - val_loss: 0.3476 - val_accuracy: 0.9100
Epoch 173/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0017 - accuracy:
0.9998 - val_loss: 0.2866 - val_accuracy: 0.9311
Epoch 174/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.2884 - val_accuracy: 0.9298
Epoch 175/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3398 - val_accuracy: 0.9137
Epoch 176/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0016 - accuracy:
0.9997 - val_loss: 0.3762 - val_accuracy: 0.9035
Epoch 177/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3319 - val_accuracy: 0.9177
Epoch 178/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0016 - accuracy:
0.9997 - val_loss: 0.2910 - val_accuracy: 0.9300
Epoch 179/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3272 - val_accuracy: 0.9183
Epoch 180/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0017 - accuracy:
0.9998 - val_loss: 0.2913 - val_accuracy: 0.9287
Epoch 181/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.2880 - val_accuracy: 0.9289
Epoch 182/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0015 - accuracy:
0.9997 - val_loss: 0.2791 - val_accuracy: 0.9337
Epoch 183/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.2872 - val_accuracy: 0.9321
Epoch 184/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0017 - accuracy:
0.9996 - val_loss: 0.3553 - val_accuracy: 0.9105
Epoch 185/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0015 - accuracy:
0.9997 - val_loss: 0.3346 - val_accuracy: 0.9164
```

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Epoch 186/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3302 - val_accuracy: 0.9186
Epoch 187/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0013 - accuracy:
0.9998 - val_loss: 0.3671 - val_accuracy: 0.9072
Epoch 188/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3241 - val_accuracy: 0.9208
Epoch 189/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.3034 - val_accuracy: 0.9288
Epoch 190/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.3388 - val_accuracy: 0.9181
Epoch 191/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.3257 - val_accuracy: 0.9219
Epoch 192/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.3932 - val_accuracy: 0.9008
Epoch 193/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.3052 - val_accuracy: 0.9295
Epoch 194/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.3909 - val_accuracy: 0.9020
Epoch 195/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.3619 - val_accuracy: 0.9114
Epoch 196/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0013 - accuracy:
0.9998 - val_loss: 0.4055 - val_accuracy: 0.8992
Epoch 197/500
52/52 [==============================] - 0s 6ms/step - loss: 0.0011 - accuracy:
0.9998 - val_loss: 0.3002 - val_accuracy: 0.9322
Epoch 198/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0011 - accuracy:
0.9999 - val_loss: 0.3409 - val_accuracy: 0.9183
Epoch 199/500
52/52 [==============================] - 0s 5ms/step - loss: 0.0010 - accuracy:
0.9999 - val_loss: 0.3149 - val_accuracy: 0.9277
Epoch 200/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0010 - accuracy:
0.9998 - val_loss: 0.3684 - val_accuracy: 0.9113
Epoch 201/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0010 - accuracy:
0.9998 - val_loss: 0.3537 - val_accuracy: 0.9168
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Epoch 202/500
52/52 [==============================] - 0s 7ms/step - loss: 9.9624e-04 -
accuracy: 0.9999 - val_loss: 0.3481 - val_accuracy: 0.9189
Epoch 203/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0010 - accuracy:
0.9999 - val_loss: 0.3199 - val_accuracy: 0.9278
Epoch 204/500
52/52 [==============================] - 0s 9ms/step - loss: 9.6717e-04 -
accuracy: 0.9999 - val_loss: 0.3452 - val_accuracy: 0.9207
Epoch 205/500
52/52 [==============================] - 0s 7ms/step - loss: 9.8527e-04 -
accuracy: 0.9998 - val_loss: 0.3476 - val_accuracy: 0.9205
Epoch 206/500
52/52 [==============================] - 0s 7ms/step - loss: 0.0011 - accuracy:
0.9998 - val_loss: 0.3375 - val_accuracy: 0.9220
Epoch 207/500
52/52 [==============================] - 0s 7ms/step - loss: 9.5695e-04 -
accuracy: 0.9999 - val_loss: 0.3167 - val_accuracy: 0.9298
Epoch 208/500
52/52 [==============================] - 0s 7ms/step - loss: 9.7419e-04 -
accuracy: 0.9999 - val_loss: 0.2953 - val_accuracy: 0.9352
Epoch 209/500
52/52 [==============================] - 0s 8ms/step - loss: 8.9949e-04 -
accuracy: 0.9999 - val_loss: 0.3360 - val_accuracy: 0.9237
Epoch 210/500
52/52 [==============================] - 0s 9ms/step - loss: 9.4113e-04 -
accuracy: 0.9999 - val_loss: 0.3245 - val_accuracy: 0.9284
Epoch 211/500
52/52 [==============================] - 0s 7ms/step - loss: 8.6356e-04 -
accuracy: 0.9999 - val_loss: 0.3501 - val_accuracy: 0.9189
Epoch 212/500
52/52 [==============================] - 0s 7ms/step - loss: 8.1315e-04 -
accuracy: 0.9999 - val_loss: 0.3723 - val_accuracy: 0.9131
Epoch 213/500
52/52 [==============================] - 0s 7ms/step - loss: 8.8808e-04 -
accuracy: 0.9999 - val_loss: 0.3212 - val_accuracy: 0.9269
Epoch 214/500
52/52 [==============================] - 0s 7ms/step - loss: 8.9075e-04 -
accuracy: 0.9999 - val_loss: 0.3716 - val_accuracy: 0.9120
Epoch 215/500
52/52 [==============================] - 0s 7ms/step - loss: 9.6224e-04 -
accuracy: 0.9999 - val_loss: 0.3114 - val_accuracy: 0.9307
Epoch 216/500
52/52 [==============================] - 0s 7ms/step - loss: 8.1477e-04 -
accuracy: 0.9999 - val_loss: 0.3249 - val_accuracy: 0.9268
Epoch 217/500
52/52 [==============================] - 0s 8ms/step - loss: 7.9543e-04 -
accuracy: 0.9999 - val_loss: 0.3260 - val_accuracy: 0.9278
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Epoch 218/500
52/52 [==============================] - 0s 7ms/step - loss: 7.9266e-04 -
accuracy: 0.9999 - val_loss: 0.3685 - val_accuracy: 0.9150
Epoch 219/500
52/52 [==============================] - 0s 6ms/step - loss: 7.8436e-04 -
accuracy: 0.9999 - val_loss: 0.3638 - val_accuracy: 0.9158
Epoch 220/500
52/52 [==============================] - 0s 6ms/step - loss: 8.6153e-04 -
accuracy: 0.9998 - val_loss: 0.3226 - val_accuracy: 0.9288
Epoch 221/500
52/52 [==============================] - 0s 6ms/step - loss: 7.8084e-04 -
accuracy: 0.9999 - val_loss: 0.3541 - val_accuracy: 0.9205
Epoch 222/500
52/52 [==============================] - 0s 6ms/step - loss: 7.5347e-04 -
accuracy: 0.9999 - val_loss: 0.3908 - val_accuracy: 0.9097
Epoch 223/500
52/52 [==============================] - 0s 6ms/step - loss: 7.4507e-04 -
accuracy: 0.9999 - val_loss: 0.3383 - val_accuracy: 0.9261
Epoch 224/500
52/52 [==============================] - 0s 6ms/step - loss: 6.6603e-04 -
accuracy: 1.0000 - val_loss: 0.3848 - val_accuracy: 0.9093
Epoch 225/500
52/52 [==============================] - 0s 6ms/step - loss: 8.6994e-04 -
accuracy: 0.9999 - val_loss: 0.3246 - val_accuracy: 0.9288
Epoch 226/500
52/52 [==============================] - 0s 5ms/step - loss: 7.6481e-04 -
accuracy: 0.9999 - val_loss: 0.3218 - val_accuracy: 0.9294
Epoch 227/500
52/52 [==============================] - 0s 6ms/step - loss: 6.8176e-04 -
accuracy: 0.9999 - val_loss: 0.3379 - val_accuracy: 0.9246
Epoch 228/500
52/52 [==============================] - 0s 6ms/step - loss: 6.4247e-04 -
accuracy: 0.9999 - val_loss: 0.3111 - val_accuracy: 0.9320
Epoch 229/500
52/52 [==============================] - 0s 6ms/step - loss: 6.8495e-04 -
accuracy: 0.9999 - val_loss: 0.3643 - val_accuracy: 0.9174
Epoch 230/500
52/52 [==============================] - 0s 6ms/step - loss: 6.7153e-04 -
accuracy: 0.9999 - val_loss: 0.3430 - val_accuracy: 0.9234
Epoch 231/500
52/52 [==============================] - 0s 6ms/step - loss: 6.4676e-04 -
accuracy: 0.9999 - val_loss: 0.3598 - val_accuracy: 0.9186
Epoch 232/500
52/52 [==============================] - 0s 5ms/step - loss: 7.0529e-04 -
accuracy: 0.9999 - val_loss: 0.3487 - val_accuracy: 0.9223
Epoch 233/500
52/52 [==============================] - 0s 6ms/step - loss: 5.9903e-04 -
accuracy: 0.9999 - val_loss: 0.4059 - val_accuracy: 0.9032
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Epoch 234/500
52/52 [==============================] - 0s 5ms/step - loss: 6.3047e-04 -
accuracy: 0.9999 - val_loss: 0.2933 - val_accuracy: 0.9363
Epoch 235/500
52/52 [==============================] - 0s 5ms/step - loss: 5.7788e-04 -
accuracy: 0.9999 - val_loss: 0.3441 - val_accuracy: 0.9239
Epoch 236/500
52/52 [==============================] - 0s 5ms/step - loss: 6.0335e-04 -
accuracy: 0.9999 - val_loss: 0.3885 - val_accuracy: 0.9102
Epoch 237/500
52/52 [==============================] - 0s 6ms/step - loss: 6.1030e-04 -
accuracy: 0.9999 - val_loss: 0.3228 - val_accuracy: 0.9308
Epoch 238/500
52/52 [==============================] - 0s 5ms/step - loss: 5.8924e-04 -
accuracy: 0.9999 - val_loss: 0.3752 - val_accuracy: 0.9121
Epoch 239/500
52/52 [==============================] - 0s 5ms/step - loss: 5.6617e-04 -
accuracy: 0.9999 - val_loss: 0.3486 - val_accuracy: 0.9220
Epoch 240/500
52/52 [==============================] - 0s 6ms/step - loss: 5.4226e-04 -
accuracy: 0.9999 - val_loss: 0.3167 - val_accuracy: 0.9325
Epoch 241/500
52/52 [==============================] - 0s 5ms/step - loss: 5.6736e-04 -
accuracy: 0.9999 - val_loss: 0.3556 - val_accuracy: 0.9209
Epoch 242/500
52/52 [==============================] - 0s 5ms/step - loss: 5.1698e-04 -
accuracy: 0.9999 - val_loss: 0.3468 - val_accuracy: 0.9230
Epoch 243/500
52/52 [==============================] - 0s 6ms/step - loss: 5.0220e-04 -
accuracy: 0.9999 - val_loss: 0.3450 - val_accuracy: 0.9228
Epoch 244/500
52/52 [==============================] - 0s 6ms/step - loss: 5.0080e-04 -
accuracy: 0.9999 - val_loss: 0.3734 - val_accuracy: 0.9132
Epoch 245/500
52/52 [==============================] - 0s 6ms/step - loss: 5.4798e-04 -
accuracy: 0.9999 - val_loss: 0.3201 - val_accuracy: 0.9291
Epoch 246/500
52/52 [==============================] - 0s 6ms/step - loss: 5.9015e-04 -
accuracy: 0.9999 - val_loss: 0.3067 - val_accuracy: 0.9320
Epoch 247/500
52/52 [==============================] - 0s 6ms/step - loss: 5.0942e-04 -
accuracy: 1.0000 - val_loss: 0.3015 - val_accuracy: 0.9348
Epoch 248/500
52/52 [==============================] - 0s 5ms/step - loss: 4.8627e-04 -
accuracy: 0.9999 - val_loss: 0.3624 - val_accuracy: 0.9171
Epoch 249/500
52/52 [==============================] - 0s 6ms/step - loss: 4.9285e-04 -
accuracy: 1.0000 - val_loss: 0.3311 - val_accuracy: 0.9272
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Epoch 250/500
52/52 [==============================] - 0s 6ms/step - loss: 5.3252e-04 -
accuracy: 0.9999 - val_loss: 0.3048 - val_accuracy: 0.9349
Epoch 251/500
52/52 [==============================] - 0s 7ms/step - loss: 4.8669e-04 -
accuracy: 1.0000 - val_loss: 0.3180 - val_accuracy: 0.9308
Epoch 252/500
52/52 [==============================] - 0s 7ms/step - loss: 6.8845e-04 -
accuracy: 0.9999 - val_loss: 0.4070 - val_accuracy: 0.9036
Epoch 253/500
52/52 [==============================] - 0s 7ms/step - loss: 5.0125e-04 -
accuracy: 0.9999 - val_loss: 0.3303 - val_accuracy: 0.9265
Epoch 254/500
52/52 [==============================] - 0s 8ms/step - loss: 4.2548e-04 -
accuracy: 0.9999 - val_loss: 0.3392 - val_accuracy: 0.9248
Epoch 255/500
52/52 [==============================] - 0s 9ms/step - loss: 4.6074e-04 -
accuracy: 0.9999 - val_loss: 0.3265 - val_accuracy: 0.9289
Epoch 256/500
52/52 [==============================] - 0s 7ms/step - loss: 4.8231e-04 -
accuracy: 1.0000 - val_loss: 0.3606 - val_accuracy: 0.9177
Epoch 257/500
52/52 [==============================] - 0s 7ms/step - loss: 4.4749e-04 -
accuracy: 0.9999 - val_loss: 0.3203 - val_accuracy: 0.9298
Epoch 258/500
52/52 [==============================] - 0s 7ms/step - loss: 4.7051e-04 -
accuracy: 1.0000 - val_loss: 0.3541 - val_accuracy: 0.9180
Epoch 259/500
52/52 [==============================] - 0s 7ms/step - loss: 4.6999e-04 -
accuracy: 0.9999 - val_loss: 0.3191 - val_accuracy: 0.9299
Epoch 260/500
52/52 [==============================] - 0s 9ms/step - loss: 6.7800e-04 -
accuracy: 0.9998 - val_loss: 0.3121 - val_accuracy: 0.9297
Epoch 261/500
52/52 [==============================] - 0s 8ms/step - loss: 4.6755e-04 -
accuracy: 0.9999 - val_loss: 0.3348 - val_accuracy: 0.9245
Epoch 262/500
52/52 [==============================] - 0s 9ms/step - loss: 3.9426e-04 -
accuracy: 0.9999 - val_loss: 0.3197 - val_accuracy: 0.9291
Epoch 263/500
52/52 [==============================] - 0s 7ms/step - loss: 4.0018e-04 -
accuracy: 0.9999 - val_loss: 0.3526 - val_accuracy: 0.9213
Epoch 264/500
52/52 [==============================] - 0s 7ms/step - loss: 4.0394e-04 -
accuracy: 1.0000 - val_loss: 0.3416 - val_accuracy: 0.9254
Epoch 265/500
52/52 [==============================] - 0s 8ms/step - loss: 4.0059e-04 -
accuracy: 0.9999 - val_loss: 0.3285 - val_accuracy: 0.9274
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Epoch 266/500
52/52 [==============================] - 0s 8ms/step - loss: 3.8875e-04 -
accuracy: 0.9999 - val_loss: 0.3149 - val_accuracy: 0.9307
Epoch 267/500
52/52 [==============================] - 0s 7ms/step - loss: 3.7335e-04 -
accuracy: 1.0000 - val_loss: 0.3515 - val_accuracy: 0.9245
Epoch 268/500
52/52 [==============================] - 0s 7ms/step - loss: 4.2083e-04 -
accuracy: 0.9999 - val_loss: 0.3411 - val_accuracy: 0.9260
Epoch 269/500
52/52 [==============================] - 0s 7ms/step - loss: 4.3248e-04 -
accuracy: 0.9999 - val_loss: 0.3763 - val_accuracy: 0.9155
Epoch 270/500
52/52 [==============================] - 0s 5ms/step - loss: 3.6996e-04 -
accuracy: 1.0000 - val_loss: 0.3768 - val_accuracy: 0.9135
Epoch 271/500
52/52 [==============================] - 0s 5ms/step - loss: 4.2099e-04 -
accuracy: 0.9999 - val_loss: 0.3179 - val_accuracy: 0.9322
Epoch 272/500
52/52 [==============================] - 0s 6ms/step - loss: 3.5176e-04 -
accuracy: 1.0000 - val_loss: 0.3805 - val_accuracy: 0.9149
Epoch 273/500
52/52 [==============================] - 0s 5ms/step - loss: 3.2072e-04 -
accuracy: 1.0000 - val_loss: 0.3769 - val_accuracy: 0.9163
Epoch 274/500
52/52 [==============================] - 0s 7ms/step - loss: 3.3235e-04 -
accuracy: 1.0000 - val_loss: 0.3305 - val_accuracy: 0.9282
Epoch 275/500
52/52 [==============================] - 0s 6ms/step - loss: 3.7808e-04 -
accuracy: 0.9999 - val_loss: 0.3810 - val_accuracy: 0.9131
Epoch 276/500
52/52 [==============================] - 0s 6ms/step - loss: 3.8127e-04 -
accuracy: 0.9999 - val_loss: 0.3269 - val_accuracy: 0.9288
Epoch 277/500
52/52 [==============================] - 0s 6ms/step - loss: 3.6843e-04 -
accuracy: 0.9999 - val_loss: 0.3325 - val_accuracy: 0.9268
Epoch 278/500
52/52 [==============================] - 0s 6ms/step - loss: 3.1625e-04 -
accuracy: 0.9999 - val_loss: 0.3229 - val_accuracy: 0.9295
Epoch 279/500
52/52 [==============================] - 0s 6ms/step - loss: 3.2081e-04 -
accuracy: 1.0000 - val_loss: 0.3198 - val_accuracy: 0.9302
Epoch 280/500
52/52 [==============================] - 0s 6ms/step - loss: 3.3014e-04 -
accuracy: 1.0000 - val_loss: 0.3437 - val_accuracy: 0.9248
Epoch 281/500
52/52 [==============================] - 0s 6ms/step - loss: 3.1248e-04 -
accuracy: 0.9999 - val_loss: 0.3662 - val_accuracy: 0.9186
```

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Epoch 282/500
52/52 [==============================] - 0s 6ms/step - loss: 3.0742e-04 -
accuracy: 1.0000 - val_loss: 0.3557 - val_accuracy: 0.9205
Epoch 283/500
52/52 [==============================] - 0s 5ms/step - loss: 3.5435e-04 -
accuracy: 0.9999 - val_loss: 0.3175 - val_accuracy: 0.9327
Epoch 284/500
52/52 [==============================] - 0s 6ms/step - loss: 3.1274e-04 -
accuracy: 1.0000 - val_loss: 0.3640 - val_accuracy: 0.9176
Epoch 285/500
52/52 [==============================] - 0s 5ms/step - loss: 3.6773e-04 -
accuracy: 1.0000 - val_loss: 0.3204 - val_accuracy: 0.9302
Epoch 286/500
52/52 [==============================] - 0s 5ms/step - loss: 2.9752e-04 -
accuracy: 1.0000 - val_loss: 0.3444 - val_accuracy: 0.9238
Epoch 287/500
52/52 [==============================] - 0s 6ms/step - loss: 2.7423e-04 -
accuracy: 1.0000 - val_loss: 0.3252 - val_accuracy: 0.9306
Epoch 288/500
52/52 [==============================] - 0s 6ms/step - loss: 2.8174e-04 -
accuracy: 0.9999 - val_loss: 0.3483 - val_accuracy: 0.9245
Epoch 289/500
52/52 [==============================] - 0s 5ms/step - loss: 2.5088e-04 -
accuracy: 1.0000 - val_loss: 0.3214 - val_accuracy: 0.9318
Epoch 290/500
52/52 [==============================] - 0s 6ms/step - loss: 3.1171e-04 -
accuracy: 0.9999 - val_loss: 0.3040 - val_accuracy: 0.9349
Epoch 291/500
52/52 [==============================] - 0s 5ms/step - loss: 4.1521e-04 -
accuracy: 0.9999 - val_loss: 0.3960 - val_accuracy: 0.9092
Epoch 292/500
52/52 [==============================] - 0s 5ms/step - loss: 2.9239e-04 -
accuracy: 1.0000 - val_loss: 0.3126 - val_accuracy: 0.9346
Epoch 293/500
52/52 [==============================] - 0s 5ms/step - loss: 3.0090e-04 -
accuracy: 1.0000 - val_loss: 0.3659 - val_accuracy: 0.9178
Epoch 294/500
52/52 [==============================] - 0s 5ms/step - loss: 2.7215e-04 -
accuracy: 1.0000 - val_loss: 0.3578 - val_accuracy: 0.9216
Epoch 295/500
52/52 [==============================] - 0s 6ms/step - loss: 3.3406e-04 -
accuracy: 0.9999 - val_loss: 0.3619 - val_accuracy: 0.9189
Epoch 296/500
52/52 [==============================] - 0s 6ms/step - loss: 2.9647e-04 -
accuracy: 0.9999 - val_loss: 0.3531 - val_accuracy: 0.9225
Epoch 297/500
52/52 [==============================] - 0s 6ms/step - loss: 3.5364e-04 -
accuracy: 0.9999 - val_loss: 0.3336 - val_accuracy: 0.9284
```

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Epoch 298/500
52/52 [==============================] - 0s 6ms/step - loss: 2.8802e-04 -
accuracy: 1.0000 - val_loss: 0.3406 - val_accuracy: 0.9263
Epoch 299/500
52/52 [==============================] - 0s 5ms/step - loss: 2.4125e-04 -
accuracy: 1.0000 - val_loss: 0.3472 - val_accuracy: 0.9265
Epoch 300/500
52/52 [==============================] - 0s 6ms/step - loss: 2.0520e-04 -
accuracy: 1.0000 - val_loss: 0.3498 - val_accuracy: 0.9250
Epoch 301/500
52/52 [==============================] - 0s 6ms/step - loss: 2.3983e-04 -
accuracy: 1.0000 - val_loss: 0.3460 - val_accuracy: 0.9259
Epoch 302/500
52/52 [==============================] - 0s 7ms/step - loss: 2.3747e-04 -
accuracy: 1.0000 - val_loss: 0.3365 - val_accuracy: 0.9282
Epoch 303/500
52/52 [==============================] - 0s 7ms/step - loss: 3.7231e-04 -
accuracy: 0.9999 - val_loss: 0.4688 - val_accuracy: 0.8936
Epoch 304/500
52/52 [==============================] - 0s 8ms/step - loss: 2.6141e-04 -
accuracy: 0.9999 - val_loss: 0.3137 - val_accuracy: 0.9282
Epoch 305/500
52/52 [==============================] - 0s 7ms/step - loss: 2.6248e-04 -
accuracy: 1.0000 - val_loss: 0.2782 - val_accuracy: 0.9386
Epoch 306/500
52/52 [==============================] - 0s 8ms/step - loss: 2.0578e-04 -
accuracy: 1.0000 - val_loss: 0.2871 - val_accuracy: 0.9376
Epoch 307/500
52/52 [==============================] - 0s 9ms/step - loss: 2.1692e-04 -
accuracy: 1.0000 - val_loss: 0.3434 - val_accuracy: 0.9214
Epoch 308/500
52/52 [==============================] - 0s 7ms/step - loss: 2.4403e-04 -
accuracy: 0.9999 - val_loss: 0.3465 - val_accuracy: 0.9238
Epoch 309/500
52/52 [==============================] - 0s 9ms/step - loss: 2.2994e-04 -
accuracy: 1.0000 - val_loss: 0.3357 - val_accuracy: 0.9269
Epoch 310/500
52/52 [==============================] - 0s 7ms/step - loss: 2.0462e-04 -
accuracy: 1.0000 - val_loss: 0.3176 - val_accuracy: 0.9318
Epoch 311/500
52/52 [==============================] - 0s 8ms/step - loss: 2.0526e-04 -
accuracy: 1.0000 - val_loss: 0.3393 - val_accuracy: 0.9266
Epoch 312/500
52/52 [==============================] - 0s 7ms/step - loss: 2.0936e-04 -
accuracy: 1.0000 - val_loss: 0.3136 - val_accuracy: 0.9337
Epoch 313/500
52/52 [==============================] - 0s 7ms/step - loss: 2.5957e-04 -
accuracy: 1.0000 - val_loss: 0.4063 - val_accuracy: 0.9063
```

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Epoch 314/500
52/52 [==============================] - 0s 7ms/step - loss: 2.6910e-04 -
accuracy: 0.9999 - val_loss: 0.3868 - val_accuracy: 0.9125
Epoch 315/500
52/52 [==============================] - 0s 6ms/step - loss: 1.9834e-04 -
accuracy: 1.0000 - val_loss: 0.3290 - val_accuracy: 0.9300
Epoch 316/500
52/52 [==============================] - 0s 7ms/step - loss: 1.9557e-04 -
accuracy: 1.0000 - val_loss: 0.3393 - val_accuracy: 0.9261
Epoch 317/500
52/52 [==============================] - 0s 7ms/step - loss: 2.0199e-04 -
accuracy: 1.0000 - val_loss: 0.3394 - val_accuracy: 0.9272
Epoch 318/500
52/52 [==============================] - 0s 8ms/step - loss: 1.9238e-04 -
accuracy: 1.0000 - val_loss: 0.3606 - val_accuracy: 0.9194
Epoch 319/500
52/52 [==============================] - 0s 8ms/step - loss: 2.0337e-04 -
accuracy: 1.0000 - val_loss: 0.3342 - val_accuracy: 0.9291
Epoch 320/500
52/52 [==============================] - 0s 7ms/step - loss: 2.5534e-04 -
accuracy: 0.9999 - val_loss: 0.4380 - val_accuracy: 0.9014
Epoch 321/500
52/52 [==============================] - 0s 6ms/step - loss: 2.2519e-04 -
accuracy: 1.0000 - val_loss: 0.3804 - val_accuracy: 0.9164
Epoch 322/500
52/52 [==============================] - 0s 5ms/step - loss: 1.7365e-04 -
accuracy: 1.0000 - val_loss: 0.3713 - val_accuracy: 0.9196
Epoch 323/500
52/52 [==============================] - 0s 6ms/step - loss: 1.6227e-04 -
accuracy: 1.0000 - val_loss: 0.3238 - val_accuracy: 0.9318
Epoch 324/500
52/52 [==============================] - 0s 6ms/step - loss: 1.5727e-04 -
accuracy: 1.0000 - val_loss: 0.3397 - val_accuracy: 0.9248
Epoch 325/500
52/52 [==============================] - 0s 6ms/step - loss: 1.6022e-04 -
accuracy: 1.0000 - val_loss: 0.3301 - val_accuracy: 0.9273
Epoch 326/500
52/52 [==============================] - 0s 6ms/step - loss: 1.6767e-04 -
accuracy: 1.0000 - val_loss: 0.3434 - val_accuracy: 0.9220
Epoch 327/500
52/52 [==============================] - 0s 6ms/step - loss: 1.6766e-04 -
accuracy: 1.0000 - val_loss: 0.3628 - val_accuracy: 0.9174
Epoch 328/500
52/52 [==============================] - 0s 6ms/step - loss: 1.7492e-04 -
accuracy: 1.0000 - val_loss: 0.3520 - val_accuracy: 0.9211
Epoch 329/500
52/52 [==============================] - 0s 6ms/step - loss: 2.3218e-04 -
accuracy: 0.9999 - val_loss: 0.4031 - val_accuracy: 0.9078
```

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Epoch 330/500
52/52 [==============================] - 0s 6ms/step - loss: 1.8874e-04 -
accuracy: 1.0000 - val_loss: 0.3559 - val_accuracy: 0.9193
Epoch 331/500
52/52 [==============================] - 0s 6ms/step - loss: 1.5415e-04 -
accuracy: 1.0000 - val_loss: 0.3338 - val_accuracy: 0.9256
Epoch 332/500
52/52 [==============================] - 0s 6ms/step - loss: 1.3438e-04 -
accuracy: 1.0000 - val_loss: 0.3101 - val_accuracy: 0.9319
Epoch 333/500
52/52 [==============================] - 0s 6ms/step - loss: 1.5759e-04 -
accuracy: 1.0000 - val_loss: 0.2963 - val_accuracy: 0.9358
Epoch 334/500
52/52 [==============================] - 0s 6ms/step - loss: 1.9461e-04 -
accuracy: 1.0000 - val_loss: 0.3057 - val_accuracy: 0.9335
Epoch 335/500
52/52 [==============================] - 0s 6ms/step - loss: 1.9727e-04 -
accuracy: 1.0000 - val_loss: 0.3292 - val_accuracy: 0.9271
Epoch 336/500
52/52 [==============================] - 0s 6ms/step - loss: 1.4733e-04 -
accuracy: 1.0000 - val_loss: 0.3325 - val_accuracy: 0.9264
Epoch 337/500
52/52 [==============================] - 0s 6ms/step - loss: 1.3947e-04 -
accuracy: 1.0000 - val_loss: 0.3055 - val_accuracy: 0.9334
Epoch 338/500
52/52 [==============================] - 0s 5ms/step - loss: 1.2922e-04 -
accuracy: 1.0000 - val_loss: 0.3049 - val_accuracy: 0.9344
Epoch 339/500
52/52 [==============================] - 0s 6ms/step - loss: 1.6271e-04 -
accuracy: 1.0000 - val_loss: 0.3134 - val_accuracy: 0.9329
Epoch 340/500
52/52 [==============================] - 0s 6ms/step - loss: 1.6355e-04 -
accuracy: 1.0000 - val_loss: 0.3733 - val_accuracy: 0.9171
Epoch 341/500
52/52 [==============================] - 0s 5ms/step - loss: 1.6055e-04 -
accuracy: 1.0000 - val_loss: 0.3380 - val_accuracy: 0.9269
Epoch 342/500
52/52 [==============================] - 0s 5ms/step - loss: 1.2146e-04 -
accuracy: 1.0000 - val_loss: 0.3829 - val_accuracy: 0.9139
Epoch 343/500
52/52 [==============================] - 0s 6ms/step - loss: 1.4958e-04 -
accuracy: 1.0000 - val_loss: 0.3442 - val_accuracy: 0.9227
Epoch 344/500
52/52 [==============================] - 0s 6ms/step - loss: 1.1403e-04 -
accuracy: 1.0000 - val_loss: 0.3325 - val_accuracy: 0.9260
Epoch 345/500
52/52 [==============================] - 0s 6ms/step - loss: 1.3017e-04 -
accuracy: 1.0000 - val_loss: 0.4201 - val_accuracy: 0.9031
```

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Epoch 346/500
52/52 [==============================] - 0s 6ms/step - loss: 1.7652e-04 -
accuracy: 0.9999 - val_loss: 0.3530 - val_accuracy: 0.9208
Epoch 347/500
52/52 [==============================] - 0s 5ms/step - loss: 2.2514e-04 -
accuracy: 0.9999 - val_loss: 0.4660 - val_accuracy: 0.8939
Epoch 348/500
52/52 [==============================] - 0s 5ms/step - loss: 1.6324e-04 -
accuracy: 0.9999 - val_loss: 0.3361 - val_accuracy: 0.9246
Epoch 349/500
52/52 [==============================] - 0s 6ms/step - loss: 1.2786e-04 -
accuracy: 1.0000 - val_loss: 0.3251 - val_accuracy: 0.9292
Epoch 350/500
52/52 [==============================] - 0s 6ms/step - loss: 1.1166e-04 -
accuracy: 1.0000 - val_loss: 0.3413 - val_accuracy: 0.9250
Epoch 351/500
52/52 [==============================] - 0s 6ms/step - loss: 1.2219e-04 -
accuracy: 1.0000 - val_loss: 0.3615 - val_accuracy: 0.9207
Epoch 352/500
52/52 [==============================] - 0s 6ms/step - loss: 1.1384e-04 -
accuracy: 1.0000 - val_loss: 0.3554 - val_accuracy: 0.9207
Epoch 353/500
52/52 [==============================] - 0s 7ms/step - loss: 1.0727e-04 -
accuracy: 1.0000 - val_loss: 0.3381 - val_accuracy: 0.9250
Epoch 354/500
52/52 [==============================] - 0s 7ms/step - loss: 9.4193e-05 -
accuracy: 1.0000 - val_loss: 0.3356 - val_accuracy: 0.9258
Epoch 355/500
52/52 [==============================] - 0s 8ms/step - loss: 1.0104e-04 -
accuracy: 1.0000 - val_loss: 0.3461 - val_accuracy: 0.9225
Epoch 356/500
52/52 [==============================] - 0s 8ms/step - loss: 1.1033e-04 -
accuracy: 1.0000 - val_loss: 0.3263 - val_accuracy: 0.9279
Epoch 357/500
52/52 [==============================] - 0s 7ms/step - loss: 9.8620e-05 -
accuracy: 1.0000 - val_loss: 0.4667 - val_accuracy: 0.8946
Epoch 358/500
52/52 [==============================] - 0s 8ms/step - loss: 4.1814e-04 -
accuracy: 0.9999 - val_loss: 0.2975 - val_accuracy: 0.9306
Epoch 359/500
52/52 [==============================] - 0s 8ms/step - loss: 1.2128e-04 -
accuracy: 1.0000 - val_loss: 0.3037 - val_accuracy: 0.9283
Epoch 360/500
52/52 [==============================] - 0s 6ms/step - loss: 1.4174e-04 -
accuracy: 1.0000 - val_loss: 0.3094 - val_accuracy: 0.9290
Epoch 361/500
52/52 [==============================] - 0s 7ms/step - loss: 1.3899e-04 -
accuracy: 1.0000 - val_loss: 0.3202 - val_accuracy: 0.9263
```

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Epoch 362/500
52/52 [==============================] - 0s 7ms/step - loss: 9.5274e-05 -
accuracy: 1.0000 - val_loss: 0.3037 - val_accuracy: 0.9308
Epoch 363/500
52/52 [==============================] - 0s 9ms/step - loss: 1.0733e-04 -
accuracy: 1.0000 - val_loss: 0.3143 - val_accuracy: 0.9280
Epoch 364/500
52/52 [==============================] - 0s 7ms/step - loss: 8.9295e-05 -
accuracy: 1.0000 - val_loss: 0.2960 - val_accuracy: 0.9333
Epoch 365/500
52/52 [==============================] - 0s 6ms/step - loss: 8.5111e-05 -
accuracy: 1.0000 - val_loss: 0.3260 - val_accuracy: 0.9258
Epoch 366/500
52/52 [==============================] - 0s 7ms/step - loss: 8.7106e-05 -
accuracy: 1.0000 - val_loss: 0.2961 - val_accuracy: 0.9337
Epoch 367/500
52/52 [==============================] - 0s 9ms/step - loss: 1.4309e-04 -
accuracy: 1.0000 - val_loss: 0.3787 - val_accuracy: 0.9152
Epoch 368/500
52/52 [==============================] - 0s 7ms/step - loss: 1.2923e-04 -
accuracy: 1.0000 - val_loss: 0.3511 - val_accuracy: 0.9220
Epoch 369/500
52/52 [==============================] - 0s 10ms/step - loss: 8.6609e-05 -
accuracy: 1.0000 - val_loss: 0.3326 - val_accuracy: 0.9261
Epoch 370/500
52/52 [==============================] - 0s 7ms/step - loss: 8.2870e-05 -
accuracy: 1.0000 - val_loss: 0.3035 - val_accuracy: 0.9336
Epoch 371/500
52/52 [==============================] - 0s 7ms/step - loss: 8.7474e-05 -
accuracy: 1.0000 - val_loss: 0.3172 - val_accuracy: 0.9303
Epoch 372/500
52/52 [==============================] - 0s 6ms/step - loss: 1.0290e-04 -
accuracy: 1.0000 - val_loss: 0.3188 - val_accuracy: 0.9310
Epoch 373/500
52/52 [==============================] - 0s 6ms/step - loss: 1.1361e-04 -
accuracy: 1.0000 - val_loss: 0.3539 - val_accuracy: 0.9218
Epoch 374/500
52/52 [==============================] - 0s 6ms/step - loss: 3.5782e-04 -
accuracy: 0.9998 - val_loss: 0.3362 - val_accuracy: 0.9253
Epoch 375/500
52/52 [==============================] - 0s 6ms/step - loss: 1.1976e-04 -
accuracy: 1.0000 - val_loss: 0.3091 - val_accuracy: 0.9337
Epoch 376/500
52/52 [==============================] - 0s 5ms/step - loss: 1.2214e-04 -
accuracy: 1.0000 - val_loss: 0.3710 - val_accuracy: 0.9161
Epoch 377/500
52/52 [==============================] - 0s 5ms/step - loss: 7.7104e-05 -
accuracy: 1.0000 - val_loss: 0.3308 - val_accuracy: 0.9261
```

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Epoch 378/500
52/52 [==============================] - 0s 6ms/step - loss: 7.6220e-05 -
accuracy: 1.0000 - val_loss: 0.3406 - val_accuracy: 0.9235
Epoch 379/500
52/52 [==============================] - 0s 6ms/step - loss: 6.9608e-05 -
accuracy: 1.0000 - val_loss: 0.3190 - val_accuracy: 0.9302
Epoch 380/500
52/52 [==============================] - 0s 5ms/step - loss: 7.7065e-05 -
accuracy: 1.0000 - val_loss: 0.3366 - val_accuracy: 0.9248
Epoch 381/500
52/52 [==============================] - 0s 6ms/step - loss: 7.8668e-05 -
accuracy: 1.0000 - val_loss: 0.3516 - val_accuracy: 0.9221
Epoch 382/500
52/52 [==============================] - 0s 7ms/step - loss: 1.0337e-04 -
accuracy: 1.0000 - val_loss: 0.3883 - val_accuracy: 0.9143
Epoch 383/500
52/52 [==============================] - 0s 5ms/step - loss: 9.5177e-05 -
accuracy: 1.0000 - val_loss: 0.3341 - val_accuracy: 0.9277
Epoch 384/500
52/52 [==============================] - 0s 6ms/step - loss: 7.3578e-05 -
accuracy: 1.0000 - val_loss: 0.3718 - val_accuracy: 0.9183
Epoch 385/500
52/52 [==============================] - 0s 6ms/step - loss: 7.9995e-05 -
accuracy: 1.0000 - val_loss: 0.3374 - val_accuracy: 0.9257
Epoch 386/500
52/52 [==============================] - 0s 6ms/step - loss: 7.3251e-05 -
accuracy: 1.0000 - val_loss: 0.3481 - val_accuracy: 0.9251
Epoch 387/500
52/52 [==============================] - 0s 6ms/step - loss: 6.6990e-05 -
accuracy: 1.0000 - val_loss: 0.3362 - val_accuracy: 0.9271
Epoch 388/500
52/52 [==============================] - 0s 6ms/step - loss: 8.0047e-05 -
accuracy: 1.0000 - val_loss: 0.3522 - val_accuracy: 0.9238
Epoch 389/500
52/52 [==============================] - 0s 6ms/step - loss: 1.2724e-04 -
accuracy: 1.0000 - val_loss: 0.3465 - val_accuracy: 0.9254
Epoch 390/500
52/52 [==============================] - 0s 6ms/step - loss: 6.3539e-05 -
accuracy: 1.0000 - val_loss: 0.3330 - val_accuracy: 0.9290
Epoch 391/500
52/52 [==============================] - 0s 6ms/step - loss: 6.4809e-05 -
accuracy: 1.0000 - val_loss: 0.3384 - val_accuracy: 0.9281
Epoch 392/500
52/52 [==============================] - 0s 6ms/step - loss: 6.1660e-05 -
accuracy: 1.0000 - val_loss: 0.3384 - val_accuracy: 0.9281
Epoch 393/500
52/52 [==============================] - 0s 6ms/step - loss: 6.9263e-05 -
accuracy: 1.0000 - val_loss: 0.3453 - val_accuracy: 0.9269
```

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Epoch 394/500
52/52 [==============================] - 0s 6ms/step - loss: 5.3417e-05 -
accuracy: 1.0000 - val_loss: 0.3613 - val_accuracy: 0.9218
Epoch 395/500
52/52 [==============================] - 0s 6ms/step - loss: 7.4464e-05 -
accuracy: 1.0000 - val_loss: 0.4112 - val_accuracy: 0.9096
Epoch 396/500
52/52 [==============================] - 0s 6ms/step - loss: 9.9191e-05 -
accuracy: 1.0000 - val_loss: 0.3672 - val_accuracy: 0.9204
Epoch 397/500
52/52 [==============================] - 0s 6ms/step - loss: 5.7860e-05 -
accuracy: 1.0000 - val_loss: 0.3428 - val_accuracy: 0.9275
Epoch 398/500
52/52 [==============================] - 0s 6ms/step - loss: 5.6016e-05 -
accuracy: 1.0000 - val_loss: 0.3457 - val_accuracy: 0.9249
Epoch 399/500
52/52 [==============================] - 0s 5ms/step - loss: 5.8681e-05 -
accuracy: 1.0000 - val_loss: 0.3642 - val_accuracy: 0.9214
Epoch 400/500
52/52 [==============================] - 0s 5ms/step - loss: 5.8792e-05 -
accuracy: 1.0000 - val_loss: 0.3322 - val_accuracy: 0.9285
Epoch 401/500
52/52 [==============================] - 0s 6ms/step - loss: 5.9335e-05 -
accuracy: 1.0000 - val_loss: 0.3227 - val_accuracy: 0.9305
Epoch 402/500
52/52 [==============================] - 0s 6ms/step - loss: 7.4548e-05 -
accuracy: 1.0000 - val_loss: 0.3518 - val_accuracy: 0.9235
Epoch 403/500
52/52 [==============================] - 0s 6ms/step - loss: 5.4080e-05 -
accuracy: 1.0000 - val_loss: 0.3436 - val_accuracy: 0.9257
Epoch 404/500
52/52 [==============================] - 0s 6ms/step - loss: 1.1745e-04 -
accuracy: 1.0000 - val_loss: 0.3372 - val_accuracy: 0.9267
Epoch 405/500
52/52 [==============================] - 0s 7ms/step - loss: 5.0288e-05 -
accuracy: 1.0000 - val_loss: 0.3630 - val_accuracy: 0.9217
Epoch 406/500
52/52 [==============================] - 0s 6ms/step - loss: 6.8497e-05 -
accuracy: 1.0000 - val_loss: 0.3700 - val_accuracy: 0.9202
Epoch 407/500
52/52 [==============================] - 0s 9ms/step - loss: 5.0724e-05 -
accuracy: 1.0000 - val_loss: 0.3220 - val_accuracy: 0.9318
Epoch 408/500
52/52 [==============================] - 0s 7ms/step - loss: 5.1334e-05 -
accuracy: 1.0000 - val_loss: 0.3506 - val_accuracy: 0.9244
Epoch 409/500
52/52 [==============================] - 0s 8ms/step - loss: 4.9929e-05 -
accuracy: 1.0000 - val_loss: 0.3327 - val_accuracy: 0.9294
```

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Epoch 410/500
52/52 [==============================] - 0s 7ms/step - loss: 5.0549e-05 -
accuracy: 1.0000 - val_loss: 0.3493 - val_accuracy: 0.9250
Epoch 411/500
52/52 [==============================] - 0s 7ms/step - loss: 5.3553e-05 -
accuracy: 1.0000 - val_loss: 0.3464 - val_accuracy: 0.9251
Epoch 412/500
52/52 [==============================] - 0s 7ms/step - loss: 4.7405e-05 -
accuracy: 1.0000 - val_loss: 0.3354 - val_accuracy: 0.9275
Epoch 413/500
52/52 [==============================] - 0s 8ms/step - loss: 1.3749e-04 -
accuracy: 1.0000 - val_loss: 0.3299 - val_accuracy: 0.9300
Epoch 414/500
52/52 [==============================] - 0s 8ms/step - loss: 1.0730e-04 -
accuracy: 1.0000 - val_loss: 0.3667 - val_accuracy: 0.9220
Epoch 415/500
52/52 [==============================] - 0s 8ms/step - loss: 6.3461e-05 -
accuracy: 1.0000 - val_loss: 0.3302 - val_accuracy: 0.9313
Epoch 416/500
52/52 [==============================] - 0s 8ms/step - loss: 4.6235e-05 -
accuracy: 1.0000 - val_loss: 0.3615 - val_accuracy: 0.9226
Epoch 417/500
52/52 [==============================] - 0s 8ms/step - loss: 5.0350e-05 -
accuracy: 1.0000 - val_loss: 0.3309 - val_accuracy: 0.9295
Epoch 418/500
52/52 [==============================] - 0s 9ms/step - loss: 5.4701e-05 -
accuracy: 1.0000 - val_loss: 0.3730 - val_accuracy: 0.9206
Epoch 419/500
52/52 [==============================] - 0s 8ms/step - loss: 4.1800e-05 -
accuracy: 1.0000 - val_loss: 0.3729 - val_accuracy: 0.9199
Epoch 420/500
52/52 [==============================] - 0s 9ms/step - loss: 6.2691e-05 -
accuracy: 1.0000 - val_loss: 0.3571 - val_accuracy: 0.9235
Epoch 421/500
52/52 [==============================] - 0s 8ms/step - loss: 4.7851e-05 -
accuracy: 1.0000 - val_loss: 0.3560 - val_accuracy: 0.9240
Epoch 422/500
52/52 [==============================] - 0s 7ms/step - loss: 4.3443e-05 -
accuracy: 1.0000 - val_loss: 0.3356 - val_accuracy: 0.9295
Epoch 423/500
52/52 [==============================] - 0s 6ms/step - loss: 5.2028e-05 -
accuracy: 1.0000 - val_loss: 0.3641 - val_accuracy: 0.9246
Epoch 424/500
52/52 [==============================] - 0s 6ms/step - loss: 6.2396e-05 -
accuracy: 1.0000 - val_loss: 0.3662 - val_accuracy: 0.9228
Epoch 425/500
52/52 [==============================] - 0s 6ms/step - loss: 1.0821e-04 -
accuracy: 1.0000 - val_loss: 0.3437 - val_accuracy: 0.9288
```

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Epoch 426/500
52/52 [==============================] - 0s 6ms/step - loss: 4.8412e-05 -
accuracy: 1.0000 - val_loss: 0.3764 - val_accuracy: 0.9220
Epoch 427/500
52/52 [==============================] - 0s 6ms/step - loss: 4.8007e-05 -
accuracy: 1.0000 - val_loss: 0.3577 - val_accuracy: 0.9267
Epoch 428/500
52/52 [==============================] - 0s 6ms/step - loss: 4.1450e-05 -
accuracy: 1.0000 - val_loss: 0.3583 - val_accuracy: 0.9243
Epoch 429/500
52/52 [==============================] - 0s 6ms/step - loss: 4.0868e-05 -
accuracy: 1.0000 - val_loss: 0.3706 - val_accuracy: 0.9228
Epoch 430/500
52/52 [==============================] - 0s 6ms/step - loss: 3.9323e-05 -
accuracy: 1.0000 - val_loss: 0.3431 - val_accuracy: 0.9283
Epoch 431/500
52/52 [==============================] - 0s 6ms/step - loss: 3.7420e-05 -
accuracy: 1.0000 - val_loss: 0.3481 - val_accuracy: 0.9278
Epoch 432/500
52/52 [==============================] - 0s 6ms/step - loss: 4.8189e-05 -
accuracy: 1.0000 - val_loss: 0.3274 - val_accuracy: 0.9352
Epoch 433/500
52/52 [==============================] - 0s 6ms/step - loss: 1.6147e-04 -
accuracy: 0.9999 - val_loss: 0.8226 - val_accuracy: 0.8509
Epoch 434/500
52/52 [==============================] - 0s 6ms/step - loss: 2.6978e-04 -
accuracy: 1.0000 - val_loss: 0.2339 - val_accuracy: 0.9457
Epoch 435/500
52/52 [==============================] - 0s 6ms/step - loss: 4.5608e-05 -
accuracy: 1.0000 - val_loss: 0.2658 - val_accuracy: 0.9398
Epoch 436/500
52/52 [==============================] - 0s 5ms/step - loss: 5.5893e-05 -
accuracy: 1.0000 - val_loss: 0.3263 - val_accuracy: 0.9250
Epoch 437/500
52/52 [==============================] - 0s 6ms/step - loss: 6.1182e-05 -
accuracy: 1.0000 - val_loss: 0.2674 - val_accuracy: 0.9404
Epoch 438/500
52/52 [==============================] - 0s 6ms/step - loss: 5.4829e-05 -
accuracy: 1.0000 - val_loss: 0.3038 - val_accuracy: 0.9316
Epoch 439/500
52/52 [==============================] - 0s 6ms/step - loss: 3.4544e-05 -
accuracy: 1.0000 - val_loss: 0.3039 - val_accuracy: 0.9318
Epoch 440/500
52/52 [==============================] - 0s 6ms/step - loss: 4.0978e-05 -
accuracy: 1.0000 - val_loss: 0.2876 - val_accuracy: 0.9359
Epoch 441/500
52/52 [==============================] - 0s 6ms/step - loss: 4.5403e-05 -
accuracy: 1.0000 - val_loss: 0.3126 - val_accuracy: 0.9306
```

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Epoch 442/500
52/52 [==============================] - 0s 6ms/step - loss: 3.6758e-05 -
accuracy: 1.0000 - val_loss: 0.2830 - val_accuracy: 0.9392
Epoch 443/500
52/52 [==============================] - 0s 6ms/step - loss: 3.8818e-05 -
accuracy: 1.0000 - val_loss: 0.3196 - val_accuracy: 0.9309
Epoch 444/500
52/52 [==============================] - 0s 6ms/step - loss: 4.9894e-05 -
accuracy: 1.0000 - val_loss: 0.3272 - val_accuracy: 0.9291
Epoch 445/500
52/52 [==============================] - 0s 6ms/step - loss: 3.6514e-05 -
accuracy: 1.0000 - val_loss: 0.3087 - val_accuracy: 0.9340
Epoch 446/500
52/52 [==============================] - 0s 6ms/step - loss: 2.9177e-05 -
accuracy: 1.0000 - val_loss: 0.3373 - val_accuracy: 0.9270
Epoch 447/500
52/52 [==============================] - 0s 6ms/step - loss: 3.4035e-05 -
accuracy: 1.0000 - val_loss: 0.3210 - val_accuracy: 0.9310
Epoch 448/500
52/52 [==============================] - 0s 5ms/step - loss: 3.8491e-05 -
accuracy: 1.0000 - val_loss: 0.3383 - val_accuracy: 0.9275
Epoch 449/500
52/52 [==============================] - 0s 6ms/step - loss: 2.8798e-05 -
accuracy: 1.0000 - val_loss: 0.3076 - val_accuracy: 0.9344
Epoch 450/500
52/52 [==============================] - 0s 6ms/step - loss: 4.1749e-05 -
accuracy: 1.0000 - val_loss: 0.3538 - val_accuracy: 0.9249
Epoch 451/500
52/52 [==============================] - 0s 6ms/step - loss: 4.4832e-05 -
accuracy: 1.0000 - val_loss: 0.3421 - val_accuracy: 0.9272
Epoch 452/500
52/52 [==============================] - 0s 5ms/step - loss: 2.9868e-05 -
accuracy: 1.0000 - val_loss: 0.3173 - val_accuracy: 0.9342
Epoch 453/500
52/52 [==============================] - 0s 6ms/step - loss: 3.5962e-05 -
accuracy: 1.0000 - val_loss: 0.3209 - val_accuracy: 0.9340
Epoch 454/500
52/52 [==============================] - 0s 7ms/step - loss: 3.1021e-05 -
accuracy: 1.0000 - val_loss: 0.3568 - val_accuracy: 0.9255
Epoch 455/500
52/52 [==============================] - 0s 8ms/step - loss: 3.3698e-05 -
accuracy: 1.0000 - val_loss: 0.3450 - val_accuracy: 0.9294
Epoch 456/500
52/52 [==============================] - 0s 8ms/step - loss: 2.7309e-05 -
accuracy: 1.0000 - val_loss: 0.3390 - val_accuracy: 0.9304
Epoch 457/500
52/52 [==============================] - 0s 7ms/step - loss: 2.6652e-05 -
accuracy: 1.0000 - val_loss: 0.3480 - val_accuracy: 0.9275
```

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Epoch 458/500
52/52 [==============================] - 0s 8ms/step - loss: 2.7131e-05 -
accuracy: 1.0000 - val_loss: 0.3546 - val_accuracy: 0.9275
Epoch 459/500
52/52 [==============================] - 0s 8ms/step - loss: 2.6446e-05 -
accuracy: 1.0000 - val_loss: 0.3532 - val_accuracy: 0.9272
Epoch 460/500
52/52 [==============================] - 0s 7ms/step - loss: 2.8881e-05 -
accuracy: 1.0000 - val_loss: 0.3384 - val_accuracy: 0.9309
Epoch 461/500
52/52 [==============================] - 0s 7ms/step - loss: 2.8618e-05 -
accuracy: 1.0000 - val_loss: 0.3462 - val_accuracy: 0.9306
Epoch 462/500
52/52 [==============================] - 0s 9ms/step - loss: 3.7056e-05 -
accuracy: 1.0000 - val_loss: 0.3852 - val_accuracy: 0.9219
Epoch 463/500
52/52 [==============================] - 0s 7ms/step - loss: 2.9150e-05 -
accuracy: 1.0000 - val_loss: 0.4085 - val_accuracy: 0.9173
Epoch 464/500
52/52 [==============================] - 0s 7ms/step - loss: 4.9602e-05 -
accuracy: 1.0000 - val_loss: 0.3117 - val_accuracy: 0.9392
Epoch 465/500
52/52 [==============================] - 0s 8ms/step - loss: 5.6488e-04 -
accuracy: 0.9999 - val_loss: 0.2271 - val_accuracy: 0.9485
Epoch 466/500
52/52 [==============================] - 0s 7ms/step - loss: 3.6497e-05 -
accuracy: 1.0000 - val_loss: 0.2803 - val_accuracy: 0.9359
Epoch 467/500
52/52 [==============================] - 0s 7ms/step - loss: 5.2588e-05 -
accuracy: 1.0000 - val_loss: 0.3304 - val_accuracy: 0.9257
Epoch 468/500
52/52 [==============================] - 0s 8ms/step - loss: 5.0413e-05 -
accuracy: 1.0000 - val_loss: 0.3113 - val_accuracy: 0.9325
Epoch 469/500
52/52 [==============================] - 0s 7ms/step - loss: 2.7576e-05 -
accuracy: 1.0000 - val_loss: 0.2860 - val_accuracy: 0.9405
Epoch 470/500
52/52 [==============================] - 0s 8ms/step - loss: 2.4417e-05 -
accuracy: 1.0000 - val_loss: 0.2984 - val_accuracy: 0.9372
Epoch 471/500
52/52 [==============================] - 0s 7ms/step - loss: 2.3042e-05 -
accuracy: 1.0000 - val_loss: 0.3225 - val_accuracy: 0.9315
Epoch 472/500
52/52 [==============================] - 0s 6ms/step - loss: 3.1245e-05 -
accuracy: 1.0000 - val_loss: 0.3049 - val_accuracy: 0.9360
Epoch 473/500
52/52 [==============================] - 0s 6ms/step - loss: 2.2180e-05 -
accuracy: 1.0000 - val_loss: 0.3309 - val_accuracy: 0.9296
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Epoch 474/500
52/52 [==============================] - 0s 6ms/step - loss: 2.5389e-05 -
accuracy: 1.0000 - val_loss: 0.3273 - val_accuracy: 0.9311
Epoch 475/500
52/52 [==============================] - 0s 6ms/step - loss: 2.6370e-05 -
accuracy: 1.0000 - val_loss: 0.3423 - val_accuracy: 0.9284
Epoch 476/500
52/52 [==============================] - 0s 6ms/step - loss: 1.3567e-04 -
accuracy: 1.0000 - val_loss: 0.3283 - val_accuracy: 0.9326
Epoch 477/500
52/52 [==============================] - 0s 6ms/step - loss: 1.8600e-04 -
accuracy: 0.9999 - val_loss: 0.3550 - val_accuracy: 0.9280
Epoch 478/500
52/52 [==============================] - 0s 6ms/step - loss: 5.4764e-05 -
accuracy: 1.0000 - val_loss: 0.3331 - val_accuracy: 0.9334
Epoch 479/500
52/52 [==============================] - 0s 6ms/step - loss: 2.9979e-05 -
accuracy: 1.0000 - val_loss: 0.3279 - val_accuracy: 0.9349
Epoch 480/500
52/52 [==============================] - 0s 6ms/step - loss: 2.1684e-05 -
accuracy: 1.0000 - val_loss: 0.3562 - val_accuracy: 0.9282
Epoch 481/500
52/52 [==============================] - 0s 6ms/step - loss: 2.0203e-05 -
accuracy: 1.0000 - val_loss: 0.3607 - val_accuracy: 0.9269
Epoch 482/500
52/52 [==============================] - 0s 6ms/step - loss: 2.1755e-05 -
accuracy: 1.0000 - val_loss: 0.3819 - val_accuracy: 0.9235
Epoch 483/500
52/52 [==============================] - 0s 6ms/step - loss: 2.5453e-05 -
accuracy: 1.0000 - val_loss: 0.3763 - val_accuracy: 0.9255
Epoch 484/500
52/52 [==============================] - 0s 5ms/step - loss: 2.0295e-05 -
accuracy: 1.0000 - val_loss: 0.3601 - val_accuracy: 0.9281
Epoch 485/500
52/52 [==============================] - 0s 6ms/step - loss: 2.2299e-05 -
accuracy: 1.0000 - val_loss: 0.3791 - val_accuracy: 0.9247
Epoch 486/500
52/52 [==============================] - 0s 6ms/step - loss: 2.1024e-05 -
accuracy: 1.0000 - val_loss: 0.3652 - val_accuracy: 0.9283
Epoch 487/500
52/52 [==============================] - 0s 6ms/step - loss: 2.7594e-05 -
accuracy: 1.0000 - val_loss: 0.3824 - val_accuracy: 0.9238
Epoch 488/500
52/52 [==============================] - 0s 6ms/step - loss: 1.9894e-05 -
accuracy: 1.0000 - val_loss: 0.3657 - val_accuracy: 0.9276
Epoch 489/500
52/52 [==============================] - 0s 6ms/step - loss: 1.8084e-05 -
accuracy: 1.0000 - val_loss: 0.3595 - val_accuracy: 0.9297
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Epoch 490/500
52/52 [==============================] - 0s 5ms/step - loss: 1.8654e-05 -
accuracy: 1.0000 - val_loss: 0.3820 - val_accuracy: 0.9243
Epoch 491/500
52/52 [==============================] - 0s 6ms/step - loss: 1.8426e-05 -
accuracy: 1.0000 - val_loss: 0.3704 - val_accuracy: 0.9264
Epoch 492/500
52/52 [==============================] - 0s 6ms/step - loss: 1.8527e-05 -
accuracy: 1.0000 - val_loss: 0.3815 - val_accuracy: 0.9249
Epoch 493/500
52/52 [==============================] - 0s 6ms/step - loss: 1.9650e-05 -
accuracy: 1.0000 - val_loss: 0.3518 - val_accuracy: 0.9324
Epoch 494/500
52/52 [==============================] - 0s 6ms/step - loss: 2.1629e-05 -
accuracy: 1.0000 - val_loss: 0.3759 - val_accuracy: 0.9267
Epoch 495/500
52/52 [==============================] - 0s 6ms/step - loss: 1.8078e-05 -
accuracy: 1.0000 - val_loss: 0.3864 - val_accuracy: 0.9240
Epoch 496/500
52/52 [==============================] - 0s 6ms/step - loss: 1.6086e-05 -
accuracy: 1.0000 - val_loss: 0.3708 - val_accuracy: 0.9282
Epoch 497/500
52/52 [==============================] - 0s 6ms/step - loss: 1.7890e-05 -
accuracy: 1.0000 - val_loss: 0.3814 - val_accuracy: 0.9249
Epoch 498/500
52/52 [==============================] - 0s 7ms/step - loss: 1.7843e-05 -
accuracy: 1.0000 - val_loss: 0.3727 - val_accuracy: 0.9276
Epoch 499/500
52/52 [==============================] - 0s 5ms/step - loss: 1.6970e-05 -
accuracy: 1.0000 - val_loss: 0.3675 - val_accuracy: 0.9290
Epoch 500/500
52/52 [==============================] - 0s 6ms/step - loss: 1.7105e-05 -
accuracy: 1.0000 - val_loss: 0.3869 - val_accuracy: 0.9248
466/466 [==============================] - 2s 3ms/step - loss: 0.1171 -
accuracy: 0.9769
Epoch 1/500
26/26 [==============================] - 1s 18ms/step - loss: 1.4726 - accuracy:
0.5407 - val_loss: 3.5178 - val_accuracy: 0.0000e+00
Epoch 2/500
26/26 [==============================] - 0s 7ms/step - loss: 0.8184 - accuracy:
0.7502 - val_loss: 2.0868 - val_accuracy: 0.2793
Epoch 3/500
26/26 [==============================] - 0s 9ms/step - loss: 0.5878 - accuracy:
0.8380 - val_loss: 1.7819 - val_accuracy: 0.4025
Epoch 4/500
26/26 [==============================] - 0s 9ms/step - loss: 0.4615 - accuracy:
0.8938 - val_loss: 1.4871 - val_accuracy: 0.4792
Epoch 5/500
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26/26 [==============================] - 0s 9ms/step - loss: 0.3815 - accuracy:
0.9174 - val_loss: 1.3821 - val_accuracy: 0.5105
Epoch 6/500
26/26 [==============================] - 0s 11ms/step - loss: 0.3265 - accuracy:
0.9319 - val_loss: 1.2366 - val_accuracy: 0.5529
Epoch 7/500
26/26 [==============================] - 0s 9ms/step - loss: 0.2864 - accuracy:
0.9396 - val_loss: 1.1312 - val_accuracy: 0.5799
Epoch 8/500
26/26 [==============================] - 0s 9ms/step - loss: 0.2557 - accuracy:
0.9474 - val_loss: 1.0725 - val_accuracy: 0.6017
Epoch 9/500
26/26 [==============================] - 0s 9ms/step - loss: 0.2313 - accuracy:
0.9513 - val_loss: 1.0441 - val_accuracy: 0.6117
Epoch 10/500
26/26 [==============================] - 0s 10ms/step - loss: 0.2111 - accuracy:
0.9552 - val_loss: 0.9596 - val_accuracy: 0.6410
Epoch 11/500
26/26 [==============================] - 0s 9ms/step - loss: 0.1942 - accuracy:
0.9581 - val_loss: 0.9372 - val_accuracy: 0.6516
Epoch 12/500
26/26 [==============================] - 0s 10ms/step - loss: 0.1797 - accuracy:
0.9614 - val_loss: 0.9191 - val_accuracy: 0.6596
Epoch 13/500
26/26 [==============================] - 0s 10ms/step - loss: 0.1671 - accuracy:
0.9635 - val_loss: 0.8764 - val_accuracy: 0.6749
Epoch 14/500
26/26 [==============================] - 0s 8ms/step - loss: 0.1559 - accuracy:
0.9660 - val_loss: 0.8501 - val_accuracy: 0.6851
Epoch 15/500
26/26 [==============================] - 0s 10ms/step - loss: 0.1460 - accuracy:
0.9678 - val_loss: 0.8222 - val_accuracy: 0.6946
Epoch 16/500
26/26 [==============================] - 0s 9ms/step - loss: 0.1372 - accuracy:
0.9697 - val_loss: 0.8227 - val_accuracy: 0.6965
Epoch 17/500
26/26 [==============================] - 0s 8ms/step - loss: 0.1294 - accuracy:
0.9711 - val_loss: 0.7693 - val_accuracy: 0.7118
Epoch 18/500
26/26 [==============================] - 0s 10ms/step - loss: 0.1222 - accuracy:
0.9726 - val_loss: 0.7688 - val_accuracy: 0.7137
Epoch 19/500
26/26 [==============================] - 0s 10ms/step - loss: 0.1157 - accuracy:
0.9745 - val_loss: 0.7627 - val_accuracy: 0.7165
Epoch 20/500
26/26 [==============================] - 0s 8ms/step - loss: 0.1099 - accuracy:
0.9754 - val_loss: 0.7438 - val_accuracy: 0.7233
Epoch 21/500
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26/26 [==============================] - 0s 7ms/step - loss: 0.1046 - accuracy:
0.9768 - val_loss: 0.7322 - val_accuracy: 0.7291
Epoch 22/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0995 - accuracy:
0.9778 - val_loss: 0.7079 - val_accuracy: 0.7361
Epoch 23/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0949 - accuracy:
0.9787 - val_loss: 0.7040 - val_accuracy: 0.7383
Epoch 24/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0908 - accuracy:
0.9795 - val_loss: 0.6821 - val_accuracy: 0.7451
Epoch 25/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0868 - accuracy:
0.9806 - val_loss: 0.6642 - val_accuracy: 0.7510
Epoch 26/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0833 - accuracy:
0.9812 - val_loss: 0.6925 - val_accuracy: 0.7449
Epoch 27/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0800 - accuracy:
0.9822 - val_loss: 0.6810 - val_accuracy: 0.7496
Epoch 28/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0769 - accuracy:
0.9827 - val_loss: 0.6312 - val_accuracy: 0.7615
Epoch 29/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0740 - accuracy:
0.9835 - val_loss: 0.6279 - val_accuracy: 0.7637
Epoch 30/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0712 - accuracy:
0.9838 - val_loss: 0.6363 - val_accuracy: 0.7620
Epoch 31/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0688 - accuracy:
0.9845 - val_loss: 0.6023 - val_accuracy: 0.7729
Epoch 32/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0664 - accuracy:
0.9851 - val_loss: 0.6107 - val_accuracy: 0.7721
Epoch 33/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0641 - accuracy:
0.9857 - val_loss: 0.6111 - val_accuracy: 0.7731
Epoch 34/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0621 - accuracy:
0.9858 - val_loss: 0.5846 - val_accuracy: 0.7798
Epoch 35/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0601 - accuracy:
0.9864 - val_loss: 0.6192 - val_accuracy: 0.7723
Epoch 36/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0583 - accuracy:
0.9866 - val_loss: 0.5698 - val_accuracy: 0.7850
Epoch 37/500
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26/26 [==============================] - 0s 9ms/step - loss: 0.0565 - accuracy:
0.9869 - val_loss: 0.5820 - val_accuracy: 0.7832
Epoch 38/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0547 - accuracy:
0.9873 - val_loss: 0.5500 - val_accuracy: 0.7915
Epoch 39/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0531 - accuracy:
0.9876 - val_loss: 0.5627 - val_accuracy: 0.7888
Epoch 40/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0518 - accuracy:
0.9880 - val_loss: 0.5542 - val_accuracy: 0.7920
Epoch 41/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0503 - accuracy:
0.9883 - val_loss: 0.5699 - val_accuracy: 0.7882
Epoch 42/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0490 - accuracy:
0.9887 - val_loss: 0.5237 - val_accuracy: 0.8001
Epoch 43/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0477 - accuracy:
0.9886 - val_loss: 0.5419 - val_accuracy: 0.7970
Epoch 44/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0463 - accuracy:
0.9890 - val_loss: 0.5086 - val_accuracy: 0.8052
Epoch 45/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0450 - accuracy:
0.9895 - val_loss: 0.5306 - val_accuracy: 0.8009
Epoch 46/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0440 - accuracy:
0.9895 - val_loss: 0.5143 - val_accuracy: 0.8055
Epoch 47/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0429 - accuracy:
0.9898 - val_loss: 0.5090 - val_accuracy: 0.8079
Epoch 48/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0418 - accuracy:
0.9901 - val_loss: 0.4909 - val_accuracy: 0.8130
Epoch 49/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0407 - accuracy:
0.9905 - val_loss: 0.4991 - val_accuracy: 0.8116
Epoch 50/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0398 - accuracy:
0.9908 - val_loss: 0.4988 - val_accuracy: 0.8125
Epoch 51/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0388 - accuracy:
0.9910 - val_loss: 0.4746 - val_accuracy: 0.8186
Epoch 52/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0378 - accuracy:
0.9912 - val_loss: 0.4833 - val_accuracy: 0.8172
Epoch 53/500
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```
26/26 [==============================] - 0s 6ms/step - loss: 0.0369 - accuracy:
0.9912 - val_loss: 0.4821 - val_accuracy: 0.8183
Epoch 54/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0362 - accuracy:
0.9915 - val_loss: 0.4987 - val_accuracy: 0.8143
Epoch 55/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0353 - accuracy:
0.9916 - val_loss: 0.4719 - val_accuracy: 0.8220
Epoch 56/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0345 - accuracy:
0.9918 - val_loss: 0.4486 - val_accuracy: 0.8284
Epoch 57/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0338 - accuracy:
0.9921 - val_loss: 0.4519 - val_accuracy: 0.8282
Epoch 58/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0330 - accuracy:
0.9925 - val_loss: 0.4418 - val_accuracy: 0.8312
Epoch 59/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0323 - accuracy:
0.9926 - val_loss: 0.4648 - val_accuracy: 0.8257
Epoch 60/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0317 - accuracy:
0.9926 - val_loss: 0.4300 - val_accuracy: 0.8349
Epoch 61/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0311 - accuracy:
0.9927 - val_loss: 0.4610 - val_accuracy: 0.8275
Epoch 62/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0303 - accuracy:
0.9931 - val_loss: 0.4308 - val_accuracy: 0.8353
Epoch 63/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0297 - accuracy:
0.9933 - val_loss: 0.4463 - val_accuracy: 0.8325
Epoch 64/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0291 - accuracy:
0.9933 - val_loss: 0.4217 - val_accuracy: 0.8394
Epoch 65/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0285 - accuracy:
0.9935 - val_loss: 0.4236 - val_accuracy: 0.8392
Epoch 66/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0281 - accuracy:
0.9938 - val_loss: 0.4267 - val_accuracy: 0.8394
Epoch 67/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0274 - accuracy:
0.9938 - val_loss: 0.4099 - val_accuracy: 0.8437
Epoch 68/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0269 - accuracy:
0.9941 - val_loss: 0.4039 - val_accuracy: 0.8468
Epoch 69/500
```

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26/26 [==============================] - 0s 10ms/step - loss: 0.0264 - accuracy:
0.9941 - val_loss: 0.4030 - val_accuracy: 0.8470
Epoch 70/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0258 - accuracy:
0.9943 - val_loss: 0.3871 - val_accuracy: 0.8512
Epoch 71/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0254 - accuracy:
0.9943 - val_loss: 0.3847 - val_accuracy: 0.8521
Epoch 72/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0249 - accuracy:
0.9945 - val_loss: 0.3775 - val_accuracy: 0.8539
Epoch 73/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0244 - accuracy:
0.9944 - val_loss: 0.3708 - val_accuracy: 0.8565
Epoch 74/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0241 - accuracy:
0.9948 - val_loss: 0.3785 - val_accuracy: 0.8546
Epoch 75/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0236 - accuracy:
0.9948 - val_loss: 0.3689 - val_accuracy: 0.8580
Epoch 76/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0232 - accuracy:
0.9948 - val_loss: 0.3699 - val_accuracy: 0.8580
Epoch 77/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0227 - accuracy:
0.9949 - val_loss: 0.3522 - val_accuracy: 0.8626
Epoch 78/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0222 - accuracy:
0.9951 - val_loss: 0.3970 - val_accuracy: 0.8513
Epoch 79/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0220 - accuracy:
0.9951 - val_loss: 0.3510 - val_accuracy: 0.8632
Epoch 80/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0217 - accuracy:
0.9953 - val_loss: 0.3381 - val_accuracy: 0.8681
Epoch 81/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0212 - accuracy:
0.9954 - val_loss: 0.3706 - val_accuracy: 0.8597
Epoch 82/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0208 - accuracy:
0.9954 - val_loss: 0.3318 - val_accuracy: 0.8707
Epoch 83/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0206 - accuracy:
0.9956 - val_loss: 0.3597 - val_accuracy: 0.8627
Epoch 84/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0201 - accuracy:
0.9958 - val_loss: 0.3618 - val_accuracy: 0.8626
Epoch 85/500
```

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26/26 [==============================] - 0s 9ms/step - loss: 0.0199 - accuracy:
0.9957 - val_loss: 0.3368 - val_accuracy: 0.8703
Epoch 86/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0196 - accuracy:
0.9958 - val_loss: 0.3616 - val_accuracy: 0.8635
Epoch 87/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0192 - accuracy:
0.9959 - val_loss: 0.3338 - val_accuracy: 0.8722
Epoch 88/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0188 - accuracy:
0.9958 - val_loss: 0.3199 - val_accuracy: 0.8764
Epoch 89/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0187 - accuracy:
0.9961 - val_loss: 0.3310 - val_accuracy: 0.8734
Epoch 90/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0182 - accuracy:
0.9962 - val_loss: 0.3409 - val_accuracy: 0.8711
Epoch 91/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0181 - accuracy:
0.9962 - val_loss: 0.3211 - val_accuracy: 0.8776
Epoch 92/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0176 - accuracy:
0.9963 - val_loss: 0.3200 - val_accuracy: 0.8781
Epoch 93/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0174 - accuracy:
0.9964 - val_loss: 0.3423 - val_accuracy: 0.8717
Epoch 94/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0174 - accuracy:
0.9962 - val_loss: 0.2840 - val_accuracy: 0.8888
Epoch 95/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0170 - accuracy:
0.9965 - val_loss: 0.2955 - val_accuracy: 0.8866
Epoch 96/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0166 - accuracy:
0.9966 - val_loss: 0.2957 - val_accuracy: 0.8866
Epoch 97/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0164 - accuracy:
0.9965 - val_loss: 0.3133 - val_accuracy: 0.8813
Epoch 98/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0163 - accuracy:
0.9965 - val_loss: 0.3034 - val_accuracy: 0.8846
Epoch 99/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0160 - accuracy:
0.9967 - val_loss: 0.3350 - val_accuracy: 0.8768
Epoch 100/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0156 - accuracy:
0.9969 - val_loss: 0.3160 - val_accuracy: 0.8815
Epoch 101/500
```

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26/26 [==============================] - 0s 8ms/step - loss: 0.0154 - accuracy:
0.9968 - val_loss: 0.2978 - val_accuracy: 0.8869
Epoch 102/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0154 - accuracy:
0.9968 - val_loss: 0.3150 - val_accuracy: 0.8822
Epoch 103/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0151 - accuracy:
0.9969 - val_loss: 0.2912 - val_accuracy: 0.8888
Epoch 104/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0148 - accuracy:
0.9971 - val_loss: 0.3234 - val_accuracy: 0.8806
Epoch 105/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0147 - accuracy:
0.9970 - val_loss: 0.3106 - val_accuracy: 0.8842
Epoch 106/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0143 - accuracy:
0.9972 - val_loss: 0.2766 - val_accuracy: 0.8934
Epoch 107/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0143 - accuracy:
0.9970 - val_loss: 0.2750 - val_accuracy: 0.8942
Epoch 108/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0140 - accuracy:
0.9971 - val_loss: 0.3398 - val_accuracy: 0.8775
Epoch 109/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0137 - accuracy:
0.9972 - val_loss: 0.2636 - val_accuracy: 0.8977
Epoch 110/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0136 - accuracy:
0.9973 - val_loss: 0.2863 - val_accuracy: 0.8915
Epoch 111/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0134 - accuracy:
0.9972 - val_loss: 0.2732 - val_accuracy: 0.8955
Epoch 112/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0131 - accuracy:
0.9974 - val_loss: 0.2954 - val_accuracy: 0.8895
Epoch 113/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0131 - accuracy:
0.9974 - val_loss: 0.2610 - val_accuracy: 0.8995
Epoch 114/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0129 - accuracy:
0.9974 - val_loss: 0.2782 - val_accuracy: 0.8946
Epoch 115/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0127 - accuracy:
0.9975 - val_loss: 0.2501 - val_accuracy: 0.9039
Epoch 116/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0125 - accuracy:
0.9975 - val_loss: 0.2715 - val_accuracy: 0.8974
Epoch 117/500
```

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26/26 [==============================] - 0s 7ms/step - loss: 0.0124 - accuracy:
0.9976 - val_loss: 0.2582 - val_accuracy: 0.9014
Epoch 118/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0122 - accuracy:
0.9974 - val_loss: 0.2592 - val_accuracy: 0.9020
Epoch 119/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0121 - accuracy:
0.9975 - val_loss: 0.2605 - val_accuracy: 0.9020
Epoch 120/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0119 - accuracy:
0.9977 - val_loss: 0.2494 - val_accuracy: 0.9049
Epoch 121/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0116 - accuracy:
0.9977 - val_loss: 0.2518 - val_accuracy: 0.9046
Epoch 122/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0115 - accuracy:
0.9978 - val_loss: 0.2482 - val_accuracy: 0.9060
Epoch 123/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0114 - accuracy:
0.9978 - val_loss: 0.2556 - val_accuracy: 0.9039
Epoch 124/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0112 - accuracy:
0.9977 - val_loss: 0.2739 - val_accuracy: 0.8983
Epoch 125/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0111 - accuracy:
0.9978 - val_loss: 0.2427 - val_accuracy: 0.9075
Epoch 126/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0109 - accuracy:
0.9979 - val_loss: 0.2300 - val_accuracy: 0.9119
Epoch 127/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0109 - accuracy:
0.9978 - val_loss: 0.2510 - val_accuracy: 0.9057
Epoch 128/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0107 - accuracy:
0.9978 - val_loss: 0.2302 - val_accuracy: 0.9122
Epoch 129/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0106 - accuracy:
0.9980 - val_loss: 0.2501 - val_accuracy: 0.9062
Epoch 130/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0104 - accuracy:
0.9979 - val_loss: 0.2436 - val_accuracy: 0.9082
Epoch 131/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0104 - accuracy:
0.9979 - val_loss: 0.2397 - val_accuracy: 0.9093
Epoch 132/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0102 - accuracy:
0.9979 - val_loss: 0.2631 - val_accuracy: 0.9030
Epoch 133/500
```

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26/26 [==============================] - 0s 9ms/step - loss: 0.0101 - accuracy:
0.9982 - val_loss: 0.2336 - val_accuracy: 0.9114
Epoch 134/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0100 - accuracy:
0.9979 - val_loss: 0.2326 - val_accuracy: 0.9116
Epoch 135/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0098 - accuracy:
0.9981 - val_loss: 0.2439 - val_accuracy: 0.9089
Epoch 136/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0097 - accuracy:
0.9981 - val_loss: 0.2196 - val_accuracy: 0.9165
Epoch 137/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0096 - accuracy:
0.9981 - val_loss: 0.2595 - val_accuracy: 0.9044
Epoch 138/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0095 - accuracy:
0.9982 - val_loss: 0.2566 - val_accuracy: 0.9051
Epoch 139/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0093 - accuracy:
0.9981 - val_loss: 0.2148 - val_accuracy: 0.9184
Epoch 140/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0092 - accuracy:
0.9982 - val_loss: 0.2315 - val_accuracy: 0.9128
Epoch 141/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0092 - accuracy:
0.9982 - val_loss: 0.2256 - val_accuracy: 0.9146
Epoch 142/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0090 - accuracy:
0.9982 - val_loss: 0.2141 - val_accuracy: 0.9184
Epoch 143/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0089 - accuracy:
0.9982 - val_loss: 0.2811 - val_accuracy: 0.8992
Epoch 144/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0089 - accuracy:
0.9983 - val_loss: 0.2268 - val_accuracy: 0.9146
Epoch 145/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0088 - accuracy:
0.9983 - val_loss: 0.2280 - val_accuracy: 0.9143
Epoch 146/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0086 - accuracy:
0.9983 - val_loss: 0.2862 - val_accuracy: 0.8981
Epoch 147/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0085 - accuracy:
0.9983 - val_loss: 0.2274 - val_accuracy: 0.9149
Epoch 148/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0084 - accuracy:
0.9983 - val_loss: 0.2071 - val_accuracy: 0.9212
Epoch 149/500
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26/26 [==============================] - 0s 10ms/step - loss: 0.0083 - accuracy:
0.9983 - val_loss: 0.2380 - val_accuracy: 0.9124
Epoch 150/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0082 - accuracy:
0.9984 - val_loss: 0.2234 - val_accuracy: 0.9164
Epoch 151/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0082 - accuracy:
0.9983 - val_loss: 0.2801 - val_accuracy: 0.9004
Epoch 152/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0081 - accuracy:
0.9984 - val_loss: 0.2101 - val_accuracy: 0.9205
Epoch 153/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0079 - accuracy:
0.9984 - val_loss: 0.2667 - val_accuracy: 0.9047
Epoch 154/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0078 - accuracy:
0.9984 - val_loss: 0.2213 - val_accuracy: 0.9177
Epoch 155/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0077 - accuracy:
0.9985 - val_loss: 0.2483 - val_accuracy: 0.9093
Epoch 156/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0077 - accuracy:
0.9985 - val_loss: 0.2340 - val_accuracy: 0.9132
Epoch 157/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0076 - accuracy:
0.9984 - val_loss: 0.2022 - val_accuracy: 0.9226
Epoch 158/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0075 - accuracy:
0.9985 - val_loss: 0.2010 - val_accuracy: 0.9229
Epoch 159/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0074 - accuracy:
0.9985 - val_loss: 0.2587 - val_accuracy: 0.9066
Epoch 160/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0073 - accuracy:
0.9986 - val_loss: 0.2057 - val_accuracy: 0.9214
Epoch 161/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0072 - accuracy:
0.9986 - val_loss: 0.2316 - val_accuracy: 0.9141
Epoch 162/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0071 - accuracy:
0.9986 - val_loss: 0.2708 - val_accuracy: 0.9035
Epoch 163/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0070 - accuracy:
0.9985 - val_loss: 0.2036 - val_accuracy: 0.9218
Epoch 164/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0070 - accuracy:
0.9987 - val_loss: 0.2344 - val_accuracy: 0.9133
Epoch 165/500
```

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26/26 [==============================] - 0s 9ms/step - loss: 0.0069 - accuracy:
0.9987 - val_loss: 0.2416 - val_accuracy: 0.9115
Epoch 166/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0068 - accuracy:
0.9986 - val_loss: 0.2330 - val_accuracy: 0.9137
Epoch 167/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0069 - accuracy:
0.9986 - val_loss: 0.1919 - val_accuracy: 0.9256
Epoch 168/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0067 - accuracy:
0.9987 - val_loss: 0.2410 - val_accuracy: 0.9118
Epoch 169/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0066 - accuracy:
0.9987 - val_loss: 0.2159 - val_accuracy: 0.9184
Epoch 170/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0065 - accuracy:
0.9987 - val_loss: 0.2268 - val_accuracy: 0.9156
Epoch 171/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0065 - accuracy:
0.9987 - val_loss: 0.2226 - val_accuracy: 0.9170
Epoch 172/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0063 - accuracy:
0.9987 - val_loss: 0.2396 - val_accuracy: 0.9117
Epoch 173/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0064 - accuracy:
0.9987 - val_loss: 0.2472 - val_accuracy: 0.9100
Epoch 174/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0063 - accuracy:
0.9988 - val_loss: 0.2043 - val_accuracy: 0.9217
Epoch 175/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0061 - accuracy:
0.9988 - val_loss: 0.2392 - val_accuracy: 0.9120
Epoch 176/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0062 - accuracy:
0.9987 - val_loss: 0.2341 - val_accuracy: 0.9134
Epoch 177/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0061 - accuracy:
0.9988 - val_loss: 0.1850 - val_accuracy: 0.9285
Epoch 178/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0060 - accuracy:
0.9989 - val_loss: 0.2429 - val_accuracy: 0.9112
Epoch 179/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0059 - accuracy:
0.9988 - val_loss: 0.1871 - val_accuracy: 0.9283
Epoch 180/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0059 - accuracy:
0.9988 - val_loss: 0.2176 - val_accuracy: 0.9178
Epoch 181/500
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26/26 [==============================] - 0s 8ms/step - loss: 0.0058 - accuracy:
0.9990 - val_loss: 0.1936 - val_accuracy: 0.9260
Epoch 182/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0057 - accuracy:
0.9989 - val_loss: 0.2238 - val_accuracy: 0.9164
Epoch 183/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0056 - accuracy:
0.9989 - val_loss: 0.2445 - val_accuracy: 0.9109
Epoch 184/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0057 - accuracy:
0.9989 - val_loss: 0.2425 - val_accuracy: 0.9113
Epoch 185/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0054 - accuracy:
0.9989 - val_loss: 0.2191 - val_accuracy: 0.9180
Epoch 186/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0054 - accuracy:
0.9990 - val_loss: 0.2311 - val_accuracy: 0.9146
Epoch 187/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0054 - accuracy:
0.9990 - val_loss: 0.2247 - val_accuracy: 0.9169
Epoch 188/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0054 - accuracy:
0.9990 - val_loss: 0.2334 - val_accuracy: 0.9143
Epoch 189/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0053 - accuracy:
0.9990 - val_loss: 0.2894 - val_accuracy: 0.9006
Epoch 190/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0052 - accuracy:
0.9990 - val_loss: 0.2254 - val_accuracy: 0.9169
Epoch 191/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0053 - accuracy:
0.9990 - val_loss: 0.1824 - val_accuracy: 0.9327
Epoch 192/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0051 - accuracy:
0.9991 - val_loss: 0.2646 - val_accuracy: 0.9068
Epoch 193/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0052 - accuracy:
0.9990 - val_loss: 0.2482 - val_accuracy: 0.9106
Epoch 194/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0050 - accuracy:
0.9990 - val_loss: 0.2240 - val_accuracy: 0.9176
Epoch 195/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0051 - accuracy:
0.9991 - val_loss: 0.1776 - val_accuracy: 0.9352
Epoch 196/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0049 - accuracy:
0.9991 - val_loss: 0.2246 - val_accuracy: 0.9181
Epoch 197/500
```

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26/26 [==============================] - 0s 6ms/step - loss: 0.0049 - accuracy:
0.9991 - val_loss: 0.2195 - val_accuracy: 0.9200
Epoch 198/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0048 - accuracy:
0.9992 - val_loss: 0.2279 - val_accuracy: 0.9175
Epoch 199/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0049 - accuracy:
0.9990 - val_loss: 0.2266 - val_accuracy: 0.9182
Epoch 200/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0047 - accuracy:
0.9991 - val_loss: 0.2053 - val_accuracy: 0.9262
Epoch 201/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0046 - accuracy:
0.9992 - val_loss: 0.2052 - val_accuracy: 0.9264
Epoch 202/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0046 - accuracy:
0.9992 - val_loss: 0.2213 - val_accuracy: 0.9205
Epoch 203/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0046 - accuracy:
0.9991 - val_loss: 0.2253 - val_accuracy: 0.9192
Epoch 204/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0046 - accuracy:
0.9992 - val_loss: 0.2516 - val_accuracy: 0.9114
Epoch 205/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0045 - accuracy:
0.9992 - val_loss: 0.2699 - val_accuracy: 0.9069
Epoch 206/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0045 - accuracy:
0.9991 - val_loss: 0.1794 - val_accuracy: 0.9389
Epoch 207/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0045 - accuracy:
0.9992 - val_loss: 0.1993 - val_accuracy: 0.9297
Epoch 208/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0043 - accuracy:
0.9992 - val_loss: 0.2421 - val_accuracy: 0.9153
Epoch 209/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0043 - accuracy:
0.9992 - val_loss: 0.2031 - val_accuracy: 0.9285
Epoch 210/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0042 - accuracy:
0.9993 - val_loss: 0.2476 - val_accuracy: 0.9137
Epoch 211/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0043 - accuracy:
0.9992 - val_loss: 0.2613 - val_accuracy: 0.9098
Epoch 212/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0041 - accuracy:
0.9993 - val_loss: 0.2178 - val_accuracy: 0.9249
Epoch 213/500
```

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26/26 [==============================] - 0s 7ms/step - loss: 0.0041 - accuracy:
0.9992 - val_loss: 0.2283 - val_accuracy: 0.9208
Epoch 214/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0041 - accuracy:
0.9992 - val_loss: 0.2246 - val_accuracy: 0.9226
Epoch 215/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0041 - accuracy:
0.9993 - val_loss: 0.2140 - val_accuracy: 0.9269
Epoch 216/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0040 - accuracy:
0.9992 - val_loss: 0.2042 - val_accuracy: 0.9318
Epoch 217/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0040 - accuracy:
0.9993 - val_loss: 0.2004 - val_accuracy: 0.9341
Epoch 218/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0038 - accuracy:
0.9993 - val_loss: 0.2794 - val_accuracy: 0.9062
Epoch 219/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0038 - accuracy:
0.9993 - val_loss: 0.2489 - val_accuracy: 0.9151
Epoch 220/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0037 - accuracy:
0.9994 - val_loss: 0.2190 - val_accuracy: 0.9257
Epoch 221/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0038 - accuracy:
0.9995 - val_loss: 0.2112 - val_accuracy: 0.9298
Epoch 222/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0037 - accuracy:
0.9993 - val_loss: 0.2385 - val_accuracy: 0.9190
Epoch 223/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0037 - accuracy:
0.9994 - val_loss: 0.2749 - val_accuracy: 0.9081
Epoch 224/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0036 - accuracy:
0.9993 - val_loss: 0.2095 - val_accuracy: 0.9316
Epoch 225/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0036 - accuracy:
0.9994 - val_loss: 0.2073 - val_accuracy: 0.9329
Epoch 226/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0036 - accuracy:
0.9994 - val_loss: 0.2297 - val_accuracy: 0.9226
Epoch 227/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0035 - accuracy:
0.9994 - val_loss: 0.2326 - val_accuracy: 0.9223
Epoch 228/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0036 - accuracy:
0.9994 - val_loss: 0.2315 - val_accuracy: 0.9235
Epoch 229/500
```

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26/26 [==============================] - 0s 11ms/step - loss: 0.0035 - accuracy:
0.9995 - val_loss: 0.2119 - val_accuracy: 0.9315
Epoch 230/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0035 - accuracy:
0.9995 - val_loss: 0.2495 - val_accuracy: 0.9171
Epoch 231/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0034 - accuracy:
0.9993 - val_loss: 0.2386 - val_accuracy: 0.9206
Epoch 232/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0033 - accuracy:
0.9994 - val_loss: 0.2295 - val_accuracy: 0.9252
Epoch 233/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0035 - accuracy:
0.9994 - val_loss: 0.2303 - val_accuracy: 0.9259
Epoch 234/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0033 - accuracy:
0.9994 - val_loss: 0.2750 - val_accuracy: 0.9099
Epoch 235/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0032 - accuracy:
0.9994 - val_loss: 0.2508 - val_accuracy: 0.9178
Epoch 236/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0032 - accuracy:
0.9995 - val_loss: 0.2135 - val_accuracy: 0.9341
Epoch 237/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0032 - accuracy:
0.9995 - val_loss: 0.2498 - val_accuracy: 0.9187
Epoch 238/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0032 - accuracy:
0.9994 - val_loss: 0.2739 - val_accuracy: 0.9110
Epoch 239/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0033 - accuracy:
0.9995 - val_loss: 0.3375 - val_accuracy: 0.8940
Epoch 240/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0032 - accuracy:
0.9995 - val_loss: 0.2687 - val_accuracy: 0.9127
Epoch 241/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0031 - accuracy:
0.9995 - val_loss: 0.2486 - val_accuracy: 0.9197
Epoch 242/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0031 - accuracy:
0.9995 - val_loss: 0.2786 - val_accuracy: 0.9102
Epoch 243/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0030 - accuracy:
0.9995 - val_loss: 0.2351 - val_accuracy: 0.9267
Epoch 244/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0029 - accuracy:
0.9996 - val_loss: 0.2494 - val_accuracy: 0.9224
Epoch 245/500
```

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26/26 [==============================] - 0s 10ms/step - loss: 0.0030 - accuracy:
0.9995 - val_loss: 0.2409 - val_accuracy: 0.9259
Epoch 246/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0030 - accuracy:
0.9994 - val_loss: 0.2525 - val_accuracy: 0.9213
Epoch 247/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0029 - accuracy:
0.9995 - val_loss: 0.2657 - val_accuracy: 0.9162
Epoch 248/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0029 - accuracy:
0.9995 - val_loss: 0.2774 - val_accuracy: 0.9128
Epoch 249/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0029 - accuracy:
0.9994 - val_loss: 0.2665 - val_accuracy: 0.9168
Epoch 250/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0028 - accuracy:
0.9995 - val_loss: 0.2694 - val_accuracy: 0.9161
Epoch 251/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0029 - accuracy:
0.9995 - val_loss: 0.2593 - val_accuracy: 0.9210
Epoch 252/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0028 - accuracy:
0.9995 - val_loss: 0.2307 - val_accuracy: 0.9317
Epoch 253/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0028 - accuracy:
0.9996 - val_loss: 0.2243 - val_accuracy: 0.9349
Epoch 254/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0027 - accuracy:
0.9996 - val_loss: 0.2520 - val_accuracy: 0.9241
Epoch 255/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0027 - accuracy:
0.9996 - val_loss: 0.2691 - val_accuracy: 0.9178
Epoch 256/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0027 - accuracy:
0.9995 - val_loss: 0.3090 - val_accuracy: 0.9054
Epoch 257/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0026 - accuracy:
0.9996 - val_loss: 0.2887 - val_accuracy: 0.9117
Epoch 258/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0026 - accuracy:
0.9996 - val_loss: 0.2806 - val_accuracy: 0.9146
Epoch 259/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0026 - accuracy:
0.9996 - val_loss: 0.2606 - val_accuracy: 0.9225
Epoch 260/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0026 - accuracy:
0.9996 - val_loss: 0.2529 - val_accuracy: 0.9250
Epoch 261/500
```

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26/26 [==============================] - 0s 8ms/step - loss: 0.0025 - accuracy:
0.9996 - val_loss: 0.3432 - val_accuracy: 0.8971
Epoch 262/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0025 - accuracy:
0.9995 - val_loss: 0.2791 - val_accuracy: 0.9182
Epoch 263/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0024 - accuracy:
0.9996 - val_loss: 0.2879 - val_accuracy: 0.9152
Epoch 264/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0024 - accuracy:
0.9996 - val_loss: 0.2756 - val_accuracy: 0.9187
Epoch 265/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0024 - accuracy:
0.9996 - val_loss: 0.2901 - val_accuracy: 0.9160
Epoch 266/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0024 - accuracy:
0.9996 - val_loss: 0.2477 - val_accuracy: 0.9319
Epoch 267/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0024 - accuracy:
0.9997 - val_loss: 0.2732 - val_accuracy: 0.9222
Epoch 268/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0023 - accuracy:
0.9996 - val_loss: 0.2856 - val_accuracy: 0.9176
Epoch 269/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0023 - accuracy:
0.9996 - val_loss: 0.3048 - val_accuracy: 0.9106
Epoch 270/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0023 - accuracy:
0.9997 - val_loss: 0.2862 - val_accuracy: 0.9178
Epoch 271/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0023 - accuracy:
0.9997 - val_loss: 0.3267 - val_accuracy: 0.9054
Epoch 272/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0023 - accuracy:
0.9996 - val_loss: 0.3012 - val_accuracy: 0.9147
Epoch 273/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0023 - accuracy:
0.9996 - val_loss: 0.2998 - val_accuracy: 0.9143
Epoch 274/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0022 - accuracy:
0.9997 - val_loss: 0.3240 - val_accuracy: 0.9063
Epoch 275/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0022 - accuracy:
0.9996 - val_loss: 0.2595 - val_accuracy: 0.9290
Epoch 276/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0023 - accuracy:
0.9996 - val_loss: 0.3021 - val_accuracy: 0.9140
Epoch 277/500
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26/26 [==============================] - 0s 8ms/step - loss: 0.0022 - accuracy:
0.9997 - val_loss: 0.2892 - val_accuracy: 0.9186
Epoch 278/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0021 - accuracy:
0.9997 - val_loss: 0.2682 - val_accuracy: 0.9268
Epoch 279/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0021 - accuracy:
0.9997 - val_loss: 0.3422 - val_accuracy: 0.9023
Epoch 280/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0021 - accuracy:
0.9997 - val_loss: 0.3583 - val_accuracy: 0.8987
Epoch 281/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0021 - accuracy:
0.9996 - val_loss: 0.3487 - val_accuracy: 0.9007
Epoch 282/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0021 - accuracy:
0.9996 - val_loss: 0.3111 - val_accuracy: 0.9137
Epoch 283/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0020 - accuracy:
0.9998 - val_loss: 0.3913 - val_accuracy: 0.8903
Epoch 284/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0020 - accuracy:
0.9997 - val_loss: 0.3044 - val_accuracy: 0.9150
Epoch 285/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0020 - accuracy:
0.9997 - val_loss: 0.2995 - val_accuracy: 0.9177
Epoch 286/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0020 - accuracy:
0.9997 - val_loss: 0.3086 - val_accuracy: 0.9147
Epoch 287/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0019 - accuracy:
0.9997 - val_loss: 0.2906 - val_accuracy: 0.9226
Epoch 288/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0019 - accuracy:
0.9998 - val_loss: 0.3173 - val_accuracy: 0.9134
Epoch 289/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0020 - accuracy:
0.9997 - val_loss: 0.3182 - val_accuracy: 0.9140
Epoch 290/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0020 - accuracy:
0.9997 - val_loss: 0.3479 - val_accuracy: 0.9049
Epoch 291/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0019 - accuracy:
0.9997 - val_loss: 0.3436 - val_accuracy: 0.9070
Epoch 292/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0020 - accuracy:
0.9997 - val_loss: 0.3132 - val_accuracy: 0.9154
Epoch 293/500
```

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26/26 [==============================] - 0s 8ms/step - loss: 0.0018 - accuracy:
0.9997 - val_loss: 0.2812 - val_accuracy: 0.9278
Epoch 294/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0018 - accuracy:
0.9998 - val_loss: 0.3487 - val_accuracy: 0.9057
Epoch 295/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0019 - accuracy:
0.9997 - val_loss: 0.2970 - val_accuracy: 0.9231
Epoch 296/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0018 - accuracy:
0.9997 - val_loss: 0.2928 - val_accuracy: 0.9251
Epoch 297/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0018 - accuracy:
0.9997 - val_loss: 0.3215 - val_accuracy: 0.9154
Epoch 298/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0018 - accuracy:
0.9997 - val_loss: 0.3829 - val_accuracy: 0.8958
Epoch 299/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0017 - accuracy:
0.9997 - val_loss: 0.3152 - val_accuracy: 0.9190
Epoch 300/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0017 - accuracy:
0.9997 - val_loss: 0.3008 - val_accuracy: 0.9238
Epoch 301/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3430 - val_accuracy: 0.9100
Epoch 302/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0017 - accuracy:
0.9998 - val_loss: 0.3268 - val_accuracy: 0.9148
Epoch 303/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0017 - accuracy:
0.9997 - val_loss: 0.3015 - val_accuracy: 0.9250
Epoch 304/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3505 - val_accuracy: 0.9075
Epoch 305/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3026 - val_accuracy: 0.9245
Epoch 306/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3174 - val_accuracy: 0.9203
Epoch 307/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3359 - val_accuracy: 0.9138
Epoch 308/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0015 - accuracy:
0.9998 - val_loss: 0.3566 - val_accuracy: 0.9077
Epoch 309/500
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26/26 [==============================] - 0s 9ms/step - loss: 0.0015 - accuracy:
0.9998 - val_loss: 0.3893 - val_accuracy: 0.8983
Epoch 310/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3843 - val_accuracy: 0.9000
Epoch 311/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0016 - accuracy:
0.9998 - val_loss: 0.3943 - val_accuracy: 0.8974
Epoch 312/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0015 - accuracy:
0.9998 - val_loss: 0.3368 - val_accuracy: 0.9157
Epoch 313/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3313 - val_accuracy: 0.9183
Epoch 314/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3670 - val_accuracy: 0.9071
Epoch 315/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0015 - accuracy:
0.9998 - val_loss: 0.3588 - val_accuracy: 0.9092
Epoch 316/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0015 - accuracy:
0.9998 - val_loss: 0.3880 - val_accuracy: 0.9001
Epoch 317/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0015 - accuracy:
0.9998 - val_loss: 0.3409 - val_accuracy: 0.9145
Epoch 318/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3005 - val_accuracy: 0.9289
Epoch 319/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3319 - val_accuracy: 0.9184
Epoch 320/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3548 - val_accuracy: 0.9108
Epoch 321/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3211 - val_accuracy: 0.9222
Epoch 322/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3838 - val_accuracy: 0.9026
Epoch 323/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0013 - accuracy:
0.9998 - val_loss: 0.4023 - val_accuracy: 0.8966
Epoch 324/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0013 - accuracy:
0.9998 - val_loss: 0.3427 - val_accuracy: 0.9152
Epoch 325/500
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26/26 [==============================] - 0s 9ms/step - loss: 0.0013 - accuracy:
0.9998 - val_loss: 0.3135 - val_accuracy: 0.9277
Epoch 326/500
26/26 [==============================] - 0s 11ms/step - loss: 0.0014 - accuracy:
0.9998 - val_loss: 0.3376 - val_accuracy: 0.9197
Epoch 327/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0013 - accuracy:
0.9998 - val_loss: 0.3427 - val_accuracy: 0.9183
Epoch 328/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0013 - accuracy:
0.9999 - val_loss: 0.3366 - val_accuracy: 0.9209
Epoch 329/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0013 - accuracy:
0.9998 - val_loss: 0.3858 - val_accuracy: 0.9052
Epoch 330/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0013 - accuracy:
0.9998 - val_loss: 0.3545 - val_accuracy: 0.9156
Epoch 331/500
26/26 [==============================] - 0s 10ms/step - loss: 0.0014 - accuracy:
0.9997 - val_loss: 0.3649 - val_accuracy: 0.9122
Epoch 332/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0013 - accuracy:
0.9998 - val_loss: 0.3738 - val_accuracy: 0.9108
Epoch 333/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.4427 - val_accuracy: 0.8892
Epoch 334/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0012 - accuracy:
0.9999 - val_loss: 0.3349 - val_accuracy: 0.9241
Epoch 335/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.3287 - val_accuracy: 0.9248
Epoch 336/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0011 - accuracy:
0.9999 - val_loss: 0.3951 - val_accuracy: 0.9029
Epoch 337/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0012 - accuracy:
0.9999 - val_loss: 0.3710 - val_accuracy: 0.9119
Epoch 338/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0011 - accuracy:
0.9999 - val_loss: 0.4228 - val_accuracy: 0.8957
Epoch 339/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.4066 - val_accuracy: 0.9020
Epoch 340/500
26/26 [==============================] - 0s 6ms/step - loss: 0.0011 - accuracy:
0.9998 - val_loss: 0.3656 - val_accuracy: 0.9146
Epoch 341/500
```

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26/26 [==============================] - 0s 8ms/step - loss: 0.0012 - accuracy:
0.9998 - val_loss: 0.3660 - val_accuracy: 0.9149
Epoch 342/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0011 - accuracy:
0.9999 - val_loss: 0.3830 - val_accuracy: 0.9096
Epoch 343/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0012 - accuracy:
0.9999 - val_loss: 0.3996 - val_accuracy: 0.9054
Epoch 344/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0010 - accuracy:
0.9999 - val_loss: 0.4275 - val_accuracy: 0.8962
Epoch 345/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0011 - accuracy:
0.9998 - val_loss: 0.3716 - val_accuracy: 0.9152
Epoch 346/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0011 - accuracy:
0.9999 - val_loss: 0.3799 - val_accuracy: 0.9133
Epoch 347/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0011 - accuracy:
0.9998 - val_loss: 0.3578 - val_accuracy: 0.9212
Epoch 348/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0010 - accuracy:
0.9999 - val_loss: 0.3980 - val_accuracy: 0.9066
Epoch 349/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0011 - accuracy:
0.9998 - val_loss: 0.3791 - val_accuracy: 0.9149
Epoch 350/500
26/26 [==============================] - 0s 8ms/step - loss: 0.0010 - accuracy:
0.9998 - val_loss: 0.3498 - val_accuracy: 0.9234
Epoch 351/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0011 - accuracy:
0.9999 - val_loss: 0.3832 - val_accuracy: 0.9134
Epoch 352/500
26/26 [==============================] - 0s 6ms/step - loss: 9.8662e-04 -
accuracy: 0.9999 - val_loss: 0.4375 - val_accuracy: 0.8962
Epoch 353/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0010 - accuracy:
0.9998 - val_loss: 0.3896 - val_accuracy: 0.9109
Epoch 354/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0010 - accuracy:
0.9999 - val_loss: 0.3711 - val_accuracy: 0.9163
Epoch 355/500
26/26 [==============================] - 0s 8ms/step - loss: 9.6778e-04 -
accuracy: 0.9999 - val_loss: 0.3639 - val_accuracy: 0.9198
Epoch 356/500
26/26 [==============================] - 0s 7ms/step - loss: 9.7053e-04 -
accuracy: 0.9998 - val_loss: 0.3779 - val_accuracy: 0.9148
Epoch 357/500
```

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26/26 [==============================] - 0s 8ms/step - loss: 0.0010 - accuracy:
0.9999 - val_loss: 0.3936 - val_accuracy: 0.9097
Epoch 358/500
26/26 [==============================] - 0s 9ms/step - loss: 0.0010 - accuracy:
0.9999 - val_loss: 0.4437 - val_accuracy: 0.8954
Epoch 359/500
26/26 [==============================] - 0s 9ms/step - loss: 9.7681e-04 -
accuracy: 0.9999 - val_loss: 0.4132 - val_accuracy: 0.9046
Epoch 360/500
26/26 [==============================] - 0s 8ms/step - loss: 9.4524e-04 -
accuracy: 0.9999 - val_loss: 0.4177 - val_accuracy: 0.9037
Epoch 361/500
26/26 [==============================] - 0s 8ms/step - loss: 9.3581e-04 -
accuracy: 0.9998 - val_loss: 0.3872 - val_accuracy: 0.9140
Epoch 362/500
26/26 [==============================] - 0s 8ms/step - loss: 9.0636e-04 -
accuracy: 0.9999 - val_loss: 0.3701 - val_accuracy: 0.9208
Epoch 363/500
26/26 [==============================] - 0s 6ms/step - loss: 9.4530e-04 -
accuracy: 0.9999 - val_loss: 0.3862 - val_accuracy: 0.9144
Epoch 364/500
26/26 [==============================] - 0s 7ms/step - loss: 0.0010 - accuracy:
0.9998 - val_loss: 0.3736 - val_accuracy: 0.9205
Epoch 365/500
26/26 [==============================] - 0s 9ms/step - loss: 8.8983e-04 -
accuracy: 0.9998 - val_loss: 0.4060 - val_accuracy: 0.9121
Epoch 366/500
26/26 [==============================] - 0s 8ms/step - loss: 8.5270e-04 -
accuracy: 0.9999 - val_loss: 0.3950 - val_accuracy: 0.9146
Epoch 367/500
26/26 [==============================] - 0s 7ms/step - loss: 8.4901e-04 -
accuracy: 0.9999 - val_loss: 0.3839 - val_accuracy: 0.9181
Epoch 368/500
26/26 [==============================] - 0s 8ms/step - loss: 8.7318e-04 -
accuracy: 0.9999 - val_loss: 0.4165 - val_accuracy: 0.9091
Epoch 369/500
26/26 [==============================] - 0s 8ms/step - loss: 8.5441e-04 -
accuracy: 0.9998 - val_loss: 0.4306 - val_accuracy: 0.9030
Epoch 370/500
26/26 [==============================] - 0s 8ms/step - loss: 8.1862e-04 -
accuracy: 0.9999 - val_loss: 0.3939 - val_accuracy: 0.9165
Epoch 371/500
26/26 [==============================] - 0s 8ms/step - loss: 8.1826e-04 -
accuracy: 0.9999 - val_loss: 0.4022 - val_accuracy: 0.9142
Epoch 372/500
26/26 [==============================] - 0s 6ms/step - loss: 8.9026e-04 -
accuracy: 0.9999 - val_loss: 0.4009 - val_accuracy: 0.9154
Epoch 373/500
```

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26/26 [==============================] - 0s 9ms/step - loss: 8.3071e-04 -
accuracy: 0.9999 - val_loss: 0.4129 - val_accuracy: 0.9115
Epoch 374/500
26/26 [==============================] - 0s 9ms/step - loss: 8.1151e-04 -
accuracy: 0.9999 - val_loss: 0.4158 - val_accuracy: 0.9110
Epoch 375/500
26/26 [==============================] - 0s 9ms/step - loss: 8.0298e-04 -
accuracy: 0.9999 - val_loss: 0.3841 - val_accuracy: 0.9189
Epoch 376/500
26/26 [==============================] - 0s 8ms/step - loss: 8.5149e-04 -
accuracy: 0.9999 - val_loss: 0.3826 - val_accuracy: 0.9199
Epoch 377/500
26/26 [==============================] - 0s 8ms/step - loss: 8.7705e-04 -
accuracy: 0.9998 - val_loss: 0.3799 - val_accuracy: 0.9199
Epoch 378/500
26/26 [==============================] - 0s 7ms/step - loss: 8.4458e-04 -
accuracy: 0.9998 - val_loss: 0.3788 - val_accuracy: 0.9214
Epoch 379/500
26/26 [==============================] - 0s 8ms/step - loss: 8.6473e-04 -
accuracy: 0.9998 - val_loss: 0.3960 - val_accuracy: 0.9162
Epoch 380/500
26/26 [==============================] - 0s 9ms/step - loss: 7.8678e-04 -
accuracy: 0.9999 - val_loss: 0.3935 - val_accuracy: 0.9165
Epoch 381/500
26/26 [==============================] - 0s 9ms/step - loss: 7.3455e-04 -
accuracy: 0.9999 - val_loss: 0.4063 - val_accuracy: 0.9127
Epoch 382/500
26/26 [==============================] - 0s 11ms/step - loss: 7.6294e-04 -
accuracy: 0.9999 - val_loss: 0.4195 - val_accuracy: 0.9111
Epoch 383/500
26/26 [==============================] - 0s 8ms/step - loss: 7.5038e-04 -
accuracy: 0.9999 - val_loss: 0.4411 - val_accuracy: 0.9045
Epoch 384/500
26/26 [==============================] - 0s 9ms/step - loss: 7.3503e-04 -
accuracy: 0.9999 - val_loss: 0.4730 - val_accuracy: 0.8940
Epoch 385/500
26/26 [==============================] - 0s 11ms/step - loss: 7.2665e-04 -
accuracy: 0.9999 - val_loss: 0.4073 - val_accuracy: 0.9157
Epoch 386/500
26/26 [==============================] - 0s 11ms/step - loss: 7.3648e-04 -
accuracy: 0.9999 - val_loss: 0.4404 - val_accuracy: 0.9041
Epoch 387/500
26/26 [==============================] - 0s 10ms/step - loss: 6.9374e-04 -
accuracy: 0.9999 - val_loss: 0.4520 - val_accuracy: 0.9025
Epoch 388/500
26/26 [==============================] - 0s 9ms/step - loss: 6.8636e-04 -
accuracy: 0.9999 - val_loss: 0.4507 - val_accuracy: 0.9030
Epoch 389/500
```

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26/26 [==============================] - 0s 9ms/step - loss: 7.1156e-04 -
accuracy: 0.9998 - val_loss: 0.4272 - val_accuracy: 0.9115
Epoch 390/500
26/26 [==============================] - 0s 9ms/step - loss: 7.0434e-04 -
accuracy: 0.9999 - val_loss: 0.4293 - val_accuracy: 0.9101
Epoch 391/500
26/26 [==============================] - 0s 10ms/step - loss: 6.8470e-04 -
accuracy: 0.9999 - val_loss: 0.4720 - val_accuracy: 0.8977
Epoch 392/500
26/26 [==============================] - 0s 10ms/step - loss: 6.7760e-04 -
accuracy: 0.9999 - val_loss: 0.4388 - val_accuracy: 0.9088
Epoch 393/500
26/26 [==============================] - 0s 10ms/step - loss: 6.8380e-04 -
accuracy: 0.9999 - val_loss: 0.4299 - val_accuracy: 0.9112
Epoch 394/500
26/26 [==============================] - 0s 11ms/step - loss: 6.7512e-04 -
accuracy: 0.9999 - val_loss: 0.4724 - val_accuracy: 0.8985
Epoch 395/500
26/26 [==============================] - 0s 9ms/step - loss: 7.4762e-04 -
accuracy: 0.9999 - val_loss: 0.4821 - val_accuracy: 0.8937
Epoch 396/500
26/26 [==============================] - 0s 9ms/step - loss: 6.5268e-04 -
accuracy: 0.9999 - val_loss: 0.4636 - val_accuracy: 0.8984
Epoch 397/500
26/26 [==============================] - 0s 10ms/step - loss: 6.4932e-04 -
accuracy: 0.9999 - val_loss: 0.4073 - val_accuracy: 0.9156
Epoch 398/500
26/26 [==============================] - 0s 8ms/step - loss: 7.7705e-04 -
accuracy: 0.9999 - val_loss: 0.4230 - val_accuracy: 0.9126
Epoch 399/500
26/26 [==============================] - 0s 8ms/step - loss: 6.4111e-04 -
accuracy: 1.0000 - val_loss: 0.4193 - val_accuracy: 0.9135
Epoch 400/500
26/26 [==============================] - 0s 8ms/step - loss: 6.2547e-04 -
accuracy: 0.9999 - val_loss: 0.4646 - val_accuracy: 0.9005
Epoch 401/500
26/26 [==============================] - 0s 8ms/step - loss: 6.8584e-04 -
accuracy: 0.9999 - val_loss: 0.4613 - val_accuracy: 0.9022
Epoch 402/500
26/26 [==============================] - 0s 9ms/step - loss: 6.0571e-04 -
accuracy: 0.9999 - val_loss: 0.4481 - val_accuracy: 0.9071
Epoch 403/500
26/26 [==============================] - 0s 9ms/step - loss: 5.9490e-04 -
accuracy: 0.9999 - val_loss: 0.4429 - val_accuracy: 0.9081
Epoch 404/500
26/26 [==============================] - 0s 10ms/step - loss: 6.1623e-04 -
accuracy: 0.9999 - val_loss: 0.4262 - val_accuracy: 0.9121
Epoch 405/500
```

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26/26 [==============================] - 0s 10ms/step - loss: 6.5446e-04 -
accuracy: 0.9999 - val_loss: 0.4356 - val_accuracy: 0.9122
Epoch 406/500
26/26 [==============================] - 0s 8ms/step - loss: 5.7922e-04 -
accuracy: 0.9999 - val_loss: 0.4272 - val_accuracy: 0.9142
Epoch 407/500
26/26 [==============================] - 0s 10ms/step - loss: 6.5408e-04 -
accuracy: 0.9999 - val_loss: 0.4369 - val_accuracy: 0.9103
Epoch 408/500
26/26 [==============================] - 0s 10ms/step - loss: 5.7141e-04 -
accuracy: 0.9999 - val_loss: 0.4652 - val_accuracy: 0.9023
Epoch 409/500
26/26 [==============================] - 0s 6ms/step - loss: 5.7672e-04 -
accuracy: 0.9999 - val_loss: 0.4219 - val_accuracy: 0.9163
Epoch 410/500
26/26 [==============================] - 0s 8ms/step - loss: 5.5223e-04 -
accuracy: 1.0000 - val_loss: 0.4487 - val_accuracy: 0.9081
Epoch 411/500
26/26 [==============================] - 0s 9ms/step - loss: 5.6064e-04 -
accuracy: 0.9999 - val_loss: 0.4478 - val_accuracy: 0.9078
Epoch 412/500
26/26 [==============================] - 0s 8ms/step - loss: 5.3565e-04 -
accuracy: 1.0000 - val_loss: 0.4620 - val_accuracy: 0.9047
Epoch 413/500
26/26 [==============================] - 0s 8ms/step - loss: 6.0192e-04 -
accuracy: 0.9999 - val_loss: 0.4423 - val_accuracy: 0.9108
Epoch 414/500
26/26 [==============================] - 0s 9ms/step - loss: 6.1000e-04 -
accuracy: 0.9999 - val_loss: 0.4341 - val_accuracy: 0.9143
Epoch 415/500
26/26 [==============================] - 0s 9ms/step - loss: 5.6706e-04 -
accuracy: 1.0000 - val_loss: 0.4569 - val_accuracy: 0.9069
Epoch 416/500
26/26 [==============================] - 0s 8ms/step - loss: 5.8148e-04 -
accuracy: 0.9999 - val_loss: 0.4402 - val_accuracy: 0.9118
Epoch 417/500
26/26 [==============================] - 0s 8ms/step - loss: 5.9935e-04 -
accuracy: 0.9999 - val_loss: 0.4422 - val_accuracy: 0.9137
Epoch 418/500
26/26 [==============================] - 0s 8ms/step - loss: 5.6728e-04 -
accuracy: 0.9999 - val_loss: 0.4241 - val_accuracy: 0.9178
Epoch 419/500
26/26 [==============================] - 0s 8ms/step - loss: 6.0015e-04 -
accuracy: 0.9999 - val_loss: 0.4781 - val_accuracy: 0.9037
Epoch 420/500
26/26 [==============================] - 0s 8ms/step - loss: 5.1146e-04 -
accuracy: 1.0000 - val_loss: 0.4507 - val_accuracy: 0.9097
Epoch 421/500
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26/26 [==============================] - 0s 8ms/step - loss: 5.1227e-04 -
accuracy: 0.9999 - val_loss: 0.4569 - val_accuracy: 0.9088
Epoch 422/500
26/26 [==============================] - 0s 9ms/step - loss: 5.1531e-04 -
accuracy: 1.0000 - val_loss: 0.4566 - val_accuracy: 0.9082
Epoch 423/500
26/26 [==============================] - 0s 9ms/step - loss: 4.9891e-04 -
accuracy: 0.9999 - val_loss: 0.4548 - val_accuracy: 0.9096
Epoch 424/500
26/26 [==============================] - 0s 7ms/step - loss: 4.8734e-04 -
accuracy: 0.9999 - val_loss: 0.4331 - val_accuracy: 0.9167
Epoch 425/500
26/26 [==============================] - 0s 8ms/step - loss: 5.2505e-04 -
accuracy: 0.9999 - val_loss: 0.4368 - val_accuracy: 0.9162
Epoch 426/500
26/26 [==============================] - 0s 7ms/step - loss: 5.3354e-04 -
accuracy: 0.9999 - val_loss: 0.4439 - val_accuracy: 0.9137
Epoch 427/500
26/26 [==============================] - 0s 9ms/step - loss: 4.7970e-04 -
accuracy: 1.0000 - val_loss: 0.4550 - val_accuracy: 0.9098
Epoch 428/500
26/26 [==============================] - 0s 9ms/step - loss: 5.0446e-04 -
accuracy: 1.0000 - val_loss: 0.4464 - val_accuracy: 0.9134
Epoch 429/500
26/26 [==============================] - 0s 8ms/step - loss: 4.6220e-04 -
accuracy: 1.0000 - val_loss: 0.5207 - val_accuracy: 0.8900
Epoch 430/500
26/26 [==============================] - 0s 8ms/step - loss: 4.6635e-04 -
accuracy: 0.9999 - val_loss: 0.4770 - val_accuracy: 0.9029
Epoch 431/500
26/26 [==============================] - 0s 7ms/step - loss: 4.9356e-04 -
accuracy: 0.9999 - val_loss: 0.4633 - val_accuracy: 0.9073
Epoch 432/500
26/26 [==============================] - 0s 9ms/step - loss: 5.0501e-04 -
accuracy: 0.9999 - val_loss: 0.4595 - val_accuracy: 0.9073
Epoch 433/500
26/26 [==============================] - 0s 8ms/step - loss: 4.4897e-04 -
accuracy: 0.9999 - val_loss: 0.4675 - val_accuracy: 0.9071
Epoch 434/500
26/26 [==============================] - 0s 7ms/step - loss: 4.4897e-04 -
accuracy: 0.9999 - val_loss: 0.4440 - val_accuracy: 0.9153
Epoch 435/500
26/26 [==============================] - 0s 8ms/step - loss: 4.5362e-04 -
accuracy: 0.9999 - val_loss: 0.4687 - val_accuracy: 0.9072
Epoch 436/500
26/26 [==============================] - 0s 8ms/step - loss: 4.4909e-04 -
accuracy: 1.0000 - val_loss: 0.4767 - val_accuracy: 0.9060
Epoch 437/500
```

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26/26 [==============================] - 0s 7ms/step - loss: 4.3191e-04 -
accuracy: 0.9999 - val_loss: 0.4533 - val_accuracy: 0.9126
Epoch 438/500
26/26 [==============================] - 0s 9ms/step - loss: 4.4534e-04 -
accuracy: 0.9999 - val_loss: 0.4642 - val_accuracy: 0.9093
Epoch 439/500
26/26 [==============================] - 0s 8ms/step - loss: 4.4610e-04 -
accuracy: 1.0000 - val_loss: 0.4825 - val_accuracy: 0.9046
Epoch 440/500
26/26 [==============================] - 0s 8ms/step - loss: 4.3114e-04 -
accuracy: 1.0000 - val_loss: 0.4776 - val_accuracy: 0.9075
Epoch 441/500
26/26 [==============================] - 0s 9ms/step - loss: 4.8705e-04 -
accuracy: 0.9999 - val_loss: 0.4609 - val_accuracy: 0.9115
Epoch 442/500
26/26 [==============================] - 0s 8ms/step - loss: 4.2338e-04 -
accuracy: 1.0000 - val_loss: 0.5024 - val_accuracy: 0.8991
Epoch 443/500
26/26 [==============================] - 0s 6ms/step - loss: 4.4975e-04 -
accuracy: 0.9999 - val_loss: 0.4992 - val_accuracy: 0.9020
Epoch 444/500
26/26 [==============================] - 0s 7ms/step - loss: 4.1618e-04 -
accuracy: 1.0000 - val_loss: 0.5697 - val_accuracy: 0.8808
Epoch 445/500
26/26 [==============================] - 0s 9ms/step - loss: 5.4166e-04 -
accuracy: 0.9999 - val_loss: 0.5065 - val_accuracy: 0.8949
Epoch 446/500
26/26 [==============================] - 0s 7ms/step - loss: 4.7542e-04 -
accuracy: 0.9999 - val_loss: 0.5049 - val_accuracy: 0.8962
Epoch 447/500
26/26 [==============================] - 0s 7ms/step - loss: 3.9532e-04 -
accuracy: 1.0000 - val_loss: 0.4742 - val_accuracy: 0.9064
Epoch 448/500
26/26 [==============================] - 0s 7ms/step - loss: 3.8065e-04 -
accuracy: 1.0000 - val_loss: 0.4768 - val_accuracy: 0.9066
Epoch 449/500
26/26 [==============================] - 0s 9ms/step - loss: 4.2056e-04 -
accuracy: 0.9999 - val_loss: 0.4588 - val_accuracy: 0.9122
Epoch 450/500
26/26 [==============================] - 0s 8ms/step - loss: 3.7587e-04 -
accuracy: 1.0000 - val_loss: 0.5118 - val_accuracy: 0.8978
Epoch 451/500
26/26 [==============================] - 0s 8ms/step - loss: 3.8788e-04 -
accuracy: 1.0000 - val_loss: 0.4835 - val_accuracy: 0.9056
Epoch 452/500
26/26 [==============================] - 0s 7ms/step - loss: 3.7361e-04 -
accuracy: 1.0000 - val_loss: 0.4811 - val_accuracy: 0.9072
Epoch 453/500
```

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26/26 [==============================] - 0s 8ms/step - loss: 3.7875e-04 -
accuracy: 1.0000 - val_loss: 0.4893 - val_accuracy: 0.9051
Epoch 454/500
26/26 [==============================] - 0s 7ms/step - loss: 3.7442e-04 -
accuracy: 1.0000 - val_loss: 0.5092 - val_accuracy: 0.8986
Epoch 455/500
26/26 [==============================] - 0s 7ms/step - loss: 4.0898e-04 -
accuracy: 0.9999 - val_loss: 0.5282 - val_accuracy: 0.8951
Epoch 456/500
26/26 [==============================] - 0s 8ms/step - loss: 3.8216e-04 -
accuracy: 1.0000 - val_loss: 0.5589 - val_accuracy: 0.8858
Epoch 457/500
26/26 [==============================] - 0s 11ms/step - loss: 4.2129e-04 -
accuracy: 0.9999 - val_loss: 0.5162 - val_accuracy: 0.8974
Epoch 458/500
26/26 [==============================] - 0s 9ms/step - loss: 4.0712e-04 -
accuracy: 0.9999 - val_loss: 0.4739 - val_accuracy: 0.9083
Epoch 459/500
26/26 [==============================] - 0s 9ms/step - loss: 3.5995e-04 -
accuracy: 1.0000 - val_loss: 0.4927 - val_accuracy: 0.9057
Epoch 460/500
26/26 [==============================] - 0s 9ms/step - loss: 3.4192e-04 -
accuracy: 1.0000 - val_loss: 0.4892 - val_accuracy: 0.9060
Epoch 461/500
26/26 [==============================] - 0s 10ms/step - loss: 3.3251e-04 -
accuracy: 1.0000 - val_loss: 0.4772 - val_accuracy: 0.9094
Epoch 462/500
26/26 [==============================] - 0s 10ms/step - loss: 3.6551e-04 -
accuracy: 1.0000 - val_loss: 0.5118 - val_accuracy: 0.8996
Epoch 463/500
26/26 [==============================] - 0s 9ms/step - loss: 3.6924e-04 -
accuracy: 0.9999 - val_loss: 0.4662 - val_accuracy: 0.9134
Epoch 464/500
26/26 [==============================] - 0s 10ms/step - loss: 3.2468e-04 -
accuracy: 1.0000 - val_loss: 0.4923 - val_accuracy: 0.9054
Epoch 465/500
26/26 [==============================] - 0s 10ms/step - loss: 3.4228e-04 -
accuracy: 0.9999 - val_loss: 0.5102 - val_accuracy: 0.9017
Epoch 466/500
26/26 [==============================] - 0s 9ms/step - loss: 3.2129e-04 -
accuracy: 1.0000 - val_loss: 0.4847 - val_accuracy: 0.9087
Epoch 467/500
26/26 [==============================] - 0s 9ms/step - loss: 3.2155e-04 -
accuracy: 1.0000 - val_loss: 0.5121 - val_accuracy: 0.9017
Epoch 468/500
26/26 [==============================] - 0s 9ms/step - loss: 3.4958e-04 -
accuracy: 0.9999 - val_loss: 0.5266 - val_accuracy: 0.8979
Epoch 469/500
```

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26/26 [==============================] - 0s 10ms/step - loss: 3.6271e-04 -
accuracy: 1.0000 - val_loss: 0.5292 - val_accuracy: 0.8978
Epoch 470/500
26/26 [==============================] - 0s 9ms/step - loss: 3.4157e-04 -
accuracy: 0.9999 - val_loss: 0.5256 - val_accuracy: 0.8994
Epoch 471/500
26/26 [==============================] - 0s 9ms/step - loss: 3.3415e-04 -
accuracy: 1.0000 - val_loss: 0.5004 - val_accuracy: 0.9059
Epoch 472/500
26/26 [==============================] - 0s 9ms/step - loss: 3.3643e-04 -
accuracy: 0.9999 - val_loss: 0.5123 - val_accuracy: 0.9021
Epoch 473/500
26/26 [==============================] - 0s 9ms/step - loss: 3.1696e-04 -
accuracy: 1.0000 - val_loss: 0.5474 - val_accuracy: 0.8933
Epoch 474/500
26/26 [==============================] - 0s 11ms/step - loss: 2.9081e-04 -
accuracy: 1.0000 - val_loss: 0.4903 - val_accuracy: 0.9088
Epoch 475/500
26/26 [==============================] - 0s 9ms/step - loss: 3.0208e-04 -
accuracy: 1.0000 - val_loss: 0.5213 - val_accuracy: 0.8993
Epoch 476/500
26/26 [==============================] - 0s 9ms/step - loss: 3.1164e-04 -
accuracy: 1.0000 - val_loss: 0.5715 - val_accuracy: 0.8859
Epoch 477/500
26/26 [==============================] - 0s 9ms/step - loss: 3.8581e-04 -
accuracy: 0.9999 - val_loss: 0.5950 - val_accuracy: 0.8799
Epoch 478/500
26/26 [==============================] - 0s 8ms/step - loss: 2.9862e-04 -
accuracy: 1.0000 - val_loss: 0.4971 - val_accuracy: 0.9054
Epoch 479/500
26/26 [==============================] - 0s 10ms/step - loss: 2.9701e-04 -
accuracy: 1.0000 - val_loss: 0.5239 - val_accuracy: 0.8984
Epoch 480/500
26/26 [==============================] - 0s 8ms/step - loss: 3.1753e-04 -
accuracy: 1.0000 - val_loss: 0.5275 - val_accuracy: 0.8970
Epoch 481/500
26/26 [==============================] - 0s 10ms/step - loss: 3.8638e-04 -
accuracy: 0.9999 - val_loss: 0.5334 - val_accuracy: 0.8961
Epoch 482/500
26/26 [==============================] - 0s 10ms/step - loss: 3.0038e-04 -
accuracy: 1.0000 - val_loss: 0.5137 - val_accuracy: 0.9029
Epoch 483/500
26/26 [==============================] - 0s 10ms/step - loss: 2.8837e-04 -
accuracy: 1.0000 - val_loss: 0.5130 - val_accuracy: 0.9035
Epoch 484/500
26/26 [==============================] - 0s 9ms/step - loss: 3.0525e-04 -
accuracy: 1.0000 - val_loss: 0.4989 - val_accuracy: 0.9066
Epoch 485/500
```

```
26/26 [==============================] - 0s 8ms/step - loss: 3.2800e-04 -
accuracy: 1.0000 - val_loss: 0.5407 - val_accuracy: 0.8936
Epoch 486/500
26/26 [==============================] - 0s 8ms/step - loss: 3.1421e-04 -
accuracy: 1.0000 - val_loss: 0.5344 - val_accuracy: 0.8952
Epoch 487/500
26/26 [==============================] - 0s 9ms/step - loss: 2.8627e-04 -
accuracy: 1.0000 - val_loss: 0.5316 - val_accuracy: 0.8982
Epoch 488/500
26/26 [==============================] - 0s 8ms/step - loss: 3.0565e-04 -
accuracy: 1.0000 - val_loss: 0.5241 - val_accuracy: 0.9009
Epoch 489/500
26/26 [==============================] - 0s 8ms/step - loss: 2.8445e-04 -
accuracy: 1.0000 - val_loss: 0.5106 - val_accuracy: 0.9042
Epoch 490/500
26/26 [==============================] - 0s 8ms/step - loss: 2.7384e-04 -
accuracy: 1.0000 - val_loss: 0.5533 - val_accuracy: 0.8935
Epoch 491/500
26/26 [==============================] - 0s 7ms/step - loss: 2.7571e-04 -
accuracy: 1.0000 - val_loss: 0.5536 - val_accuracy: 0.8934
Epoch 492/500
26/26 [==============================] - 0s 9ms/step - loss: 2.5940e-04 -
accuracy: 1.0000 - val_loss: 0.5162 - val_accuracy: 0.9047
Epoch 493/500
26/26 [==============================] - 0s 6ms/step - loss: 2.6087e-04 -
accuracy: 1.0000 - val_loss: 0.5487 - val_accuracy: 0.8965
Epoch 494/500
26/26 [==============================] - 0s 9ms/step - loss: 2.7826e-04 -
accuracy: 1.0000 - val_loss: 0.5032 - val_accuracy: 0.9092
Epoch 495/500
26/26 [==============================] - 0s 7ms/step - loss: 2.4443e-04 -
accuracy: 1.0000 - val_loss: 0.5447 - val_accuracy: 0.8962
Epoch 496/500
26/26 [==============================] - 0s 8ms/step - loss: 2.9270e-04 -
accuracy: 0.9999 - val_loss: 0.5511 - val_accuracy: 0.8952
Epoch 497/500
26/26 [==============================] - 0s 7ms/step - loss: 2.5732e-04 -
accuracy: 1.0000 - val_loss: 0.5271 - val_accuracy: 0.9020
Epoch 498/500
26/26 [==============================] - 0s 9ms/step - loss: 2.5524e-04 -
accuracy: 1.0000 - val_loss: 0.5534 - val_accuracy: 0.8943
Epoch 499/500
26/26 [==============================] - 0s 6ms/step - loss: 2.8189e-04 -
accuracy: 1.0000 - val_loss: 0.5108 - val_accuracy: 0.9070
Epoch 500/500
26/26 [==============================] - 0s 7ms/step - loss: 2.6683e-04 -
accuracy: 1.0000 - val_loss: 0.5289 - val_accuracy: 0.9011
466/466 [==============================] - 1s 3ms/step - loss: 0.0739 -
```

```
accuracy: 0.9799
```

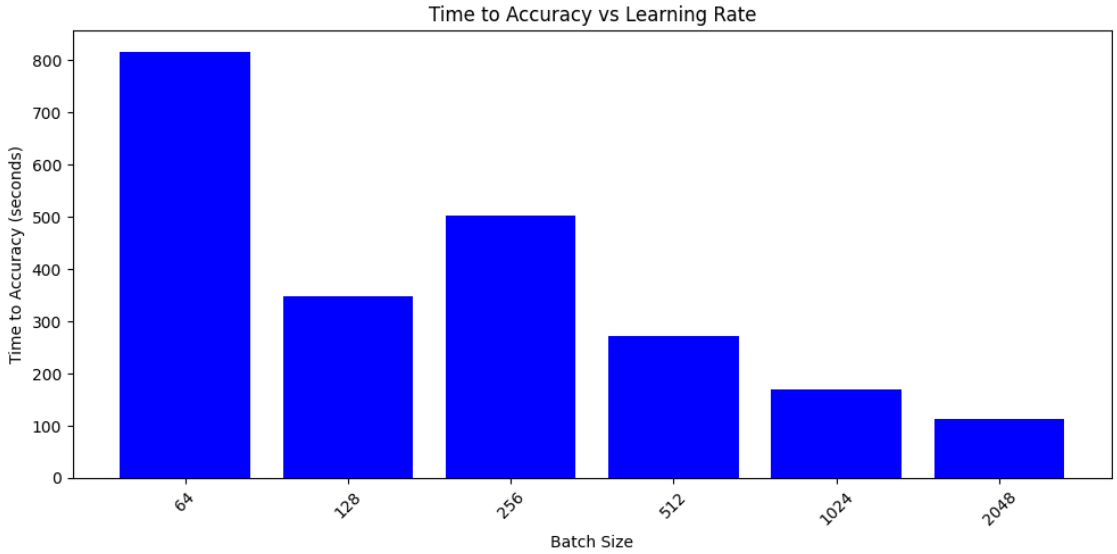
Next, you will visualize the results.

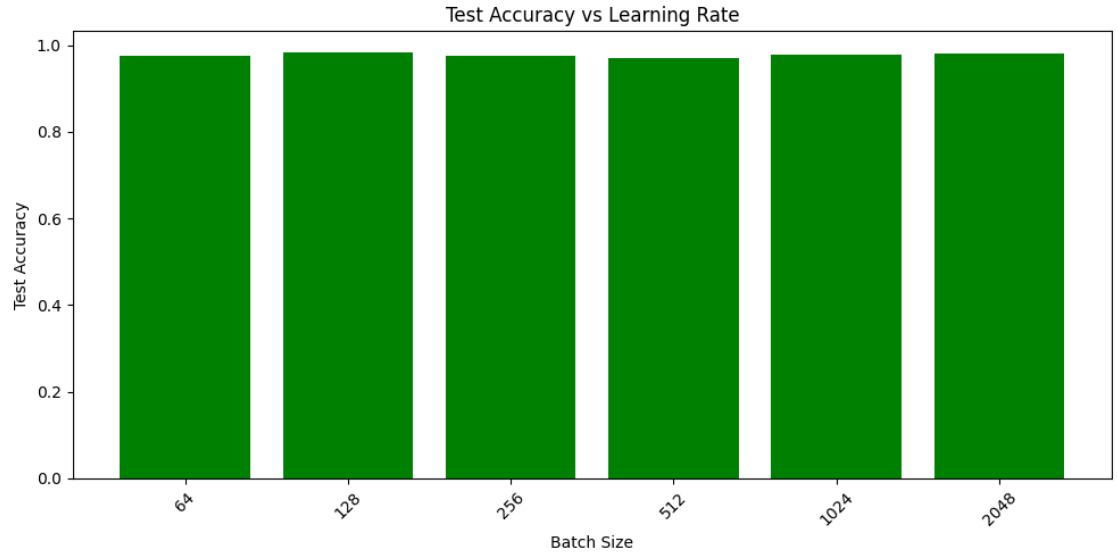
GPU runtime instructions: Create a figure with four subplots. In each subplot, create a bar plot with batch size on the horizontal axis and (1) Time to accuracy, (2) Energy to accuracy, (3) Test accuracy, (4) Epochs, on the vertical axis on each subplot, respectively. Use an appropriate vertical range for each subplot. Label all axes.

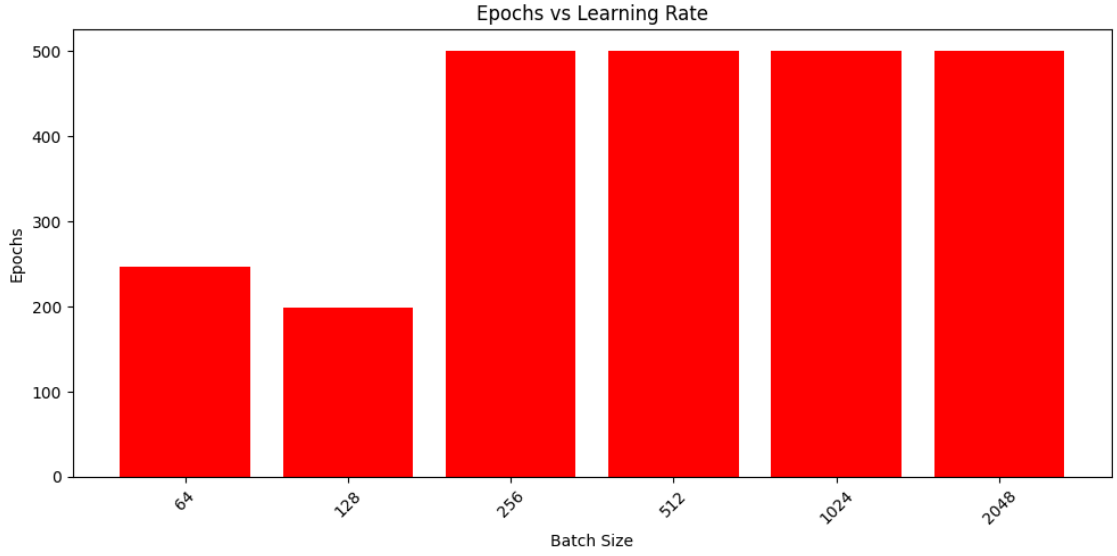
CPU runtime instructions: Create a figure with three subplots. In each subplot, create a bar plot with batch size on the horizontal axis and (1) Time to accuracy, (2) Test accuracy, (3) Epochs, on the vertical axis on each subplot, respectively. Use an appropriate vertical range for each subplot. Label all axes.

[ ]:
```python
# TODO - visualize effect of varying batch size, when training to a target␣
↪accuracy

batch_size = [m['batch_size'] for m in metrics_vs_bs]
time_to_accuracy = [m['train_time'] for m in metrics_vs_bs]
test_accuracies = [m['test_accuracy'] for m in metrics_vs_bs]
epochs = [m['epochs'] for m in metrics_vs_bs]
fig, axes = plt.subplots(3, 1, figsize=(10, 15))

# Converting learning rates to strings for better display on the x-axis
batch_size_labels = [str(bs) for bs in batch_size]

# Subplot 1: Time to Accuracy
axes[0].bar(batch_size_labels, time_to_accuracy, color='blue')
axes[0].set_title('Time to Accuracy vs Learning Rate')
axes[0].set_xlabel('Batch Size')
axes[0].set_ylabel('Time to Accuracy (seconds)')

# Subplot 2: Test Accuracy
axes[1].bar(batch_size_labels, test_accuracies, color='green')
axes[1].set_title('Test Accuracy vs Learning Rate')
axes[1].set_xlabel('Batch Size')
axes[1].set_ylabel('Test Accuracy')

# Subplot 3: Epochs
axes[2].bar(batch_size_labels, epochs, color='red')
axes[2].set_title('Epochs vs Learning Rate')
axes[2].set_xlabel('Batch Size')
axes[2].set_ylabel('Epochs')

# Adjusting x-axis and y-axis for better readability
for ax in axes:
    ax.tick_params(axis='x', labelrotation=45)  # Rotate x-axis labels for␣
↪clarity
```

```
plt.tight_layout()
plt.show()
```


Time to Accuracy vs Learning Rate
Time to Accuracy (seconds)
0
100
200
300
400
500
600
700
800
64
128
256
512
1024
2048
Batch Size


Test Accuracy vs Learning Rate
Test Accuracy
0.0
0.2
0.4
0.6
0.8
1.0
64
128
256
512
1024
2048
Batch Size


Epochs vs Learning Rate
Epochs
0
100
200
300
400
500
64
128
256
512
1024
2048
Batch Size

Comment on the results: Given that the model is trained to a target validation accuracy, what is the effect of the batch size on the training process?

Note: because of the stochastic nature of neural network training AND in the compute resource, these measurements can be very "noisy". Look for overall trends, but don't be concerned with small differences from one experiment to the next, or with occasional "outlier" results. Also note that if the number of epochs is 500, this is an indication that the target validation accuracy was *not* reached in 500 epochs!

Time to Accuracy: The time required to reach the target validation accuracy appears to be highest for the smallest batch size (64) and decreases as the batch size increases to 256. Beyond this point, the time taken does not decrease significantly with further increases in batch size. This suggests that there is a diminishing return on reducing training time after a certain batch size threshold.

Test Accuracy: The test accuracy remains relatively stable across different batch sizes. This indicates that the batch size does not have a significant effect on the model's generalization to the test data, within the range of batch sizes provided.

Epochs: The number of epochs required to reach the target validation accuracy tends to decrease as the batch size increases. This is likely due to the fact that larger batch sizes provide a more accurate estimate of the gradient, leading to more efficient learning steps.