```
from sklearn.datasets import make_moons
X_moons, y_moons = make_moons(n_samples=20000, noise=0.2, random_state=42)
X_moons.shape
y_moons.shape
```

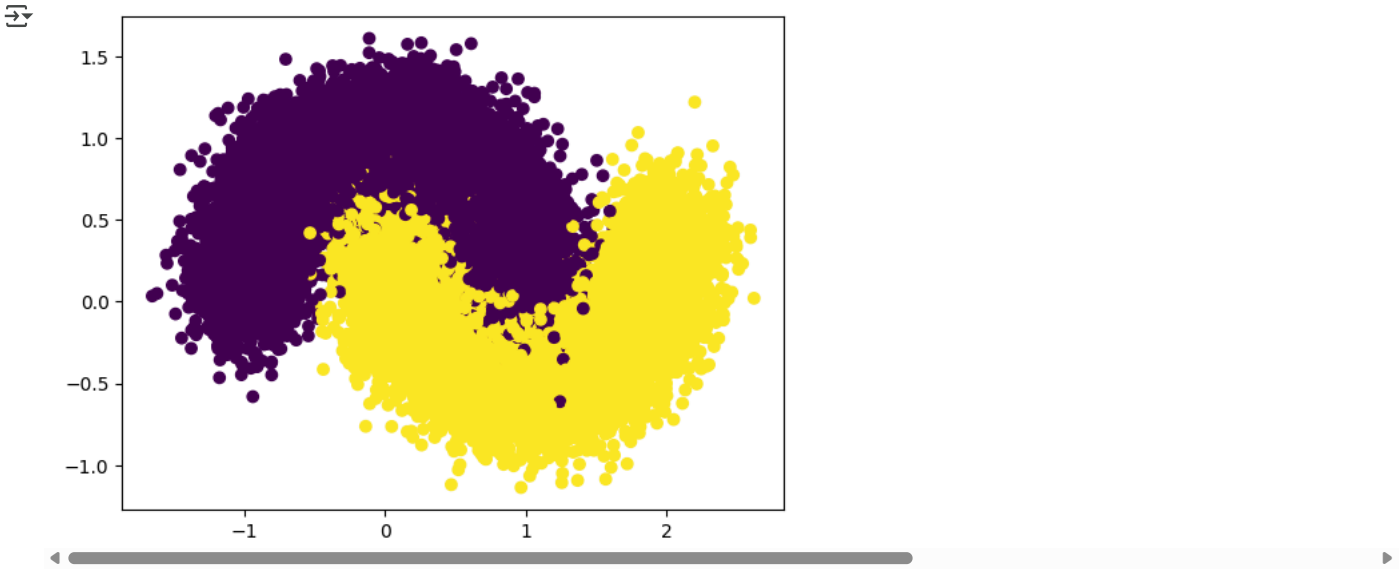
```
(20000,)
```

```
from sklearn.datasets import make_circles
X_circles, y_circles = make_circles(random_state=42)
X_circles.shape
y_circles.shape
list(y_circles[:5])
```

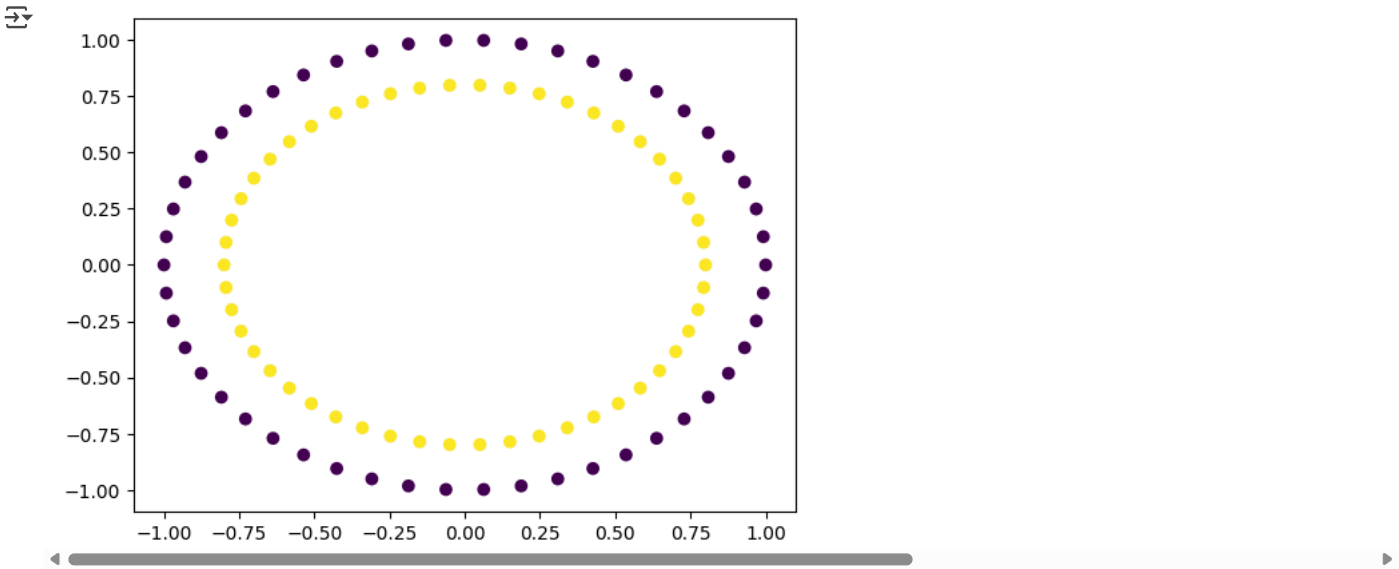
```
[np.int64(1), np.int64(1), np.int64(1), np.int64(0), np.int64(0)]
```

```
import numpy as np
import matplotlib.pyplot as plt

plt.scatter(X_moons[:,0], X_moons[:,1], c=y_moons)
plt.show()
```




```
plt.scatter(X_circles[:,0], X_circles[:,1], c=y_circles)
plt.show()
```




```
import pandas as pd
df = pd.DataFrame(X_moons)
df.head()
```

What can I help you build?

	0	1
0	-0.014152	0.074098
1	0.719697	0.566071
2	-1.177546	0.623492
3	1.053187	0.133187
4	0.306126	-0.297564

Next steps: Generate code with df | View recommended plots | New interactive sheet

Generate: split the make moons dataset into training and test data — Close

1 of 1 | Undo Changes | Use code with caution

```
from sklearn.model_selection import train_test_split

X_moons_train, X_moons_test, y_moons_train, y_moons_test = train_test_split(X_moons, y_moons, test_size=0.2, random_state=42)

print(f"Training features shape: {X_moons_train.shape}")
print(f"Training labels shape: {y_moons_train.shape}")
print(f"Testing features shape: {X_moons_test.shape}")
print(f"Testing labels shape: {y_moons_test.shape}")
```

```
Training features shape: (16000, 2)
Training labels shape: (16000,)
Testing features shape: (4000, 2)
Testing labels shape: (4000,)
```

Generate: create a neural network with 512 neurons split in 3 hidden layers and 3000 epochs and using adam optimiser and sigmoid — Close

1 of 1 | Undo Changes | Use code with caution

```
!pip install tensorflow
import matplotlib.pyplot as plt
import tensorflow as tf


model = tf.keras.models.Sequential([
    tf.keras.layers.Dense(512, activation='relu', input_shape=(2,)),
    tf.keras.layers.Dense(512, activation='relu'),
    tf.keras.layers.Dense(512, activation='relu'),
    tf.keras.layers.Dense(1, activation='sigmoid')
])


model.compile(optimizer='adam',
              loss='binary_crossentropy',
              metrics=['accuracy'])


history = model.fit(X_moons_train, y_moons_train, epochs=300, validation_split=0.2)


loss, accuracy = model.evaluate(X_moons_test, y_moons_test)
print(f"Test Loss: {loss}")
print(f"Test Accuracy: {accuracy}")

plt.plot(history.history['accuracy'], label='accuracy')
plt.plot(history.history['val_accuracy'], label = 'val_accuracy')
plt.xlabel('Epoch')
plt.ylabel('Accuracy')
plt.ylim([0, 1])
plt.legend(loc='lower right')
plt.show()

plt.plot(history.history['loss'], label='loss')
plt.plot(history.history['val_loss'], label = 'val_loss')
plt.xlabel('Epoch')
plt.ylabel('Loss')
plt.legend(loc='upper right')
plt.show()
```

```
Collecting tensorflow
  Downloading tensorflow-2.19.0-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (4.1 kB)
Requirement already satisfied: absl-py>=1.0.0 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (1.4.0)
Collecting astunparse>=1.6.0 (from tensorflow)
  Downloading astunparse-1.6.3-py2.py3-none-any.whl.metadata (4.4 kB)
Collecting flatbuffers>=24.3.25 (from tensorflow)
  Downloading flatbuffers-25.2.10-py2.py3-none-any.whl.metadata (875 bytes)
Requirement already satisfied: gast!=0.5.0,!=0.5.1,!=0.5.2,>=0.2.1 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (0.6
Collecting google-pasta>=0.1.1 (from tensorflow)
  Downloading google_pasta-0.2.0-py3-none-any.whl.metadata (814 bytes)
Collecting libclang>=13.0.0 (from tensorflow)
  Downloading libclang-18.1.1-py2.py3-none-manylinux2010_x86_64.whl.metadata (5.2 kB)
Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (3.4.0)
Requirement already satisfied: packaging in /usr/local/lib/python3.11/dist-packages (from tensorflow) (25.0)
Collecting protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<6.0.0dev,>=3.20.3 (from tensorflow)
  Downloading protobuf-5.29.5-cp38-abi3-manylinux2014_x86_64.whl.metadata (592 bytes)
Requirement already satisfied: requests<3,>=2.21.0 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (2.32.3)
Requirement already satisfied: setuptools in /usr/local/lib/python3.11/dist-packages (from tensorflow) (75.2.0)
Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (1.17.0)
Requirement already satisfied: termcolor>=1.1.0 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (3.1.0)
Requirement already satisfied: typing-extensions>=3.6.6 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (4.14.0)
Requirement already satisfied: wrapt>=1.11.0 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (1.17.2)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (1.73.1)
Collecting tensorboard~=2.19.0 (from tensorflow)
  Downloading tensorboard-2.19.0-py3-none-any.whl.metadata (1.8 kB)
Requirement already satisfied: keras>=3.5.0 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (3.8.0)
Requirement already satisfied: numpy<2.2.0,>=1.26.0 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (2.0.2)
Requirement already satisfied: h5py>=3.11.0 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (3.14.0)
Requirement already satisfied: ml-dtypes<1.0.0,>=0.5.1 in /usr/local/lib/python3.11/dist-packages (from tensorflow) (0.5.1)
Collecting tensorflow-io-gcs-filesystem>=0.23.1 (from tensorflow)
  Downloading tensorflow_io_gcs_filesystem-0.37.1-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (14 kB)
Collecting wheel<1.0,>=0.23.0 (from astunparse>=1.6.0->tensorflow)
  Downloading wheel-0.45.1-py3-none-any.whl.metadata (2.3 kB)
Requirement already satisfied: rich in /usr/local/lib/python3.11/dist-packages (from keras>=3.5.0->tensorflow) (14.0.0)
Requirement already satisfied: namex in /usr/local/lib/python3.11/dist-packages (from keras>=3.5.0->tensorflow) (0.1.0)
Requirement already satisfied: optree in /usr/local/lib/python3.11/dist-packages (from keras>=3.5.0->tensorflow) (0.16.0)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.11/dist-packages (from requests<3,>=2.21.0->tensor
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.11/dist-packages (from requests<3,>=2.21.0->tensorflow) (3.10
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.11/dist-packages (from requests<3,>=2.21.0->tensorflow)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-packages (from requests<3,>=2.21.0->tensorflow)
Requirement already satisfied: markdown>=2.6.8 in /usr/lib/python3/dist-packages (from tensorboard~=2.19.0->tensorflow) (3.3.6)
Collecting tensorboard-data-server<0.8.0,>=0.7.0 (from tensorboard~=2.19.0->tensorflow)
  Downloading tensorboard_data_server-0.7.2-py3-none-manylinux_2_31_x86_64.whl.metadata (1.1 kB)
Collecting werkzeug>=1.0.1 (from tensorboard~=2.19.0->tensorflow)
  Downloading werkzeug-3.1.3-py3-none-any.whl.metadata (3.7 kB)
Requirement already satisfied: MarkupSafe>=2.1.1 in /usr/local/lib/python3.11/dist-packages (from werkzeug>=1.0.1->tensorboard~=2.19
Requirement already satisfied: markdown-it-py>=2.2.0 in /usr/local/lib/python3.11/dist-packages (from rich->keras>=3.5.0->tensorflow
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in /usr/local/lib/python3.11/dist-packages (from rich->keras>=3.5.0->tensorfl
Requirement already satisfied: mdurl~=0.1 in /usr/local/lib/python3.11/dist-packages (from markdown-it-py>=2.2.0->rich->keras>=3.5.0
Downloading tensorflow-2.19.0-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (644.9 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 644.9/644.9 MB 1.6 MB/s eta 0:00:00
Downloading astunparse-1.6.3-py2.py3-none-any.whl (12 kB)
Downloading flatbuffers-25.2.10-py2.py3-none-any.whl (30 kB)
Downloading google_pasta-0.2.0-py3-none-any.whl (57 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 57.5/57.5 kB 4.5 MB/s eta 0:00:00
Downloading libclang-18.1.1-py2.py3-none-manylinux2010_x86_64.whl (24.5 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 24.5/24.5 MB 81.7 MB/s eta 0:00:00
Downloading protobuf-5.29.5-cp38-abi3-manylinux2014_x86_64.whl (319 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 319.9/319.9 kB 19.1 MB/s eta 0:00:00
Downloading tensorboard-2.19.0-py3-none-any.whl (5.5 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 5.5/5.5 MB 115.1 MB/s eta 0:00:00
Downloading tensorflow_io_gcs_filesystem-0.37.1-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (5.1 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 5.1/5.1 MB 111.6 MB/s eta 0:00:00
Downloading tensorboard_data_server-0.7.2-py3-none-manylinux_2_31_x86_64.whl (6.6 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 6.6/6.6 MB 115.5 MB/s eta 0:00:00
Downloading werkzeug-3.1.3-py3-none-any.whl (224 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 224.5/224.5 kB 16.6 MB/s eta 0:00:00
Downloading wheel-0.45.1-py3-none-any.whl (72 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 72.5/72.5 kB 5.4 MB/s eta 0:00:00
Installing collected packages: libclang, flatbuffers, wheel, werkzeug, tensorflow-io-gcs-filesystem, tensorboard-data-server, protob
  Attempting uninstall: protobuf
    Found existing installation: protobuf 6.31.1
    Uninstalling protobuf-6.31.1:
      Successfully uninstalled protobuf-6.31.1
Successfully installed astunparse-1.6.3 flatbuffers-25.2.10 google-pasta-0.2.0 libclang-18.1.1 protobuf-5.29.5 tensorboard-2.19.0 te
WARNING: The following packages were previously imported in this runtime:
  [google]
You must restart the runtime in order to use newly installed versions.
```

RESTART SESSION

```
Epoch 1/300
/usr/local/lib/python3.11/dist-packages/keras/src/layers/core/dense.py:87: UserWarning: Do not pass an `input_shape`/`input_dim` arg
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
400/400 ━━━━━━━━━━━━━━━━━━━━ 6s 10ms/step - accuracy: 0.9099 - loss: 0.2196 - val_accuracy: 0.9638 - val_loss: 0.0961
Epoch 2/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9685 - loss: 0.0873 - val_accuracy: 0.9650 - val_loss: 0.0943
Epoch 3/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9670 - loss: 0.0812 - val_accuracy: 0.9681 - val_loss: 0.0884
Epoch 4/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9700 - loss: 0.0787 - val_accuracy: 0.9691 - val_loss: 0.0829
```

```
Epoch 5/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9707 - loss: 0.0762 - val_accuracy: 0.9684 - val_loss: 0.0848
Epoch 6/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9725 - loss: 0.0734 - val_accuracy: 0.9675 - val_loss: 0.0996
Epoch 7/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9717 - loss: 0.0735 - val_accuracy: 0.9666 - val_loss: 0.0873
Epoch 8/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9691 - loss: 0.0800 - val_accuracy: 0.9650 - val_loss: 0.0920
Epoch 9/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9718 - loss: 0.0805 - val_accuracy: 0.9678 - val_loss: 0.0891
Epoch 10/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9701 - loss: 0.0785 - val_accuracy: 0.9697 - val_loss: 0.0930
Epoch 11/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9736 - loss: 0.0742 - val_accuracy: 0.9622 - val_loss: 0.1038
Epoch 12/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9699 - loss: 0.0747 - val_accuracy: 0.9691 - val_loss: 0.0843
Epoch 13/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9712 - loss: 0.0749 - val_accuracy: 0.9666 - val_loss: 0.0843
Epoch 14/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9739 - loss: 0.0701 - val_accuracy: 0.9669 - val_loss: 0.0885
Epoch 15/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9709 - loss: 0.0746 - val_accuracy: 0.9688 - val_loss: 0.0840
Epoch 16/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9703 - loss: 0.0752 - val_accuracy: 0.9697 - val_loss: 0.0861
Epoch 17/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9726 - loss: 0.0747 - val_accuracy: 0.9688 - val_loss: 0.0844
Epoch 18/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9711 - loss: 0.0760 - val_accuracy: 0.9688 - val_loss: 0.0847
Epoch 19/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9715 - loss: 0.0758 - val_accuracy: 0.9659 - val_loss: 0.0854
Epoch 20/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9732 - loss: 0.0735 - val_accuracy: 0.9669 - val_loss: 0.0850
Epoch 21/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9711 - loss: 0.0766 - val_accuracy: 0.9688 - val_loss: 0.0852
Epoch 22/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9735 - loss: 0.0732 - val_accuracy: 0.9684 - val_loss: 0.0869
Epoch 23/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9690 - loss: 0.0773 - val_accuracy: 0.9684 - val_loss: 0.0828
Epoch 24/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9719 - loss: 0.0752 - val_accuracy: 0.9688 - val_loss: 0.0873
Epoch 25/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9709 - loss: 0.0769 - val_accuracy: 0.9663 - val_loss: 0.0907
Epoch 26/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9739 - loss: 0.0706 - val_accuracy: 0.9706 - val_loss: 0.0860
Epoch 27/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9701 - loss: 0.0742 - val_accuracy: 0.9678 - val_loss: 0.0877
Epoch 28/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9725 - loss: 0.0713 - val_accuracy: 0.9691 - val_loss: 0.0823
Epoch 29/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9692 - loss: 0.0779 - val_accuracy: 0.9688 - val_loss: 0.0826
Epoch 30/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9734 - loss: 0.0721 - val_accuracy: 0.9697 - val_loss: 0.0819
Epoch 31/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9727 - loss: 0.0733 - val_accuracy: 0.9694 - val_loss: 0.0851
Epoch 32/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9723 - loss: 0.0715 - val_accuracy: 0.9697 - val_loss: 0.0832
Epoch 33/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9727 - loss: 0.0731 - val_accuracy: 0.9700 - val_loss: 0.0835
Epoch 34/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9741 - loss: 0.0687 - val_accuracy: 0.9691 - val_loss: 0.0840
Epoch 35/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9713 - loss: 0.0712 - val_accuracy: 0.9700 - val_loss: 0.0819
Epoch 36/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9712 - loss: 0.0704 - val_accuracy: 0.9700 - val_loss: 0.0838
Epoch 37/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9716 - loss: 0.0752 - val_accuracy: 0.9691 - val_loss: 0.0845
Epoch 38/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9715 - loss: 0.0705 - val_accuracy: 0.9684 - val_loss: 0.0876
Epoch 39/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9702 - loss: 0.0775 - val_accuracy: 0.9672 - val_loss: 0.0891
Epoch 40/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9709 - loss: 0.0749 - val_accuracy: 0.9672 - val_loss: 0.0945
Epoch 41/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9738 - loss: 0.0695 - val_accuracy: 0.9706 - val_loss: 0.0826
Epoch 42/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9724 - loss: 0.0731 - val_accuracy: 0.9681 - val_loss: 0.0861
Epoch 43/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9742 - loss: 0.0696 - val_accuracy: 0.9678 - val_loss: 0.0880
Epoch 44/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9747 - loss: 0.0674 - val_accuracy: 0.9675 - val_loss: 0.0863
Epoch 45/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9707 - loss: 0.0767 - val_accuracy: 0.9681 - val_loss: 0.0859
Epoch 46/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9713 - loss: 0.0724 - val_accuracy: 0.9659 - val_loss: 0.0857
Epoch 47/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9712 - loss: 0.0764 - val_accuracy: 0.9694 - val_loss: 0.0892
Epoch 48/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 8ms/step - accuracy: 0.9728 - loss: 0.0711 - val_accuracy: 0.9694 - val_loss: 0.0918
Epoch 49/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9736 - loss: 0.0708 - val_accuracy: 0.9684 - val_loss: 0.0851
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Epoch 50/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9758 - loss: 0.0635 - val_accuracy: 0.9675 - val_loss: 0.0875
Epoch 51/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9730 - loss: 0.0683 - val_accuracy: 0.9666 - val_loss: 0.0893
Epoch 52/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9728 - loss: 0.0719 - val_accuracy: 0.9656 - val_loss: 0.0984
Epoch 53/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0682 - val_accuracy: 0.9675 - val_loss: 0.0848
Epoch 54/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9740 - loss: 0.0700 - val_accuracy: 0.9684 - val_loss: 0.0834
Epoch 55/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0707 - val_accuracy: 0.9663 - val_loss: 0.0892
Epoch 56/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9735 - loss: 0.0694 - val_accuracy: 0.9669 - val_loss: 0.0929
Epoch 57/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9724 - loss: 0.0703 - val_accuracy: 0.9666 - val_loss: 0.0865
Epoch 58/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9720 - loss: 0.0704 - val_accuracy: 0.9678 - val_loss: 0.0847
Epoch 59/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 8ms/step - accuracy: 0.9732 - loss: 0.0690 - val_accuracy: 0.9684 - val_loss: 0.0823
Epoch 60/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 8ms/step - accuracy: 0.9724 - loss: 0.0718 - val_accuracy: 0.9684 - val_loss: 0.0874
Epoch 61/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9732 - loss: 0.0711 - val_accuracy: 0.9669 - val_loss: 0.0922
Epoch 62/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9736 - loss: 0.0731 - val_accuracy: 0.9681 - val_loss: 0.0852
Epoch 63/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9742 - loss: 0.0668 - val_accuracy: 0.9684 - val_loss: 0.0879
Epoch 64/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9721 - loss: 0.0718 - val_accuracy: 0.9681 - val_loss: 0.0872
Epoch 65/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9716 - loss: 0.0758 - val_accuracy: 0.9666 - val_loss: 0.0974
Epoch 66/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9728 - loss: 0.0710 - val_accuracy: 0.9700 - val_loss: 0.0848
Epoch 67/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9738 - loss: 0.0662 - val_accuracy: 0.9697 - val_loss: 0.0856
Epoch 68/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9738 - loss: 0.0704 - val_accuracy: 0.9694 - val_loss: 0.0853
Epoch 69/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 8ms/step - accuracy: 0.9744 - loss: 0.0695 - val_accuracy: 0.9697 - val_loss: 0.0817
Epoch 70/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 8ms/step - accuracy: 0.9720 - loss: 0.0722 - val_accuracy: 0.9681 - val_loss: 0.0838
Epoch 71/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9720 - loss: 0.0718 - val_accuracy: 0.9694 - val_loss: 0.0935
Epoch 72/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9726 - loss: 0.0709 - val_accuracy: 0.9669 - val_loss: 0.0923
Epoch 73/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9725 - loss: 0.0728 - val_accuracy: 0.9684 - val_loss: 0.0833
Epoch 74/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9742 - loss: 0.0685 - val_accuracy: 0.9663 - val_loss: 0.0921
Epoch 75/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9700 - loss: 0.0770 - val_accuracy: 0.9684 - val_loss: 0.0855
Epoch 76/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 8ms/step - accuracy: 0.9721 - loss: 0.0702 - val_accuracy: 0.9684 - val_loss: 0.0842
Epoch 77/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9734 - loss: 0.0699 - val_accuracy: 0.9681 - val_loss: 0.0838
Epoch 78/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9721 - loss: 0.0742 - val_accuracy: 0.9659 - val_loss: 0.1056
Epoch 79/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 8ms/step - accuracy: 0.9722 - loss: 0.0687 - val_accuracy: 0.9675 - val_loss: 0.0869
Epoch 80/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9716 - loss: 0.0731 - val_accuracy: 0.9681 - val_loss: 0.0893
Epoch 81/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9726 - loss: 0.0729 - val_accuracy: 0.9675 - val_loss: 0.0851
Epoch 82/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9718 - loss: 0.0721 - val_accuracy: 0.9684 - val_loss: 0.0861
Epoch 83/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9727 - loss: 0.0732 - val_accuracy: 0.9672 - val_loss: 0.0993
Epoch 84/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9706 - loss: 0.0716 - val_accuracy: 0.9672 - val_loss: 0.0891
Epoch 85/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9722 - loss: 0.0703 - val_accuracy: 0.9675 - val_loss: 0.0935
Epoch 86/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9708 - loss: 0.0750 - val_accuracy: 0.9697 - val_loss: 0.0859
Epoch 87/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9698 - loss: 0.0721 - val_accuracy: 0.9688 - val_loss: 0.0853
Epoch 88/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9694 - loss: 0.0764 - val_accuracy: 0.9688 - val_loss: 0.0881
Epoch 89/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9723 - loss: 0.0718 - val_accuracy: 0.9681 - val_loss: 0.0845
Epoch 90/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9753 - loss: 0.0668 - val_accuracy: 0.9694 - val_loss: 0.1072
Epoch 91/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9726 - loss: 0.0686 - val_accuracy: 0.9691 - val_loss: 0.0839
Epoch 92/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9762 - loss: 0.0670 - val_accuracy: 0.9681 - val_loss: 0.0825
Epoch 93/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9714 - loss: 0.0725 - val_accuracy: 0.9659 - val_loss: 0.0930
Epoch 94/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0713 - val_accuracy: 0.9672 - val_loss: 0.0875
Epoch 95/300
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Epoch 95/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9742 - loss: 0.0698 - val_accuracy: 0.9659 - val_loss: 0.0892
Epoch 96/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9724 - loss: 0.0711 - val_accuracy: 0.9697 - val_loss: 0.0876
Epoch 97/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9695 - loss: 0.0727 - val_accuracy: 0.9678 - val_loss: 0.0924
Epoch 98/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9728 - loss: 0.0667 - val_accuracy: 0.9678 - val_loss: 0.0868
Epoch 99/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9743 - loss: 0.0684 - val_accuracy: 0.9688 - val_loss: 0.0840
Epoch 100/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9718 - loss: 0.0701 - val_accuracy: 0.9678 - val_loss: 0.0908
Epoch 101/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9754 - loss: 0.0627 - val_accuracy: 0.9681 - val_loss: 0.0864
Epoch 102/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9747 - loss: 0.0650 - val_accuracy: 0.9691 - val_loss: 0.0826
Epoch 103/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9735 - loss: 0.0697 - val_accuracy: 0.9694 - val_loss: 0.0894
Epoch 104/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9730 - loss: 0.0695 - val_accuracy: 0.9663 - val_loss: 0.0927
Epoch 105/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9720 - loss: 0.0737 - val_accuracy: 0.9681 - val_loss: 0.0948
Epoch 106/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9734 - loss: 0.0682 - val_accuracy: 0.9663 - val_loss: 0.0906
Epoch 107/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9726 - loss: 0.0697 - val_accuracy: 0.9688 - val_loss: 0.0909
Epoch 108/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9732 - loss: 0.0690 - val_accuracy: 0.9669 - val_loss: 0.0938
Epoch 109/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9736 - loss: 0.0721 - val_accuracy: 0.9675 - val_loss: 0.0892
Epoch 110/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9733 - loss: 0.0735 - val_accuracy: 0.9684 - val_loss: 0.0898
Epoch 111/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9715 - loss: 0.0705 - val_accuracy: 0.9666 - val_loss: 0.0924
Epoch 112/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9741 - loss: 0.0661 - val_accuracy: 0.9694 - val_loss: 0.0856
Epoch 113/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9721 - loss: 0.0673 - val_accuracy: 0.9659 - val_loss: 0.0900
Epoch 114/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9736 - loss: 0.0676 - val_accuracy: 0.9675 - val_loss: 0.0948
Epoch 115/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9714 - loss: 0.0713 - val_accuracy: 0.9681 - val_loss: 0.0847
Epoch 116/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9713 - loss: 0.0704 - val_accuracy: 0.9678 - val_loss: 0.0923
Epoch 117/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9741 - loss: 0.0658 - val_accuracy: 0.9684 - val_loss: 0.0875
Epoch 118/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9726 - loss: 0.0693 - val_accuracy: 0.9694 - val_loss: 0.0881
Epoch 119/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9728 - loss: 0.0686 - val_accuracy: 0.9659 - val_loss: 0.0886
Epoch 120/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9711 - loss: 0.0719 - val_accuracy: 0.9691 - val_loss: 0.0892
Epoch 121/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9708 - loss: 0.0719 - val_accuracy: 0.9678 - val_loss: 0.1008
Epoch 122/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9716 - loss: 0.0722 - val_accuracy: 0.9688 - val_loss: 0.0886
Epoch 123/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0701 - val_accuracy: 0.9663 - val_loss: 0.0921
Epoch 124/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9725 - loss: 0.0720 - val_accuracy: 0.9669 - val_loss: 0.0925
Epoch 125/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9723 - loss: 0.0667 - val_accuracy: 0.9684 - val_loss: 0.0864
Epoch 126/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9736 - loss: 0.0695 - val_accuracy: 0.9700 - val_loss: 0.0885
Epoch 127/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9716 - loss: 0.0696 - val_accuracy: 0.9675 - val_loss: 0.0859
Epoch 128/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9723 - loss: 0.0712 - val_accuracy: 0.9688 - val_loss: 0.0885
Epoch 129/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9700 - loss: 0.0731 - val_accuracy: 0.9688 - val_loss: 0.0905
Epoch 130/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9708 - loss: 0.0703 - val_accuracy: 0.9681 - val_loss: 0.0914
Epoch 131/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9717 - loss: 0.0712 - val_accuracy: 0.9675 - val_loss: 0.0905
Epoch 132/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9745 - loss: 0.0645 - val_accuracy: 0.9672 - val_loss: 0.0914
Epoch 133/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9743 - loss: 0.0641 - val_accuracy: 0.9672 - val_loss: 0.0908
Epoch 134/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9734 - loss: 0.0688 - val_accuracy: 0.9688 - val_loss: 0.0901
Epoch 135/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9726 - loss: 0.0735 - val_accuracy: 0.9681 - val_loss: 0.0976
Epoch 136/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9727 - loss: 0.0691 - val_accuracy: 0.9666 - val_loss: 0.0995
Epoch 137/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9727 - loss: 0.0711 - val_accuracy: 0.9678 - val_loss: 0.0926
Epoch 138/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9714 - loss: 0.0709 - val_accuracy: 0.9688 - val_loss: 0.0885
Epoch 139/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9732 - loss: 0.0680 - val_accuracy: 0.9688 - val_loss: 0.0886
Epoch 140/300
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400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9717 - loss: 0.0700 - val_accuracy: 0.9678 - val_loss: 0.0892
Epoch 141/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9750 - loss: 0.0639 - val_accuracy: 0.9666 - val_loss: 0.0896
Epoch 142/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9724 - loss: 0.0701 - val_accuracy: 0.9669 - val_loss: 0.0885
Epoch 143/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9742 - loss: 0.0687 - val_accuracy: 0.9681 - val_loss: 0.0910
Epoch 144/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9712 - loss: 0.0706 - val_accuracy: 0.9697 - val_loss: 0.0936
Epoch 145/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9737 - loss: 0.0664 - val_accuracy: 0.9675 - val_loss: 0.0907
Epoch 146/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9725 - loss: 0.0696 - val_accuracy: 0.9678 - val_loss: 0.0922
Epoch 147/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9708 - loss: 0.0713 - val_accuracy: 0.9684 - val_loss: 0.0905
Epoch 148/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0690 - val_accuracy: 0.9666 - val_loss: 0.1036
Epoch 149/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9714 - loss: 0.0715 - val_accuracy: 0.9678 - val_loss: 0.0883
Epoch 150/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9727 - loss: 0.0673 - val_accuracy: 0.9691 - val_loss: 0.0872
Epoch 151/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9727 - loss: 0.0691 - val_accuracy: 0.9684 - val_loss: 0.0927
Epoch 152/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9726 - loss: 0.0696 - val_accuracy: 0.9684 - val_loss: 0.0978
Epoch 153/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9725 - loss: 0.0689 - val_accuracy: 0.9684 - val_loss: 0.0987
Epoch 154/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9745 - loss: 0.0686 - val_accuracy: 0.9681 - val_loss: 0.0933
Epoch 155/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9745 - loss: 0.0675 - val_accuracy: 0.9688 - val_loss: 0.0924
Epoch 156/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9728 - loss: 0.0671 - val_accuracy: 0.9678 - val_loss: 0.0900
Epoch 157/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9739 - loss: 0.0671 - val_accuracy: 0.9653 - val_loss: 0.1037
Epoch 158/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9723 - loss: 0.0678 - val_accuracy: 0.9691 - val_loss: 0.0920
Epoch 159/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9716 - loss: 0.0692 - val_accuracy: 0.9681 - val_loss: 0.0970
Epoch 160/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9715 - loss: 0.0689 - val_accuracy: 0.9688 - val_loss: 0.0920
Epoch 161/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9750 - loss: 0.0629 - val_accuracy: 0.9684 - val_loss: 0.0939
Epoch 162/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9743 - loss: 0.0691 - val_accuracy: 0.9669 - val_loss: 0.0980
Epoch 163/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9724 - loss: 0.0724 - val_accuracy: 0.9669 - val_loss: 0.0977
Epoch 164/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9737 - loss: 0.0662 - val_accuracy: 0.9675 - val_loss: 0.0992
Epoch 165/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9728 - loss: 0.0674 - val_accuracy: 0.9688 - val_loss: 0.0953
Epoch 166/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9715 - loss: 0.0720 - val_accuracy: 0.9691 - val_loss: 0.0973
Epoch 167/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9724 - loss: 0.0675 - val_accuracy: 0.9675 - val_loss: 0.0954
Epoch 168/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9735 - loss: 0.0650 - val_accuracy: 0.9663 - val_loss: 0.1021
Epoch 169/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9737 - loss: 0.0686 - val_accuracy: 0.9669 - val_loss: 0.0980
Epoch 170/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9761 - loss: 0.0601 - val_accuracy: 0.9672 - val_loss: 0.0998
Epoch 171/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9735 - loss: 0.0658 - val_accuracy: 0.9691 - val_loss: 0.0917
Epoch 172/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9727 - loss: 0.0705 - val_accuracy: 0.9675 - val_loss: 0.0931
Epoch 173/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9738 - loss: 0.0673 - val_accuracy: 0.9681 - val_loss: 0.0981
Epoch 174/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9729 - loss: 0.0686 - val_accuracy: 0.9684 - val_loss: 0.1011
Epoch 175/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9732 - loss: 0.0669 - val_accuracy: 0.9684 - val_loss: 0.0969
Epoch 176/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9725 - loss: 0.0701 - val_accuracy: 0.9691 - val_loss: 0.0967
Epoch 177/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9737 - loss: 0.0672 - val_accuracy: 0.9675 - val_loss: 0.0957
Epoch 178/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9734 - loss: 0.0667 - val_accuracy: 0.9684 - val_loss: 0.0918
Epoch 179/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9732 - loss: 0.0677 - val_accuracy: 0.9681 - val_loss: 0.0959
Epoch 180/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9736 - loss: 0.0653 - val_accuracy: 0.9681 - val_loss: 0.0901
Epoch 181/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9730 - loss: 0.0669 - val_accuracy: 0.9697 - val_loss: 0.0955
Epoch 182/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9706 - loss: 0.0713 - val_accuracy: 0.9691 - val_loss: 0.1018
Epoch 183/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0671 - val_accuracy: 0.9675 - val_loss: 0.1051
Epoch 184/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9723 - loss: 0.0683 - val_accuracy: 0.9681 - val_loss: 0.0935
Epoch 185/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9734 - loss: 0.0656 - val_accuracy: 0.9666 - val_loss: 0.0934
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Epoch 186/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9732 - loss: 0.0695 - val_accuracy: 0.9675 - val_loss: 0.0916
Epoch 187/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9716 - loss: 0.0705 - val_accuracy: 0.9675 - val_loss: 0.0978
Epoch 188/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9735 - loss: 0.0679 - val_accuracy: 0.9694 - val_loss: 0.0973
Epoch 189/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9709 - loss: 0.0701 - val_accuracy: 0.9672 - val_loss: 0.1046
Epoch 190/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9698 - loss: 0.0720 - val_accuracy: 0.9675 - val_loss: 0.1054
Epoch 191/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9718 - loss: 0.0727 - val_accuracy: 0.9681 - val_loss: 0.0996
Epoch 192/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9742 - loss: 0.0646 - val_accuracy: 0.9656 - val_loss: 0.0982
Epoch 193/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9713 - loss: 0.0691 - val_accuracy: 0.9684 - val_loss: 0.1045
Epoch 194/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9745 - loss: 0.0632 - val_accuracy: 0.9675 - val_loss: 0.1106
Epoch 195/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9706 - loss: 0.0827 - val_accuracy: 0.9666 - val_loss: 0.1087
Epoch 196/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9712 - loss: 0.0699 - val_accuracy: 0.9675 - val_loss: 0.0972
Epoch 197/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9716 - loss: 0.0710 - val_accuracy: 0.9669 - val_loss: 0.1031
Epoch 198/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9731 - loss: 0.0699 - val_accuracy: 0.9669 - val_loss: 0.0953
Epoch 199/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0695 - val_accuracy: 0.9700 - val_loss: 0.0945
Epoch 200/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9708 - loss: 0.0701 - val_accuracy: 0.9675 - val_loss: 0.1011
Epoch 201/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9735 - loss: 0.0660 - val_accuracy: 0.9672 - val_loss: 0.0944
Epoch 202/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9743 - loss: 0.0668 - val_accuracy: 0.9675 - val_loss: 0.0892
Epoch 203/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9747 - loss: 0.0664 - val_accuracy: 0.9672 - val_loss: 0.0949
Epoch 204/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9725 - loss: 0.0724 - val_accuracy: 0.9666 - val_loss: 0.0994
Epoch 205/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9717 - loss: 0.0736 - val_accuracy: 0.9681 - val_loss: 0.0958
Epoch 206/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9715 - loss: 0.0691 - val_accuracy: 0.9675 - val_loss: 0.0974
Epoch 207/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9736 - loss: 0.0691 - val_accuracy: 0.9678 - val_loss: 0.1081
Epoch 208/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9707 - loss: 0.0718 - val_accuracy: 0.9675 - val_loss: 0.1063
Epoch 209/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9719 - loss: 0.0666 - val_accuracy: 0.9697 - val_loss: 0.1018
Epoch 210/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9716 - loss: 0.0683 - val_accuracy: 0.9684 - val_loss: 0.1073
Epoch 211/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9757 - loss: 0.0622 - val_accuracy: 0.9672 - val_loss: 0.1078
Epoch 212/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9743 - loss: 0.0632 - val_accuracy: 0.9678 - val_loss: 0.1152
Epoch 213/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9726 - loss: 0.0668 - val_accuracy: 0.9678 - val_loss: 0.1101
Epoch 214/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9763 - loss: 0.0624 - val_accuracy: 0.9653 - val_loss: 0.1061
Epoch 215/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9729 - loss: 0.0681 - val_accuracy: 0.9678 - val_loss: 0.1087
Epoch 216/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9737 - loss: 0.0651 - val_accuracy: 0.9681 - val_loss: 0.1128
Epoch 217/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 10ms/step - accuracy: 0.9728 - loss: 0.0675 - val_accuracy: 0.9688 - val_loss: 0.1040
Epoch 218/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9729 - loss: 0.0666 - val_accuracy: 0.9697 - val_loss: 0.1140
Epoch 219/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9707 - loss: 0.0698 - val_accuracy: 0.9688 - val_loss: 0.1080
Epoch 220/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9731 - loss: 0.0681 - val_accuracy: 0.9678 - val_loss: 0.1002
Epoch 221/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9731 - loss: 0.0695 - val_accuracy: 0.9675 - val_loss: 0.1094
Epoch 222/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9759 - loss: 0.0633 - val_accuracy: 0.9703 - val_loss: 0.1043
Epoch 223/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9739 - loss: 0.0652 - val_accuracy: 0.9681 - val_loss: 0.1036
Epoch 224/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9712 - loss: 0.0679 - val_accuracy: 0.9678 - val_loss: 0.1044
Epoch 225/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9756 - loss: 0.0627 - val_accuracy: 0.9672 - val_loss: 0.1023
Epoch 226/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9709 - loss: 0.0709 - val_accuracy: 0.9659 - val_loss: 0.1068
Epoch 227/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9720 - loss: 0.0706 - val_accuracy: 0.9675 - val_loss: 0.0950
Epoch 228/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9715 - loss: 0.0684 - val_accuracy: 0.9675 - val_loss: 0.0962
Epoch 229/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9716 - loss: 0.0690 - val_accuracy: 0.9688 - val_loss: 0.0967
Epoch 230/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9739 - loss: 0.0674 - val_accuracy: 0.9659 - val_loss: 0.1104
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Epoch 231/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9738 - loss: 0.0665 - val_accuracy: 0.9672 - val_loss: 0.1004
Epoch 232/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9724 - loss: 0.0682 - val_accuracy: 0.9669 - val_loss: 0.0953
Epoch 233/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9733 - loss: 0.0675 - val_accuracy: 0.9675 - val_loss: 0.1031
Epoch 234/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9736 - loss: 0.0669 - val_accuracy: 0.9675 - val_loss: 0.1014
Epoch 235/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9724 - loss: 0.0667 - val_accuracy: 0.9681 - val_loss: 0.1013
Epoch 236/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0683 - val_accuracy: 0.9678 - val_loss: 0.0953
Epoch 237/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9751 - loss: 0.0656 - val_accuracy: 0.9675 - val_loss: 0.0978
Epoch 238/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9739 - loss: 0.0639 - val_accuracy: 0.9669 - val_loss: 0.0939
Epoch 239/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0661 - val_accuracy: 0.9672 - val_loss: 0.1043
Epoch 240/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9726 - loss: 0.0685 - val_accuracy: 0.9672 - val_loss: 0.1038
Epoch 241/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9737 - loss: 0.0657 - val_accuracy: 0.9663 - val_loss: 0.0978
Epoch 242/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9717 - loss: 0.0655 - val_accuracy: 0.9672 - val_loss: 0.1038
Epoch 243/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9723 - loss: 0.0706 - val_accuracy: 0.9691 - val_loss: 0.1041
Epoch 244/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9724 - loss: 0.0690 - val_accuracy: 0.9684 - val_loss: 0.1084
Epoch 245/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9727 - loss: 0.0662 - val_accuracy: 0.9669 - val_loss: 0.1043
Epoch 246/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 10ms/step - accuracy: 0.9752 - loss: 0.0655 - val_accuracy: 0.9681 - val_loss: 0.1051
Epoch 247/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 10ms/step - accuracy: 0.9726 - loss: 0.0690 - val_accuracy: 0.9672 - val_loss: 0.1042
Epoch 248/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9693 - loss: 0.0709 - val_accuracy: 0.9688 - val_loss: 0.1031
Epoch 249/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9731 - loss: 0.0645 - val_accuracy: 0.9650 - val_loss: 0.1153
Epoch 250/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9727 - loss: 0.0669 - val_accuracy: 0.9666 - val_loss: 0.1003
Epoch 251/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9758 - loss: 0.0654 - val_accuracy: 0.9678 - val_loss: 0.1069
Epoch 252/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9734 - loss: 0.0663 - val_accuracy: 0.9675 - val_loss: 0.1013
Epoch 253/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9721 - loss: 0.0664 - val_accuracy: 0.9678 - val_loss: 0.1009
Epoch 254/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9722 - loss: 0.0664 - val_accuracy: 0.9666 - val_loss: 0.1042
Epoch 255/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9744 - loss: 0.0638 - val_accuracy: 0.9669 - val_loss: 0.0995
Epoch 256/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9749 - loss: 0.0648 - val_accuracy: 0.9666 - val_loss: 0.1149
Epoch 257/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9720 - loss: 0.0681 - val_accuracy: 0.9672 - val_loss: 0.1055
Epoch 258/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9738 - loss: 0.0676 - val_accuracy: 0.9684 - val_loss: 0.1042
Epoch 259/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9735 - loss: 0.0651 - val_accuracy: 0.9678 - val_loss: 0.1005
Epoch 260/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9736 - loss: 0.0643 - val_accuracy: 0.9666 - val_loss: 0.1096
Epoch 261/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9753 - loss: 0.0632 - val_accuracy: 0.9675 - val_loss: 0.1096
Epoch 262/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9713 - loss: 0.0701 - val_accuracy: 0.9669 - val_loss: 0.1127
Epoch 263/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9712 - loss: 0.0703 - val_accuracy: 0.9672 - val_loss: 0.1086
Epoch 264/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9736 - loss: 0.0663 - val_accuracy: 0.9663 - val_loss: 0.1104
Epoch 265/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9742 - loss: 0.0646 - val_accuracy: 0.9678 - val_loss: 0.1107
Epoch 266/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9749 - loss: 0.0625 - val_accuracy: 0.9681 - val_loss: 0.1169
Epoch 267/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9737 - loss: 0.0655 - val_accuracy: 0.9684 - val_loss: 0.1065
Epoch 268/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9730 - loss: 0.0678 - val_accuracy: 0.9675 - val_loss: 0.1147
Epoch 269/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9713 - loss: 0.0706 - val_accuracy: 0.9684 - val_loss: 0.1132
Epoch 270/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9733 - loss: 0.0667 - val_accuracy: 0.9672 - val_loss: 0.1222
Epoch 271/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9741 - loss: 0.0675 - val_accuracy: 0.9675 - val_loss: 0.1113
Epoch 272/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9757 - loss: 0.0612 - val_accuracy: 0.9669 - val_loss: 0.1137
Epoch 273/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9746 - loss: 0.0644 - val_accuracy: 0.9666 - val_loss: 0.1030
Epoch 274/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9732 - loss: 0.0671 - val_accuracy: 0.9659 - val_loss: 0.1119
Epoch 275/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9751 - loss: 0.0598 - val_accuracy: 0.9669 - val_loss: 0.1123
Epoch 276/300
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400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9758 - loss: 0.0650 - val_accuracy: 0.9641 - val_loss: 0.1185
Epoch 277/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9730 - loss: 0.0652 - val_accuracy: 0.9669 - val_loss: 0.1163
Epoch 278/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9732 - loss: 0.0670 - val_accuracy: 0.9672 - val_loss: 0.1179
Epoch 279/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9740 - loss: 0.0661 - val_accuracy: 0.9672 - val_loss: 0.1185
Epoch 280/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9703 - loss: 0.0712 - val_accuracy: 0.9672 - val_loss: 0.1094
Epoch 281/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9729 - loss: 0.0653 - val_accuracy: 0.9672 - val_loss: 0.1124
Epoch 282/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9737 - loss: 0.0626 - val_accuracy: 0.9656 - val_loss: 0.1178
Epoch 283/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9742 - loss: 0.0626 - val_accuracy: 0.9659 - val_loss: 0.1107
Epoch 284/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9753 - loss: 0.0640 - val_accuracy: 0.9681 - val_loss: 0.1144
Epoch 285/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9732 - loss: 0.0668 - val_accuracy: 0.9678 - val_loss: 0.1136
Epoch 286/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9721 - loss: 0.0653 - val_accuracy: 0.9638 - val_loss: 0.1219
Epoch 287/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9729 - loss: 0.0670 - val_accuracy: 0.9669 - val_loss: 0.1214
Epoch 288/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9741 - loss: 0.0622 - val_accuracy: 0.9684 - val_loss: 0.1231
Epoch 289/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9699 - loss: 0.0699 - val_accuracy: 0.9681 - val_loss: 0.1197
Epoch 290/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 8ms/step - accuracy: 0.9750 - loss: 0.0653 - val_accuracy: 0.9669 - val_loss: 0.1226
Epoch 291/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9728 - loss: 0.0652 - val_accuracy: 0.9681 - val_loss: 0.1192
Epoch 292/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9754 - loss: 0.0630 - val_accuracy: 0.9675 - val_loss: 0.1264
Epoch 293/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9731 - loss: 0.0671 - val_accuracy: 0.9666 - val_loss: 0.1193
Epoch 294/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9726 - loss: 0.0660 - val_accuracy: 0.9669 - val_loss: 0.1227
Epoch 295/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9735 - loss: 0.0629 - val_accuracy: 0.9669 - val_loss: 0.1239
Epoch 296/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9741 - loss: 0.0630 - val_accuracy: 0.9675 - val_loss: 0.1584
Epoch 297/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9745 - loss: 0.0629 - val_accuracy: 0.9663 - val_loss: 0.1131
Epoch 298/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 8ms/step - accuracy: 0.9731 - loss: 0.0658 - val_accuracy: 0.9669 - val_loss: 0.1089
Epoch 299/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 3s 9ms/step - accuracy: 0.9740 - loss: 0.0633 - val_accuracy: 0.9678 - val_loss: 0.1140
Epoch 300/300
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 9ms/step - accuracy: 0.9742 - loss: 0.0645 - val_accuracy: 0.9653 - val_loss: 0.1172
125/125 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - accuracy: 0.9714 - loss: 0.1167
Test Loss: 0.10167862474918365
Test Accuracy: 0.9732499718666077
```

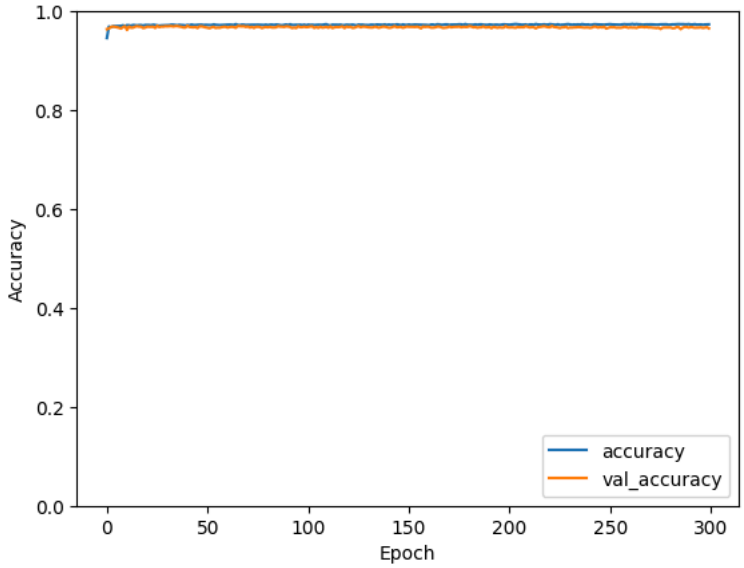

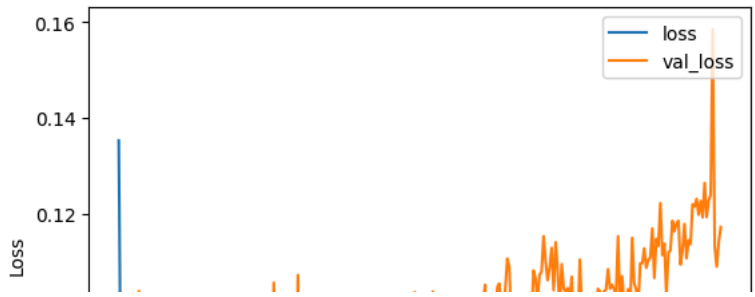

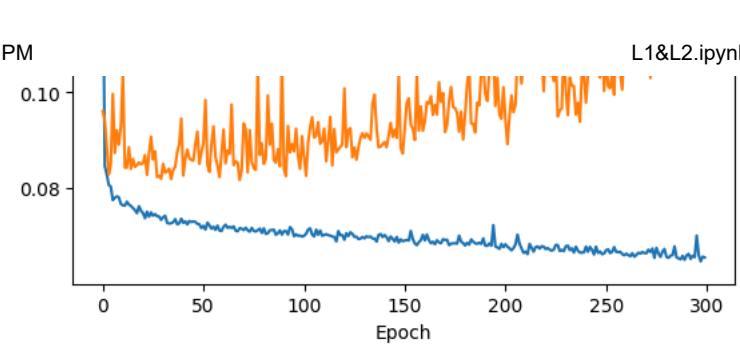
0.10
0.08
0
50
100
150
200
250
300
Epoch

Generate | l1 regularization on the same dataset plus graph it against actual y and predicted y and print learning rate | Close

1 of 1 | Undo Changes | Use code with caution

```
import matplotlib.pyplot as plt
import numpy as np
from tensorflow.keras import regularizers

model_l1 = tf.keras.models.Sequential([
    tf.keras.layers.Dense(512, activation='relu', input_shape=(2,),
                          kernel_regularizer=regularizers.l1(0.01)),
    tf.keras.layers.Dense(512, activation='relu',
                          kernel_regularizer=regularizers.l1(0.01)),
    tf.keras.layers.Dense(512, activation='relu',
                          kernel_regularizer=regularizers.l1(0.01)),
    tf.keras.layers.Dense(1, activation='sigmoid')
])


learning_rate = 0.001


optimizer = tf.keras.optimizers.Adam(learning_rate=learning_rate)

model_l1.compile(optimizer=optimizer,
                 loss='binary_crossentropy',
                 metrics=['accuracy'])

history_l1 = model_l1.fit(X_moons_train, y_moons_train, epochs=100, validation_split=0.2)

loss_l1, accuracy_l1 = model_l1.evaluate(X_moons_test, y_moons_test)
print(f"Test Loss with L1 regularization: {loss_l1}")
print(f"Test Accuracy with L1 regularization: {accuracy_l1}")
print(f"Learning Rate: {learning_rate}")


plt.plot(history_l1.history['accuracy'], label='accuracy_l1')
plt.plot(history_l1.history['val_accuracy'], label = 'val_accuracy_l1')
plt.xlabel('Epoch')
plt.ylabel('Accuracy')
plt.ylim([0, 1])
plt.legend(loc='lower right')
plt.title('Model Accuracy with L1 Regularization')
plt.show()


plt.plot(history_l1.history['loss'], label='loss_l1')
plt.plot(history_l1.history['val_loss'], label = 'val_loss_l1')
plt.xlabel('Epoch')
plt.ylabel('Loss')
plt.legend(loc='upper right')
plt.title('Model Loss with L1 Regularization')
plt.show()


y_pred_l1 = model_l1.predict(X_moons_test)
y_pred_l1_classes = (y_pred_l1 > 0.5).astype("int32")


plt.figure(figsize=(12, 6))


plt.subplot(1, 2, 1)
plt.scatter(X_moons_test[:, 0], X_moons_test[:, 1], c=y_moons_test, cmap='viridis', alpha=0.6)
plt.title('Actual Test Data Labels')
plt.xlabel('Feature 1')
plt.ylabel('Feature 2')

plt.subplot(1, 2, 2)
plt.scatter(X_moons_test[:, 0], X_moons_test[:, 1], c=y_pred_l1_classes.flatten(), cmap='viridis', alpha=0.6)
plt.title('Predicted Test Data Labels (L1 Regularization)')
plt.xlabel('Feature 1')
plt.ylabel('Feature 2')

plt.tight_layout()
plt.show()

x_min, x_max = X_moons[:, 0].min() - .5, X_moons[:, 0].max() + .5
y_min, y_max = X_moons[:, 1].min() - .5, X_moons[:, 1].max() + .5
```

```
xx, yy = np.meshgrid(np.arange(x_min, x_max, 0.02),
                     np.arange(y_min, y_max, 0.02))

Z_l1 = model_l1.predict(np.c_[xx.ravel(), yy.ravel()])
Z_l1 = Z_l1.reshape(xx.shape)
Z_l1_classes = (Z_l1 > 0.5).astype("int32")

plt.figure(figsize=(8, 6))
plt.contourf(xx, yy, Z_l1_classes, cmap='viridis', alpha=.8)
plt.scatter(X_moons[:, 0], X_moons[:, 1], c=y_moons, cmap='viridis', edgecolors='k')
plt.title('Decision Boundary with L1 Regularization')
plt.xlabel('Feature 1')
plt.ylabel('Feature 2')
plt.show()
```

```
Epoch 1/100
/usr/local/lib/python3.11/dist-packages/keras/src/layers/core/dense.py:87: UserWarning: Do not pass an `input_shape`/`input_dim` arg
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
400/400 ━━━━━━━━━━━━━━━━━━━━ 6s 12ms/step - accuracy: 0.6154 - loss: 47.3625 - val_accuracy: 0.5106 - val_loss: 1.3366
Epoch 2/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4933 - loss: 1.3389 - val_accuracy: 0.4894 - val_loss: 1.3348
Epoch 3/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4995 - loss: 1.3360 - val_accuracy: 0.5106 - val_loss: 1.3328
Epoch 4/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5034 - loss: 1.3351 - val_accuracy: 0.4894 - val_loss: 1.3317
Epoch 5/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5002 - loss: 1.3339 - val_accuracy: 0.4894 - val_loss: 1.3286
Epoch 6/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4965 - loss: 1.3322 - val_accuracy: 0.5106 - val_loss: 1.3288
Epoch 7/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4953 - loss: 1.3327 - val_accuracy: 0.4894 - val_loss: 1.3295
Epoch 8/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4990 - loss: 1.3317 - val_accuracy: 0.5106 - val_loss: 1.3310
Epoch 9/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5013 - loss: 1.3310 - val_accuracy: 0.5106 - val_loss: 1.3297
Epoch 10/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5026 - loss: 1.3310 - val_accuracy: 0.5106 - val_loss: 1.3282
Epoch 11/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5003 - loss: 1.3306 - val_accuracy: 0.5106 - val_loss: 1.3296
Epoch 12/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5051 - loss: 1.3305 - val_accuracy: 0.5106 - val_loss: 1.3262
Epoch 13/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4929 - loss: 1.3303 - val_accuracy: 0.5106 - val_loss: 1.3256
Epoch 14/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4932 - loss: 1.3307 - val_accuracy: 0.5106 - val_loss: 1.3281
Epoch 15/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4993 - loss: 1.3305 - val_accuracy: 0.5106 - val_loss: 1.3315
Epoch 16/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 13ms/step - accuracy: 0.4960 - loss: 1.3306 - val_accuracy: 0.5106 - val_loss: 1.3270
Epoch 17/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4900 - loss: 1.3305 - val_accuracy: 0.5106 - val_loss: 1.3292
Epoch 18/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4968 - loss: 1.3305 - val_accuracy: 0.5106 - val_loss: 1.3301
Epoch 19/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4978 - loss: 1.3303 - val_accuracy: 0.5106 - val_loss: 1.3279
Epoch 20/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4994 - loss: 1.3305 - val_accuracy: 0.5106 - val_loss: 1.3263
Epoch 21/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4923 - loss: 1.3304 - val_accuracy: 0.5106 - val_loss: 1.3296
Epoch 22/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4905 - loss: 1.3304 - val_accuracy: 0.5106 - val_loss: 1.3276
Epoch 23/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5038 - loss: 1.3304 - val_accuracy: 0.5106 - val_loss: 1.3271
Epoch 24/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5063 - loss: 1.3303 - val_accuracy: 0.4894 - val_loss: 1.3282
Epoch 25/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4966 - loss: 1.3304 - val_accuracy: 0.5106 - val_loss: 1.3299
Epoch 26/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5083 - loss: 1.3303 - val_accuracy: 0.4894 - val_loss: 1.3273
Epoch 27/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4869 - loss: 1.3303 - val_accuracy: 0.5106 - val_loss: 1.3279
Epoch 28/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5120 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3285
Epoch 29/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4979 - loss: 1.3305 - val_accuracy: 0.5106 - val_loss: 1.3298
Epoch 30/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4993 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3259
Epoch 31/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5083 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3279
Epoch 32/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5032 - loss: 1.3304 - val_accuracy: 0.5106 - val_loss: 1.3308
Epoch 33/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4999 - loss: 1.3304 - val_accuracy: 0.5106 - val_loss: 1.3264
Epoch 34/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4893 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3264
Epoch 35/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4975 - loss: 1.3304 - val_accuracy: 0.5106 - val_loss: 1.3282
Epoch 36/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5048 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3305
Epoch 37/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5005 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3270
Epoch 38/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5044 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3298
Epoch 39/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5014 - loss: 1.3303 - val_accuracy: 0.5106 - val_loss: 1.3279
Epoch 40/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5026 - loss: 1.3301 - val_accuracy: 0.5106 - val_loss: 1.3261
Epoch 41/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5059 - loss: 1.3302 - val_accuracy: 0.4894 - val_loss: 1.3261
Epoch 42/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4967 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3305
Epoch 43/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4987 - loss: 1.3303 - val_accuracy: 0.5106 - val_loss: 1.3284
Epoch 44/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5120 - loss: 1.3300 - val_accuracy: 0.5106 - val_loss: 1.3287
```

```
Epoch 45/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4945 - loss: 1.3301 - val_accuracy: 0.5106 - val_loss: 1.3286
Epoch 46/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5065 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3290
Epoch 47/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4958 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3263
Epoch 48/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5018 - loss: 1.3301 - val_accuracy: 0.5106 - val_loss: 1.3271
Epoch 49/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4936 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3270
Epoch 50/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5033 - loss: 1.3303 - val_accuracy: 0.5106 - val_loss: 1.3297
Epoch 51/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4857 - loss: 1.3300 - val_accuracy: 0.5106 - val_loss: 1.3274
Epoch 52/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4951 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3272
Epoch 53/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4977 - loss: 1.3302 - val_accuracy: 0.5106 - val_loss: 1.3304
Epoch 54/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4987 - loss: 1.3301 - val_accuracy: 0.5106 - val_loss: 1.3282
Epoch 55/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4881 - loss: 1.3300 - val_accuracy: 0.5106 - val_loss: 1.3271
Epoch 56/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4906 - loss: 1.3303 - val_accuracy: 0.5106 - val_loss: 1.3273
Epoch 57/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5042 - loss: 1.3299 - val_accuracy: 0.5106 - val_loss: 1.3288
Epoch 58/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4965 - loss: 1.3300 - val_accuracy: 0.5106 - val_loss: 1.3256
Epoch 59/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5066 - loss: 1.3300 - val_accuracy: 0.5106 - val_loss: 1.3283
Epoch 60/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4972 - loss: 1.3301 - val_accuracy: 0.5106 - val_loss: 1.3295
Epoch 61/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4964 - loss: 1.3299 - val_accuracy: 0.5106 - val_loss: 1.3271
Epoch 62/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4920 - loss: 1.3300 - val_accuracy: 0.5106 - val_loss: 1.3258
Epoch 63/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4972 - loss: 1.3300 - val_accuracy: 0.5106 - val_loss: 1.3303
Epoch 64/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5061 - loss: 1.3299 - val_accuracy: 0.5106 - val_loss: 1.3290
Epoch 65/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5028 - loss: 1.3300 - val_accuracy: 0.5106 - val_loss: 1.3287
Epoch 66/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5094 - loss: 1.3298 - val_accuracy: 0.4894 - val_loss: 1.3265
Epoch 67/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5062 - loss: 1.3298 - val_accuracy: 0.4894 - val_loss: 1.3282
Epoch 68/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5042 - loss: 1.3299 - val_accuracy: 0.5106 - val_loss: 1.3260
Epoch 69/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5058 - loss: 1.3298 - val_accuracy: 0.5106 - val_loss: 1.3262
Epoch 70/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5042 - loss: 1.3297 - val_accuracy: 0.5106 - val_loss: 1.3281
Epoch 71/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5014 - loss: 1.3300 - val_accuracy: 0.5106 - val_loss: 1.3299
Epoch 72/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5050 - loss: 1.3297 - val_accuracy: 0.5106 - val_loss: 1.3280
Epoch 73/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4861 - loss: 1.3298 - val_accuracy: 0.5106 - val_loss: 1.3278
Epoch 74/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5065 - loss: 1.3298 - val_accuracy: 0.5106 - val_loss: 1.3298
Epoch 75/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4980 - loss: 1.3298 - val_accuracy: 0.5106 - val_loss: 1.3262
Epoch 76/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.5023 - loss: 1.3296 - val_accuracy: 0.5106 - val_loss: 1.3258
Epoch 77/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4948 - loss: 1.3299 - val_accuracy: 0.5106 - val_loss: 1.3276
Epoch 78/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4972 - loss: 1.3296 - val_accuracy: 0.5106 - val_loss: 1.3293
Epoch 79/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5129 - loss: 1.3294 - val_accuracy: 0.4894 - val_loss: 1.3252
Epoch 80/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5015 - loss: 1.3296 - val_accuracy: 0.5106 - val_loss: 1.3285
Epoch 81/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4988 - loss: 1.3297 - val_accuracy: 0.5106 - val_loss: 1.3298
Epoch 82/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4994 - loss: 1.3296 - val_accuracy: 0.5106 - val_loss: 1.3268
Epoch 83/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.4977 - loss: 1.3296 - val_accuracy: 0.5106 - val_loss: 1.3260
Epoch 84/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 11ms/step - accuracy: 0.5013 - loss: 1.3295 - val_accuracy: 0.5106 - val_loss: 1.3284
Epoch 85/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5045 - loss: 1.3295 - val_accuracy: 0.5106 - val_loss: 1.3259
Epoch 86/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 11ms/step - accuracy: 0.5088 - loss: 1.3294 - val_accuracy: 0.5106 - val_loss: 1.3278
Epoch 87/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 4s 11ms/step - accuracy: 0.4915 - loss: 1.3295 - val_accuracy: 0.5106 - val_loss: 1.3284
Epoch 88/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 11ms/step - accuracy: 0.5003 - loss: 1.3295 - val_accuracy: 0.5106 - val_loss: 1.3288
Epoch 89/100
400/400 ━━━━━━━━━━━━━━━━━━━━ 5s 12ms/step - accuracy: 0.4924 - loss: 1.3295 - val_accuracy: 0.5106 - val_loss: 1.3260
Epoch 90/100
```