# lstm-model-2

November 24, 2024

[ ]:
```
import os
import numpy as np
import cv2
import mediapipe as mp
import matplotlib.pyplot as plt
import torch
import torch.nn as nn
import torch.optim as optim
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.metrics import accuracy_score, classification_report
import seaborn as sns
import pandas as pd
```

```
Requirement already satisfied: mediapipe in /opt/conda/lib/python3.10/site-
packages (0.10.15)
Requirement already satisfied: absl-py in /opt/conda/lib/python3.10/site-
packages (from mediapipe) (1.4.0)
Requirement already satisfied: attrs>=19.1.0 in /opt/conda/lib/python3.10/site-
packages (from mediapipe) (23.2.0)
Requirement already satisfied: flatbuffers>=2.0 in
/opt/conda/lib/python3.10/site-packages (from mediapipe) (24.3.25)
Requirement already satisfied: jax in /opt/conda/lib/python3.10/site-packages
(from mediapipe) (0.4.33)
Requirement already satisfied: jaxlib in /opt/conda/lib/python3.10/site-packages
(from mediapipe) (0.4.33)
Requirement already satisfied: matplotlib in /opt/conda/lib/python3.10/site-
packages (from mediapipe) (3.7.5)
Requirement already satisfied: numpy<2 in /opt/conda/lib/python3.10/site-
packages (from mediapipe) (1.26.4)
Requirement already satisfied: opencv-contrib-python in
/opt/conda/lib/python3.10/site-packages (from mediapipe) (4.10.0.84)
Requirement already satisfied: protobuf<5,>=4.25.3 in
/opt/conda/lib/python3.10/site-packages (from mediapipe) (4.25.5)
Requirement already satisfied: sounddevice>=0.4.4 in
/opt/conda/lib/python3.10/site-packages (from mediapipe) (0.5.1)
Requirement already satisfied: CFFI>=1.0 in /opt/conda/lib/python3.10/site-
packages (from sounddevice>=0.4.4->mediapipe) (1.16.0)
```

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Requirement already satisfied: ml-dtypes>=0.2.0 in
/opt/conda/lib/python3.10/site-packages (from jax->mediapipe) (0.3.2)
Requirement already satisfied: opt-einsum in /opt/conda/lib/python3.10/site-
packages (from jax->mediapipe) (3.3.0)
Requirement already satisfied: scipy>=1.10 in /opt/conda/lib/python3.10/site-
packages (from jax->mediapipe) (1.14.1)
Requirement already satisfied: contourpy>=1.0.1 in
/opt/conda/lib/python3.10/site-packages (from matplotlib->mediapipe) (1.2.1)
Requirement already satisfied: cycler>=0.10 in /opt/conda/lib/python3.10/site-
packages (from matplotlib->mediapipe) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in
/opt/conda/lib/python3.10/site-packages (from matplotlib->mediapipe) (4.53.0)
Requirement already satisfied: kiwisolver>=1.0.1 in
/opt/conda/lib/python3.10/site-packages (from matplotlib->mediapipe) (1.4.5)
Requirement already satisfied: packaging>=20.0 in
/opt/conda/lib/python3.10/site-packages (from matplotlib->mediapipe) (21.3)
Requirement already satisfied: pillow>=6.2.0 in /opt/conda/lib/python3.10/site-
packages (from matplotlib->mediapipe) (10.3.0)
Requirement already satisfied: pyparsing>=2.3.1 in
/opt/conda/lib/python3.10/site-packages (from matplotlib->mediapipe) (3.1.2)
Requirement already satisfied: python-dateutil>=2.7 in
/opt/conda/lib/python3.10/site-packages (from matplotlib->mediapipe)
(2.9.0.post0)
Requirement already satisfied: pycparser in /opt/conda/lib/python3.10/site-
packages (from CFFI>=1.0->sounddevice>=0.4.4->mediapipe) (2.22)
Requirement already satisfied: six>=1.5 in /opt/conda/lib/python3.10/site-
packages (from python-dateutil>=2.7->matplotlib->mediapipe) (1.16.0)
```

[7]:
```
# Load the dataset
x = np.load('pose_landmarks_dataset.npy')
y = np.load('pose_landmarks_labels.npy')
```

[8]:
```
# Split data into training and testing sets
x_train, x_val, y_train, y_val = train_test_split(x, y, test_size=0.2,␣
↪random_state=42)
```

[9]:
```
# Initialize label encoder
label_encoder = LabelEncoder()
y_train_encoded = label_encoder.fit_transform(y_train)
y_val_encoded = label_encoder.transform(y_val)
```

[14]:
```
from keras.models import Sequential
from keras.layers import LSTM, Dropout, Dense, TimeDistributed
from keras.optimizers import Adam

num_classes = len(np.unique(y_train_encoded))
```

[15]:
```
model = Sequential()
model.add(LSTM(128, return_sequences=True, input_shape=(x_train.shape[1],␣
 ↪x_train.shape[2])))
model.add(Dropout(0.4))
model.add(LSTM(128, return_sequences=True))
model.add(Dropout(0.4))
model.add(LSTM(64, return_sequences=True))
model.add(Dropout(0.4))
model.add(TimeDistributed(Dense(64, activation='relu')))
model.add(Dropout(0.4))
model.add(LSTM(32))
model.add(Dropout(0.4))
model.add(Dense(num_classes, activation='softmax'))

optimizer = Adam(learning_rate=0.001)
model.compile(optimizer=optimizer, loss='sparse_categorical_crossentropy',␣
 ↪metrics=['accuracy'])
```

[16]:
```
# Train the model and store the training history
history = model.fit(x_train, y_train_encoded,
                    validation_data=(x_val, y_val_encoded),
                    epochs=600, batch_size=32)

# Extract accuracy and validation accuracy from the history
train_accuracy = history.history['accuracy']
val_accuracy = history.history['val_accuracy']
epochs = range(1, len(train_accuracy) + 1)

# Plot training and validation accuracy
plt.figure(figsize=(10, 5))
plt.plot(epochs, train_accuracy, label='Training Accuracy', color='blue')
plt.plot(epochs, val_accuracy, label='Validation Accuracy', color='orange')

# Label the graph
plt.title('Training and Validation Accuracy over Epochs')
plt.xlabel('Epochs')
plt.ylabel('Accuracy')
plt.legend()

# Show the plot
plt.show()
```

```
Epoch 1/600
150/150             28s 127ms/step -
accuracy: 0.1969 - loss: 2.0093 - val_accuracy: 0.3094 - val_loss: 1.7827
Epoch 2/600
150/150             20s 122ms/step -
```

```
accuracy: 0.2975 - loss: 1.8244 - val_accuracy: 0.2986 - val_loss: 1.7148
Epoch 3/600
150/150             19s 114ms/step -
accuracy: 0.3111 - loss: 1.7221 - val_accuracy: 0.3186 - val_loss: 1.6737
Epoch 4/600
150/150             18s 120ms/step -
accuracy: 0.3197 - loss: 1.7168 - val_accuracy: 0.3169 - val_loss: 1.6313
Epoch 5/600
150/150             18s 122ms/step -
accuracy: 0.3294 - loss: 1.6537 - val_accuracy: 0.3703 - val_loss: 1.4923
Epoch 6/600
150/150             18s 123ms/step -
accuracy: 0.3554 - loss: 1.5847 - val_accuracy: 0.3686 - val_loss: 1.4302
Epoch 7/600
150/150             18s 118ms/step -
accuracy: 0.3635 - loss: 1.4554 - val_accuracy: 0.4195 - val_loss: 1.2982
Epoch 8/600
150/150             18s 119ms/step -
accuracy: 0.4066 - loss: 1.3893 - val_accuracy: 0.4254 - val_loss: 1.2952
Epoch 9/600
150/150             18s 120ms/step -
accuracy: 0.3762 - loss: 1.4781 - val_accuracy: 0.3845 - val_loss: 1.3748
Epoch 10/600
150/150             17s 116ms/step -
accuracy: 0.4266 - loss: 1.3336 - val_accuracy: 0.4621 - val_loss: 1.1890
Epoch 11/600
150/150             18s 118ms/step -
accuracy: 0.4452 - loss: 1.2862 - val_accuracy: 0.4028 - val_loss: 1.2586
Epoch 12/600
150/150             18s 119ms/step -
accuracy: 0.4206 - loss: 1.2953 - val_accuracy: 0.4354 - val_loss: 1.3864
Epoch 13/600
150/150             21s 125ms/step -
accuracy: 0.4347 - loss: 1.2823 - val_accuracy: 0.4562 - val_loss: 1.1931
Epoch 14/600
150/150             19s 124ms/step -
accuracy: 0.4174 - loss: 1.3029 - val_accuracy: 0.4362 - val_loss: 1.2354
Epoch 15/600
150/150             25s 163ms/step -
accuracy: 0.4432 - loss: 1.2478 - val_accuracy: 0.4504 - val_loss: 1.1982
Epoch 16/600
150/150             21s 138ms/step -
accuracy: 0.4429 - loss: 1.2613 - val_accuracy: 0.4829 - val_loss: 1.1462
Epoch 17/600
150/150             21s 138ms/step -
accuracy: 0.4663 - loss: 1.2019 - val_accuracy: 0.4846 - val_loss: 1.1117
Epoch 18/600
150/150             19s 128ms/step -
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accuracy: 0.4658 - loss: 1.1834 - val_accuracy: 0.4779 - val_loss: 1.1234
Epoch 19/600
150/150             21s 129ms/step -
accuracy: 0.4658 - loss: 1.1949 - val_accuracy: 0.4862 - val_loss: 1.1026
Epoch 20/600
150/150             18s 123ms/step -
accuracy: 0.4692 - loss: 1.1738 - val_accuracy: 0.4562 - val_loss: 1.1191
Epoch 21/600
150/150             19s 125ms/step -
accuracy: 0.4762 - loss: 1.1709 - val_accuracy: 0.4921 - val_loss: 1.1059
Epoch 22/600
150/150             18s 120ms/step -
accuracy: 0.4527 - loss: 1.2216 - val_accuracy: 0.3870 - val_loss: 1.4662
Epoch 23/600
150/150             18s 120ms/step -
accuracy: 0.4102 - loss: 1.3747 - val_accuracy: 0.4821 - val_loss: 1.1441
Epoch 24/600
150/150             20s 118ms/step -
accuracy: 0.4638 - loss: 1.2084 - val_accuracy: 0.4662 - val_loss: 1.1609
Epoch 25/600
150/150             18s 123ms/step -
accuracy: 0.4563 - loss: 1.1730 - val_accuracy: 0.4846 - val_loss: 1.1104
Epoch 26/600
150/150             18s 122ms/step -
accuracy: 0.4798 - loss: 1.1767 - val_accuracy: 0.4887 - val_loss: 1.0686
Epoch 27/600
150/150             18s 120ms/step -
accuracy: 0.4625 - loss: 1.1618 - val_accuracy: 0.5054 - val_loss: 1.0887
Epoch 28/600
150/150             19s 127ms/step -
accuracy: 0.4804 - loss: 1.1429 - val_accuracy: 0.5038 - val_loss: 1.0577
Epoch 29/600
150/150             20s 130ms/step -
accuracy: 0.4721 - loss: 1.1999 - val_accuracy: 0.4929 - val_loss: 1.0888
Epoch 30/600
150/150             19s 129ms/step -
accuracy: 0.4952 - loss: 1.1226 - val_accuracy: 0.4812 - val_loss: 1.1136
Epoch 31/600
150/150             20s 129ms/step -
accuracy: 0.4955 - loss: 1.1209 - val_accuracy: 0.5221 - val_loss: 1.0341
Epoch 32/600
150/150             20s 129ms/step -
accuracy: 0.4838 - loss: 1.1107 - val_accuracy: 0.4787 - val_loss: 1.1737
Epoch 33/600
150/150             19s 123ms/step -
accuracy: 0.4853 - loss: 1.1325 - val_accuracy: 0.5021 - val_loss: 1.0333
Epoch 34/600
150/150             19s 130ms/step -
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accuracy: 0.4951 - loss: 1.0815 - val_accuracy: 0.5054 - val_loss: 1.0335
Epoch 35/600
150/150             19s 126ms/step -
accuracy: 0.5160 - loss: 1.0895 - val_accuracy: 0.4896 - val_loss: 1.1332
Epoch 36/600
150/150             19s 126ms/step -
accuracy: 0.4830 - loss: 1.1096 - val_accuracy: 0.5154 - val_loss: 1.0526
Epoch 37/600
150/150             20s 136ms/step -
accuracy: 0.5125 - loss: 1.0652 - val_accuracy: 0.5388 - val_loss: 1.0456
Epoch 38/600
150/150             20s 137ms/step -
accuracy: 0.5128 - loss: 1.0855 - val_accuracy: 0.4946 - val_loss: 1.0688
Epoch 39/600
150/150             22s 147ms/step -
accuracy: 0.5037 - loss: 1.1074 - val_accuracy: 0.5179 - val_loss: 1.0110
Epoch 40/600
150/150             22s 148ms/step -
accuracy: 0.5179 - loss: 1.0458 - val_accuracy: 0.5113 - val_loss: 1.0643
Epoch 41/600
150/150             19s 127ms/step -
accuracy: 0.5317 - loss: 1.0523 - val_accuracy: 0.5254 - val_loss: 1.0258
Epoch 42/600
150/150             20s 131ms/step -
accuracy: 0.5077 - loss: 1.0802 - val_accuracy: 0.5421 - val_loss: 0.9999
Epoch 43/600
150/150             20s 135ms/step -
accuracy: 0.5280 - loss: 1.0567 - val_accuracy: 0.5288 - val_loss: 1.0016
Epoch 44/600
150/150             20s 130ms/step -
accuracy: 0.5162 - loss: 1.0512 - val_accuracy: 0.5204 - val_loss: 1.0386
Epoch 45/600
150/150             21s 138ms/step -
accuracy: 0.5078 - loss: 1.0773 - val_accuracy: 0.5104 - val_loss: 1.0380
Epoch 46/600
150/150             21s 142ms/step -
accuracy: 0.5014 - loss: 1.0753 - val_accuracy: 0.5096 - val_loss: 1.0761
Epoch 47/600
150/150             21s 141ms/step -
accuracy: 0.5173 - loss: 1.0584 - val_accuracy: 0.5446 - val_loss: 1.0020
Epoch 48/600
150/150             23s 152ms/step -
accuracy: 0.5293 - loss: 1.0262 - val_accuracy: 0.5279 - val_loss: 1.0308
Epoch 49/600
150/150             23s 156ms/step -
accuracy: 0.5220 - loss: 1.0645 - val_accuracy: 0.5154 - val_loss: 1.0541
Epoch 50/600
150/150             21s 142ms/step -
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accuracy: 0.5231 - loss: 1.0782 - val_accuracy: 0.5480 - val_loss: 1.0039
Epoch 51/600
150/150             41s 142ms/step -
accuracy: 0.5210 - loss: 1.0470 - val_accuracy: 0.5288 - val_loss: 1.0038
Epoch 52/600
150/150             20s 132ms/step -
accuracy: 0.5504 - loss: 1.0087 - val_accuracy: 0.5438 - val_loss: 0.9920
Epoch 53/600
150/150             20s 136ms/step -
accuracy: 0.5397 - loss: 1.0207 - val_accuracy: 0.5446 - val_loss: 0.9760
Epoch 54/600
150/150             20s 133ms/step -
accuracy: 0.5236 - loss: 1.0457 - val_accuracy: 0.5213 - val_loss: 1.0079
Epoch 55/600
150/150             21s 140ms/step -
accuracy: 0.5594 - loss: 0.9962 - val_accuracy: 0.5438 - val_loss: 0.9664
Epoch 56/600
150/150             21s 137ms/step -
accuracy: 0.5294 - loss: 1.0352 - val_accuracy: 0.4812 - val_loss: 1.2173
Epoch 57/600
150/150             22s 147ms/step -
accuracy: 0.5071 - loss: 1.0983 - val_accuracy: 0.5721 - val_loss: 0.9803
Epoch 58/600
150/150             20s 136ms/step -
accuracy: 0.5509 - loss: 1.0017 - val_accuracy: 0.5405 - val_loss: 0.9766
Epoch 59/600
150/150             23s 156ms/step -
accuracy: 0.5528 - loss: 0.9944 - val_accuracy: 0.5505 - val_loss: 0.9711
Epoch 60/600
150/150             22s 144ms/step -
accuracy: 0.5260 - loss: 1.0173 - val_accuracy: 0.5296 - val_loss: 1.0248
Epoch 61/600
150/150             22s 148ms/step -
accuracy: 0.5399 - loss: 1.0403 - val_accuracy: 0.5263 - val_loss: 0.9940
Epoch 62/600
150/150             20s 135ms/step -
accuracy: 0.5473 - loss: 0.9985 - val_accuracy: 0.5546 - val_loss: 0.9694
Epoch 63/600
150/150             20s 130ms/step -
accuracy: 0.5359 - loss: 1.0434 - val_accuracy: 0.5254 - val_loss: 1.0111
Epoch 64/600
150/150             21s 131ms/step -
accuracy: 0.5527 - loss: 1.0233 - val_accuracy: 0.5521 - val_loss: 0.9605
Epoch 65/600
150/150             20s 137ms/step -
accuracy: 0.5629 - loss: 0.9929 - val_accuracy: 0.5338 - val_loss: 0.9702
Epoch 66/600
150/150             19s 129ms/step -
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accuracy: 0.5654 - loss: 0.9903 - val_accuracy: 0.5563 - val_loss: 0.9461
Epoch 67/600
150/150             19s 129ms/step -
accuracy: 0.5652 - loss: 0.9679 - val_accuracy: 0.5371 - val_loss: 0.9674
Epoch 68/600
150/150             18s 122ms/step -
accuracy: 0.5593 - loss: 0.9769 - val_accuracy: 0.5463 - val_loss: 0.9464
Epoch 69/600
150/150             20s 131ms/step -
accuracy: 0.5787 - loss: 0.9395 - val_accuracy: 0.5446 - val_loss: 0.9472
Epoch 70/600
150/150             19s 128ms/step -
accuracy: 0.5645 - loss: 0.9843 - val_accuracy: 0.5329 - val_loss: 0.9775
Epoch 71/600
150/150             20s 124ms/step -
accuracy: 0.5638 - loss: 0.9847 - val_accuracy: 0.5588 - val_loss: 0.9410
Epoch 72/600
150/150             19s 124ms/step -
accuracy: 0.5766 - loss: 0.9628 - val_accuracy: 0.5530 - val_loss: 0.9401
Epoch 73/600
150/150             19s 127ms/step -
accuracy: 0.5700 - loss: 0.9636 - val_accuracy: 0.5505 - val_loss: 0.9620
Epoch 74/600
150/150             19s 124ms/step -
accuracy: 0.5775 - loss: 0.9625 - val_accuracy: 0.5705 - val_loss: 0.9303
Epoch 75/600
150/150             18s 123ms/step -
accuracy: 0.5506 - loss: 1.0286 - val_accuracy: 0.5855 - val_loss: 0.9140
Epoch 76/600
150/150             19s 126ms/step -
accuracy: 0.5464 - loss: 1.0092 - val_accuracy: 0.5555 - val_loss: 0.9702
Epoch 77/600
150/150             21s 126ms/step -
accuracy: 0.5702 - loss: 0.9667 - val_accuracy: 0.5455 - val_loss: 0.9777
Epoch 78/600
150/150             19s 124ms/step -
accuracy: 0.5731 - loss: 0.9875 - val_accuracy: 0.5463 - val_loss: 0.9587
Epoch 79/600
150/150             19s 126ms/step -
accuracy: 0.5768 - loss: 0.9546 - val_accuracy: 0.5746 - val_loss: 0.9270
Epoch 80/600
150/150             18s 123ms/step -
accuracy: 0.5751 - loss: 0.9662 - val_accuracy: 0.5688 - val_loss: 0.9539
Epoch 81/600
150/150             18s 122ms/step -
accuracy: 0.5827 - loss: 0.9364 - val_accuracy: 0.5638 - val_loss: 0.9237
Epoch 82/600
150/150             18s 120ms/step -
```

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accuracy: 0.5422 - loss: 1.0423 - val_accuracy: 0.5680 - val_loss: 0.9170
Epoch 83/600
150/150             19s 124ms/step -
accuracy: 0.5678 - loss: 0.9731 - val_accuracy: 0.5688 - val_loss: 0.9409
Epoch 84/600
150/150             21s 129ms/step -
accuracy: 0.5911 - loss: 0.9528 - val_accuracy: 0.5538 - val_loss: 0.9537
Epoch 85/600
150/150             18s 122ms/step -
accuracy: 0.5865 - loss: 0.9439 - val_accuracy: 0.5922 - val_loss: 0.8893
Epoch 86/600
150/150             19s 126ms/step -
accuracy: 0.5803 - loss: 0.9393 - val_accuracy: 0.5405 - val_loss: 0.9720
Epoch 87/600
150/150             18s 119ms/step -
accuracy: 0.5573 - loss: 1.0268 - val_accuracy: 0.5705 - val_loss: 0.9056
Epoch 88/600
150/150             18s 122ms/step -
accuracy: 0.5954 - loss: 0.9050 - val_accuracy: 0.5897 - val_loss: 0.8775
Epoch 89/600
150/150             18s 118ms/step -
accuracy: 0.5984 - loss: 0.9270 - val_accuracy: 0.5955 - val_loss: 0.8950
Epoch 90/600
150/150             18s 121ms/step -
accuracy: 0.5899 - loss: 0.8936 - val_accuracy: 0.5463 - val_loss: 0.9509
Epoch 91/600
150/150             18s 123ms/step -
accuracy: 0.5732 - loss: 0.9499 - val_accuracy: 0.6080 - val_loss: 0.8710
Epoch 92/600
150/150             18s 121ms/step -
accuracy: 0.5989 - loss: 0.9218 - val_accuracy: 0.5655 - val_loss: 0.9082
Epoch 93/600
150/150             19s 125ms/step -
accuracy: 0.5911 - loss: 0.9215 - val_accuracy: 0.5805 - val_loss: 0.9215
Epoch 94/600
150/150             17s 116ms/step -
accuracy: 0.5979 - loss: 0.9417 - val_accuracy: 0.6088 - val_loss: 0.8658
Epoch 95/600
150/150             18s 119ms/step -
accuracy: 0.5989 - loss: 0.9065 - val_accuracy: 0.5780 - val_loss: 0.9151
Epoch 97/600
150/150             18s 121ms/step -
accuracy: 0.5939 - loss: 0.9112 - val_accuracy: 0.5596 - val_loss: 0.9393
Epoch 98/600
150/150             18s 117ms/step -
accuracy: 0.5934 - loss: 0.9262 - val_accuracy: 0.5930 - val_loss: 0.8733
Epoch 99/600
150/150             18s 120ms/step -
```

```
accuracy: 0.6132 - loss: 0.8906 - val_accuracy: 0.6047 - val_loss: 0.8884
Epoch 100/600
150/150             18s 120ms/step -
accuracy: 0.6042 - loss: 0.8905 - val_accuracy: 0.6172 - val_loss: 0.8524
Epoch 101/600
150/150             17s 115ms/step -
accuracy: 0.6232 - loss: 0.8634 - val_accuracy: 0.5847 - val_loss: 0.9169
Epoch 102/600
150/150             18s 122ms/step -
accuracy: 0.6020 - loss: 0.9214 - val_accuracy: 0.5913 - val_loss: 0.8814
Epoch 103/600
150/150             18s 120ms/step -
accuracy: 0.6177 - loss: 0.8543 - val_accuracy: 0.5872 - val_loss: 0.9113
Epoch 104/600
150/150             19s 124ms/step -
accuracy: 0.5983 - loss: 0.9197 - val_accuracy: 0.5855 - val_loss: 0.8933
Epoch 105/600
150/150             18s 118ms/step -
accuracy: 0.6130 - loss: 0.8742 - val_accuracy: 0.5922 - val_loss: 0.8717
Epoch 106/600
150/150             22s 146ms/step -
accuracy: 0.6071 - loss: 0.9013 - val_accuracy: 0.5813 - val_loss: 0.9495
Epoch 107/600
150/150             24s 159ms/step -
accuracy: 0.5823 - loss: 0.9378 - val_accuracy: 0.6022 - val_loss: 0.9153
Epoch 108/600
150/150             26s 171ms/step -
accuracy: 0.6126 - loss: 0.8706 - val_accuracy: 0.5988 - val_loss: 0.8816
Epoch 109/600
150/150             24s 160ms/step -
accuracy: 0.6104 - loss: 0.8754 - val_accuracy: 0.5997 - val_loss: 0.8395
Epoch 110/600
150/150             23s 156ms/step -
accuracy: 0.6061 - loss: 0.8810 - val_accuracy: 0.5863 - val_loss: 0.8881
Epoch 111/600
150/150             22s 145ms/step -
accuracy: 0.6268 - loss: 0.8620 - val_accuracy: 0.5830 - val_loss: 0.8960
Epoch 112/600
150/150             20s 134ms/step -
accuracy: 0.6240 - loss: 0.8645 - val_accuracy: 0.6130 - val_loss: 0.8606
Epoch 113/600
150/150             21s 142ms/step -
accuracy: 0.6100 - loss: 0.8854 - val_accuracy: 0.6122 - val_loss: 0.8439
Epoch 114/600
150/150             21s 140ms/step -
accuracy: 0.6172 - loss: 0.8738 - val_accuracy: 0.6138 - val_loss: 0.8491
Epoch 115/600
150/150             21s 137ms/step -
```

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accuracy: 0.6188 - loss: 0.8670 - val_accuracy: 0.6205 - val_loss: 0.8364
Epoch 116/600
150/150             20s 135ms/step -
accuracy: 0.6425 - loss: 0.8248 - val_accuracy: 0.6188 - val_loss: 0.8343
Epoch 117/600
150/150             20s 129ms/step -
accuracy: 0.6172 - loss: 0.8716 - val_accuracy: 0.6422 - val_loss: 0.8446
Epoch 118/600
150/150             20s 134ms/step -
accuracy: 0.6214 - loss: 0.8582 - val_accuracy: 0.6130 - val_loss: 0.8244
Epoch 119/600
150/150             22s 147ms/step -
accuracy: 0.6313 - loss: 0.8459 - val_accuracy: 0.6322 - val_loss: 0.8249
Epoch 120/600
150/150             19s 129ms/step -
accuracy: 0.6306 - loss: 0.8394 - val_accuracy: 0.6297 - val_loss: 0.8206
Epoch 121/600
150/150             19s 126ms/step -
accuracy: 0.6338 - loss: 0.8333 - val_accuracy: 0.6439 - val_loss: 0.7879
Epoch 122/600
150/150             18s 122ms/step -
accuracy: 0.6439 - loss: 0.8479 - val_accuracy: 0.5972 - val_loss: 0.8781
Epoch 123/600
150/150             19s 126ms/step -
accuracy: 0.6269 - loss: 0.8637 - val_accuracy: 0.5947 - val_loss: 0.9849
Epoch 124/600
150/150             22s 134ms/step -
accuracy: 0.6202 - loss: 0.8729 - val_accuracy: 0.6305 - val_loss: 0.8152
Epoch 125/600
150/150             20s 127ms/step -
accuracy: 0.6279 - loss: 0.8282 - val_accuracy: 0.5955 - val_loss: 0.8878
Epoch 126/600
150/150             20s 132ms/step -
accuracy: 0.6160 - loss: 0.8755 - val_accuracy: 0.6113 - val_loss: 0.8676
Epoch 127/600
150/150             19s 123ms/step -
accuracy: 0.6416 - loss: 0.8402 - val_accuracy: 0.6539 - val_loss: 0.7846
Epoch 128/600
150/150             20s 135ms/step -
accuracy: 0.6504 - loss: 0.8150 - val_accuracy: 0.6455 - val_loss: 0.8176
Epoch 129/600
150/150             19s 127ms/step -
accuracy: 0.6263 - loss: 0.8547 - val_accuracy: 0.5922 - val_loss: 0.8546
Epoch 130/600
150/150             19s 118ms/step -
accuracy: 0.6240 - loss: 0.8372 - val_accuracy: 0.5671 - val_loss: 1.0413
Epoch 131/600
150/150             21s 119ms/step -
```

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accuracy: 0.6226 - loss: 0.8674 - val_accuracy: 0.6230 - val_loss: 0.8055
Epoch 132/600
150/150             18s 120ms/step -
accuracy: 0.6521 - loss: 0.7995 - val_accuracy: 0.6180 - val_loss: 0.8121
Epoch 133/600
150/150             18s 120ms/step -
accuracy: 0.6536 - loss: 0.8006 - val_accuracy: 0.5905 - val_loss: 0.8724
Epoch 134/600
150/150             17s 116ms/step -
accuracy: 0.6428 - loss: 0.8302 - val_accuracy: 0.6405 - val_loss: 0.8090
Epoch 135/600
150/150             19s 128ms/step -
accuracy: 0.6394 - loss: 0.8231 - val_accuracy: 0.6130 - val_loss: 0.8967
Epoch 136/600
150/150             18s 117ms/step -
accuracy: 0.6492 - loss: 0.8320 - val_accuracy: 0.6389 - val_loss: 0.8014
Epoch 137/600
150/150             18s 118ms/step -
accuracy: 0.6255 - loss: 0.8400 - val_accuracy: 0.6389 - val_loss: 0.8175
Epoch 138/600
150/150             18s 122ms/step -
accuracy: 0.6337 - loss: 0.8343 - val_accuracy: 0.6389 - val_loss: 0.8377
Epoch 139/600
150/150             18s 118ms/step -
accuracy: 0.6504 - loss: 0.8225 - val_accuracy: 0.6572 - val_loss: 0.7749
Epoch 140/600
150/150             17s 117ms/step -
accuracy: 0.6374 - loss: 0.8412 - val_accuracy: 0.6505 - val_loss: 0.7723
Epoch 141/600
150/150             17s 114ms/step -
accuracy: 0.6626 - loss: 0.7780 - val_accuracy: 0.6664 - val_loss: 0.7618
Epoch 142/600
150/150             18s 120ms/step -
accuracy: 0.6438 - loss: 0.8251 - val_accuracy: 0.6080 - val_loss: 0.8599
Epoch 143/600
150/150             17s 116ms/step -
accuracy: 0.6646 - loss: 0.7951 - val_accuracy: 0.6656 - val_loss: 0.7830
Epoch 144/600
150/150             22s 123ms/step -
accuracy: 0.6514 - loss: 0.8092 - val_accuracy: 0.6422 - val_loss: 0.7692
Epoch 145/600
150/150             19s 124ms/step -
accuracy: 0.6503 - loss: 0.7882 - val_accuracy: 0.6631 - val_loss: 0.7869
Epoch 146/600
150/150             21s 125ms/step -
accuracy: 0.6570 - loss: 0.7763 - val_accuracy: 0.6564 - val_loss: 0.7718
Epoch 147/600
150/150             19s 124ms/step -
```

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accuracy: 0.6623 - loss: 0.8036 - val_accuracy: 0.6097 - val_loss: 0.8402
Epoch 148/600
150/150             18s 119ms/step -
accuracy: 0.6587 - loss: 0.7977 - val_accuracy: 0.6555 - val_loss: 0.8041
Epoch 149/600
150/150             19s 125ms/step -
accuracy: 0.6741 - loss: 0.7844 - val_accuracy: 0.6497 - val_loss: 0.7721
Epoch 150/600
150/150             18s 119ms/step -
accuracy: 0.6675 - loss: 0.7711 - val_accuracy: 0.6497 - val_loss: 0.7899
Epoch 151/600
150/150             18s 123ms/step -
accuracy: 0.6698 - loss: 0.7608 - val_accuracy: 0.6088 - val_loss: 0.8285
Epoch 152/600
150/150             20s 122ms/step -
accuracy: 0.6603 - loss: 0.7850 - val_accuracy: 0.6230 - val_loss: 0.8829
Epoch 153/600
150/150             19s 128ms/step -
accuracy: 0.6619 - loss: 0.7775 - val_accuracy: 0.6572 - val_loss: 0.7733
Epoch 154/600
150/150             19s 125ms/step -
accuracy: 0.6477 - loss: 0.8180 - val_accuracy: 0.6480 - val_loss: 0.7695
Epoch 155/600
150/150             20s 125ms/step -
accuracy: 0.6611 - loss: 0.7703 - val_accuracy: 0.6530 - val_loss: 0.7784
Epoch 156/600
150/150             18s 123ms/step -
accuracy: 0.6639 - loss: 0.7703 - val_accuracy: 0.6113 - val_loss: 0.8372
Epoch 157/600
150/150             18s 119ms/step -
accuracy: 0.6480 - loss: 0.8358 - val_accuracy: 0.6430 - val_loss: 0.8028
Epoch 158/600
150/150             20s 132ms/step -
accuracy: 0.6682 - loss: 0.7801 - val_accuracy: 0.6547 - val_loss: 0.7742
Epoch 159/600
150/150             19s 125ms/step -
accuracy: 0.6604 - loss: 0.7804 - val_accuracy: 0.6814 - val_loss: 0.7375
Epoch 160/600
150/150             18s 123ms/step -
accuracy: 0.6817 - loss: 0.7495 - val_accuracy: 0.6172 - val_loss: 0.8876
Epoch 161/600
150/150             19s 127ms/step -
accuracy: 0.6657 - loss: 0.7837 - val_accuracy: 0.6797 - val_loss: 0.7620
Epoch 162/600
150/150             18s 123ms/step -
accuracy: 0.6767 - loss: 0.7429 - val_accuracy: 0.6656 - val_loss: 0.7552
Epoch 163/600
150/150             19s 124ms/step -
```

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accuracy: 0.6796 - loss: 0.7484 - val_accuracy: 0.6480 - val_loss: 0.7606
Epoch 164/600
150/150             17s 116ms/step -
accuracy: 0.6591 - loss: 0.7785 - val_accuracy: 0.6589 - val_loss: 0.7323
Epoch 165/600
150/150             19s 129ms/step -
accuracy: 0.6676 - loss: 0.7710 - val_accuracy: 0.5555 - val_loss: 1.0285
Epoch 166/600
150/150             18s 119ms/step -
accuracy: 0.6588 - loss: 0.8159 - val_accuracy: 0.6714 - val_loss: 0.7403
Epoch 167/600
150/150             18s 120ms/step -
accuracy: 0.6733 - loss: 0.7842 - val_accuracy: 0.6731 - val_loss: 0.7424
Epoch 168/600
150/150             19s 123ms/step -
accuracy: 0.6833 - loss: 0.7525 - val_accuracy: 0.6839 - val_loss: 0.7345
Epoch 169/600
150/150             22s 146ms/step -
accuracy: 0.6874 - loss: 0.7534 - val_accuracy: 0.6797 - val_loss: 0.7380
Epoch 170/600
150/150             27s 177ms/step -
accuracy: 0.6704 - loss: 0.7673 - val_accuracy: 0.6522 - val_loss: 0.7779
Epoch 171/600
150/150             23s 154ms/step -
accuracy: 0.6835 - loss: 0.7437 - val_accuracy: 0.6514 - val_loss: 0.7834
Epoch 172/600
150/150             22s 145ms/step -
accuracy: 0.6869 - loss: 0.7467 - val_accuracy: 0.6439 - val_loss: 0.7973
Epoch 173/600
150/150             22s 149ms/step -
accuracy: 0.6830 - loss: 0.7280 - val_accuracy: 0.6439 - val_loss: 0.7974
Epoch 174/600
150/150             21s 138ms/step -
accuracy: 0.6831 - loss: 0.7434 - val_accuracy: 0.6389 - val_loss: 0.8235
Epoch 175/600
150/150             20s 136ms/step -
accuracy: 0.6715 - loss: 0.7738 - val_accuracy: 0.6731 - val_loss: 0.7579
Epoch 176/600
150/150             21s 143ms/step -
accuracy: 0.6817 - loss: 0.7550 - val_accuracy: 0.6597 - val_loss: 0.7602
Epoch 177/600
150/150             22s 144ms/step -
accuracy: 0.6840 - loss: 0.7305 - val_accuracy: 0.6714 - val_loss: 0.7540
Epoch 178/600
150/150             20s 136ms/step -
accuracy: 0.6867 - loss: 0.7494 - val_accuracy: 0.6764 - val_loss: 0.7389
Epoch 179/600
150/150             21s 139ms/step -
```

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accuracy: 0.6897 - loss: 0.7360 - val_accuracy: 0.6706 - val_loss: 0.7267
Epoch 180/600
150/150             20s 135ms/step -
accuracy: 0.6665 - loss: 0.7809 - val_accuracy: 0.6314 - val_loss: 0.8333
Epoch 181/600
150/150             23s 155ms/step -
accuracy: 0.6585 - loss: 0.7830 - val_accuracy: 0.6255 - val_loss: 0.7995
Epoch 182/600
150/150             23s 156ms/step -
accuracy: 0.6867 - loss: 0.7278 - val_accuracy: 0.6631 - val_loss: 0.7541
Epoch 183/600
150/150             22s 145ms/step -
accuracy: 0.6846 - loss: 0.7487 - val_accuracy: 0.7023 - val_loss: 0.7015
Epoch 184/600
150/150             24s 160ms/step -
accuracy: 0.6923 - loss: 0.7138 - val_accuracy: 0.6639 - val_loss: 0.7533
Epoch 185/600
150/150             24s 158ms/step -
accuracy: 0.6712 - loss: 0.7491 - val_accuracy: 0.6664 - val_loss: 0.7618
Epoch 186/600
150/150             22s 145ms/step -
accuracy: 0.6845 - loss: 0.7429 - val_accuracy: 0.6797 - val_loss: 0.7635
Epoch 187/600
150/150             21s 138ms/step -
accuracy: 0.6764 - loss: 0.7526 - val_accuracy: 0.6797 - val_loss: 0.7574
Epoch 188/600
150/150             21s 138ms/step -
accuracy: 0.7071 - loss: 0.6904 - val_accuracy: 0.6347 - val_loss: 0.8277
Epoch 189/600
150/150             21s 139ms/step -
accuracy: 0.6758 - loss: 0.7313 - val_accuracy: 0.6839 - val_loss: 0.7318
Epoch 190/600
150/150             21s 137ms/step -
accuracy: 0.6847 - loss: 0.7343 - val_accuracy: 0.6772 - val_loss: 0.7252
Epoch 191/600
150/150             20s 132ms/step -
accuracy: 0.6992 - loss: 0.7006 - val_accuracy: 0.6322 - val_loss: 0.7831
Epoch 192/600
150/150             20s 132ms/step -
accuracy: 0.6958 - loss: 0.7260 - val_accuracy: 0.7089 - val_loss: 0.6916
Epoch 193/600
150/150             20s 127ms/step -
accuracy: 0.6961 - loss: 0.7061 - val_accuracy: 0.7289 - val_loss: 0.6760
Epoch 194/600
150/150             19s 127ms/step -
accuracy: 0.7103 - loss: 0.6903 - val_accuracy: 0.6781 - val_loss: 0.7455
Epoch 195/600
150/150             19s 124ms/step -
```

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accuracy: 0.6870 - loss: 0.7251 - val_accuracy: 0.6856 - val_loss: 0.7289
Epoch 196/600
150/150             19s 123ms/step -
accuracy: 0.7061 - loss: 0.6923 - val_accuracy: 0.6522 - val_loss: 0.7792
Epoch 197/600
150/150             17s 116ms/step -
accuracy: 0.6955 - loss: 0.7465 - val_accuracy: 0.6814 - val_loss: 0.7335
Epoch 198/600
150/150             22s 123ms/step -
accuracy: 0.7176 - loss: 0.6812 - val_accuracy: 0.6505 - val_loss: 0.7708
Epoch 199/600
150/150             18s 122ms/step -
accuracy: 0.7015 - loss: 0.7135 - val_accuracy: 0.6639 - val_loss: 0.7950
Epoch 200/600
150/150             18s 119ms/step -
accuracy: 0.7071 - loss: 0.6884 - val_accuracy: 0.6981 - val_loss: 0.7192
Epoch 201/600
150/150             21s 137ms/step -
accuracy: 0.7235 - loss: 0.6460 - val_accuracy: 0.6781 - val_loss: 0.7472
Epoch 202/600
150/150             20s 130ms/step -
accuracy: 0.7030 - loss: 0.6987 - val_accuracy: 0.6897 - val_loss: 0.7105
Epoch 203/600
150/150             20s 127ms/step -
accuracy: 0.6998 - loss: 0.7118 - val_accuracy: 0.6897 - val_loss: 0.7251
Epoch 204/600
150/150             20s 133ms/step -
accuracy: 0.7139 - loss: 0.6734 - val_accuracy: 0.6589 - val_loss: 0.8028
Epoch 205/600
150/150             21s 141ms/step -
accuracy: 0.6848 - loss: 0.7580 - val_accuracy: 0.6714 - val_loss: 0.7420
Epoch 206/600
150/150             19s 130ms/step -
accuracy: 0.7204 - loss: 0.6854 - val_accuracy: 0.7081 - val_loss: 0.7074
Epoch 207/600
150/150             21s 142ms/step -
accuracy: 0.7040 - loss: 0.7003 - val_accuracy: 0.6756 - val_loss: 0.7284
Epoch 208/600
150/150             41s 139ms/step -
accuracy: 0.7011 - loss: 0.7030 - val_accuracy: 0.6939 - val_loss: 0.7231
Epoch 209/600
150/150             19s 124ms/step -
accuracy: 0.6963 - loss: 0.7077 - val_accuracy: 0.6972 - val_loss: 0.6861
Epoch 210/600
150/150             18s 122ms/step -
accuracy: 0.7078 - loss: 0.6698 - val_accuracy: 0.6514 - val_loss: 0.8817
Epoch 211/600
150/150             18s 119ms/step -
```

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accuracy: 0.7067 - loss: 0.7000 - val_accuracy: 0.6681 - val_loss: 0.7875
Epoch 212/600
150/150             18s 122ms/step -
accuracy: 0.6972 - loss: 0.7072 - val_accuracy: 0.6864 - val_loss: 0.7308
Epoch 213/600
150/150             19s 124ms/step -
accuracy: 0.7016 - loss: 0.6957 - val_accuracy: 0.6672 - val_loss: 0.7555
Epoch 214/600
150/150             19s 126ms/step -
accuracy: 0.6966 - loss: 0.7089 - val_accuracy: 0.6714 - val_loss: 0.7442
Epoch 215/600
150/150             19s 126ms/step -
accuracy: 0.6893 - loss: 0.7461 - val_accuracy: 0.7031 - val_loss: 0.6933
Epoch 216/600
150/150             22s 135ms/step -
accuracy: 0.7194 - loss: 0.6998 - val_accuracy: 0.6847 - val_loss: 0.7159
Epoch 217/600
150/150             19s 126ms/step -
accuracy: 0.6504 - loss: 0.8817 - val_accuracy: 0.7056 - val_loss: 0.6859
Epoch 218/600
150/150             19s 126ms/step -
accuracy: 0.7284 - loss: 0.6549 - val_accuracy: 0.7148 - val_loss: 0.7045
Epoch 219/600
150/150             22s 135ms/step -
accuracy: 0.7074 - loss: 0.6881 - val_accuracy: 0.7181 - val_loss: 0.6884
Epoch 220/600
150/150             22s 147ms/step -
accuracy: 0.7243 - loss: 0.6518 - val_accuracy: 0.6797 - val_loss: 0.7409
Epoch 221/600
150/150             22s 143ms/step -
accuracy: 0.7300 - loss: 0.6774 - val_accuracy: 0.7356 - val_loss: 0.6794
Epoch 222/600
150/150             22s 144ms/step -
accuracy: 0.7150 - loss: 0.6836 - val_accuracy: 0.7056 - val_loss: 0.7214
Epoch 223/600
150/150             39s 130ms/step -
accuracy: 0.6978 - loss: 0.7070 - val_accuracy: 0.6889 - val_loss: 0.7326
Epoch 224/600
150/150             19s 129ms/step -
accuracy: 0.7152 - loss: 0.6666 - val_accuracy: 0.7131 - val_loss: 0.6941
Epoch 225/600
150/150             20s 135ms/step -
accuracy: 0.7283 - loss: 0.6571 - val_accuracy: 0.7223 - val_loss: 0.6810
Epoch 226/600
150/150             20s 130ms/step -
accuracy: 0.7210 - loss: 0.6563 - val_accuracy: 0.6931 - val_loss: 0.7251
Epoch 227/600
150/150             21s 137ms/step -
```

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accuracy: 0.7209 - loss: 0.6755 - val_accuracy: 0.7148 - val_loss: 0.6910
Epoch 228/600
150/150             41s 140ms/step -
accuracy: 0.7331 - loss: 0.6278 - val_accuracy: 0.6672 - val_loss: 0.7743
Epoch 229/600
150/150             21s 141ms/step -
accuracy: 0.7083 - loss: 0.7135 - val_accuracy: 0.7056 - val_loss: 0.7109
Epoch 230/600
150/150             23s 151ms/step -
accuracy: 0.7031 - loss: 0.6787 - val_accuracy: 0.6964 - val_loss: 0.7354
Epoch 231/600
150/150             21s 142ms/step -
accuracy: 0.7138 - loss: 0.6797 - val_accuracy: 0.7214 - val_loss: 0.6597
Epoch 232/600
150/150             42s 147ms/step -
accuracy: 0.7362 - loss: 0.6586 - val_accuracy: 0.7273 - val_loss: 0.6621
Epoch 233/600
150/150             23s 151ms/step -
accuracy: 0.7289 - loss: 0.6319 - val_accuracy: 0.7089 - val_loss: 0.7195
Epoch 234/600
150/150             20s 134ms/step -
accuracy: 0.7129 - loss: 0.6735 - val_accuracy: 0.6847 - val_loss: 0.7410
Epoch 235/600
150/150             18s 123ms/step -
accuracy: 0.7246 - loss: 0.6490 - val_accuracy: 0.6856 - val_loss: 0.7200
Epoch 236/600
150/150             19s 126ms/step -
accuracy: 0.7351 - loss: 0.6461 - val_accuracy: 0.6856 - val_loss: 0.7196
Epoch 237/600
150/150             20s 120ms/step -
accuracy: 0.7411 - loss: 0.6298 - val_accuracy: 0.7098 - val_loss: 0.6938
Epoch 238/600
150/150             18s 121ms/step -
accuracy: 0.7190 - loss: 0.6541 - val_accuracy: 0.7264 - val_loss: 0.7165
Epoch 239/600
150/150             19s 124ms/step -
accuracy: 0.7398 - loss: 0.6445 - val_accuracy: 0.7006 - val_loss: 0.7030
Epoch 240/600
150/150             18s 123ms/step -
accuracy: 0.7229 - loss: 0.6596 - val_accuracy: 0.7006 - val_loss: 0.7114
Epoch 241/600
150/150             18s 120ms/step -
accuracy: 0.7177 - loss: 0.6703 - val_accuracy: 0.6797 - val_loss: 0.7537
Epoch 242/600
150/150             18s 117ms/step -
accuracy: 0.7161 - loss: 0.6860 - val_accuracy: 0.7331 - val_loss: 0.6837
Epoch 243/600
150/150             18s 120ms/step -
```

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accuracy: 0.7395 - loss: 0.6254 - val_accuracy: 0.6856 - val_loss: 0.7727
Epoch 244/600
150/150             18s 119ms/step -
accuracy: 0.7050 - loss: 0.7155 - val_accuracy: 0.6297 - val_loss: 0.8556
Epoch 245/600
150/150             18s 122ms/step -
accuracy: 0.7073 - loss: 0.7367 - val_accuracy: 0.6897 - val_loss: 0.7575
Epoch 246/600
150/150             18s 121ms/step -
accuracy: 0.7224 - loss: 0.6794 - val_accuracy: 0.7189 - val_loss: 0.7119
Epoch 247/600
150/150             20s 118ms/step -
accuracy: 0.7348 - loss: 0.6375 - val_accuracy: 0.6981 - val_loss: 0.7181
Epoch 248/600
150/150             18s 123ms/step -
accuracy: 0.7435 - loss: 0.6195 - val_accuracy: 0.7306 - val_loss: 0.6774
Epoch 249/600
150/150             19s 126ms/step -
accuracy: 0.7450 - loss: 0.6197 - val_accuracy: 0.7148 - val_loss: 0.6950
Epoch 250/600
150/150             20s 132ms/step -
accuracy: 0.7395 - loss: 0.6356 - val_accuracy: 0.7381 - val_loss: 0.6624
Epoch 251/600
150/150             19s 124ms/step -
accuracy: 0.7457 - loss: 0.6089 - val_accuracy: 0.7281 - val_loss: 0.6776
Epoch 252/600
150/150             20s 121ms/step -
accuracy: 0.7362 - loss: 0.6395 - val_accuracy: 0.6906 - val_loss: 0.7445
Epoch 253/600
150/150             18s 119ms/step -
accuracy: 0.7206 - loss: 0.6756 - val_accuracy: 0.7673 - val_loss: 0.6464
Epoch 254/600
150/150             18s 120ms/step -
accuracy: 0.7453 - loss: 0.6309 - val_accuracy: 0.6589 - val_loss: 0.8389
Epoch 255/600
150/150             18s 119ms/step -
accuracy: 0.7304 - loss: 0.6522 - val_accuracy: 0.7239 - val_loss: 0.6718
Epoch 256/600
150/150             20s 119ms/step -
accuracy: 0.7631 - loss: 0.5932 - val_accuracy: 0.6647 - val_loss: 0.7855
Epoch 257/600
150/150             18s 118ms/step -
accuracy: 0.7328 - loss: 0.6592 - val_accuracy: 0.7440 - val_loss: 0.6278
Epoch 258/600
150/150             17s 115ms/step -
accuracy: 0.7404 - loss: 0.6145 - val_accuracy: 0.7106 - val_loss: 0.7144
Epoch 259/600
150/150             18s 118ms/step -
```

```
accuracy: 0.7282 - loss: 0.6715 - val_accuracy: 0.7598 - val_loss: 0.6505
Epoch 260/600
150/150             17s 115ms/step -
accuracy: 0.7594 - loss: 0.5819 - val_accuracy: 0.7415 - val_loss: 0.6592
Epoch 261/600
150/150             18s 118ms/step -
accuracy: 0.7365 - loss: 0.6460 - val_accuracy: 0.7581 - val_loss: 0.6295
Epoch 262/600
150/150             18s 121ms/step -
accuracy: 0.7546 - loss: 0.5948 - val_accuracy: 0.7415 - val_loss: 0.6664
Epoch 263/600
150/150             18s 121ms/step -
accuracy: 0.7540 - loss: 0.5998 - val_accuracy: 0.7164 - val_loss: 0.6899
Epoch 264/600
150/150             18s 118ms/step -
accuracy: 0.7314 - loss: 0.6541 - val_accuracy: 0.7173 - val_loss: 0.6863
Epoch 265/600
150/150             20s 114ms/step -
accuracy: 0.7576 - loss: 0.6027 - val_accuracy: 0.7089 - val_loss: 0.6883
Epoch 266/600
150/150             20s 134ms/step -
accuracy: 0.7530 - loss: 0.6080 - val_accuracy: 0.7106 - val_loss: 0.7057
Epoch 267/600
150/150             21s 141ms/step -
accuracy: 0.7255 - loss: 0.6617 - val_accuracy: 0.7181 - val_loss: 0.7061
Epoch 268/600
150/150             21s 137ms/step -
accuracy: 0.7616 - loss: 0.6063 - val_accuracy: 0.7448 - val_loss: 0.6561
Epoch 269/600
150/150             23s 153ms/step -
accuracy: 0.7393 - loss: 0.6183 - val_accuracy: 0.7189 - val_loss: 0.6888
Epoch 270/600
150/150             22s 146ms/step -
accuracy: 0.7558 - loss: 0.6201 - val_accuracy: 0.7089 - val_loss: 0.7132
Epoch 271/600
150/150             21s 138ms/step -
accuracy: 0.7490 - loss: 0.6053 - val_accuracy: 0.7423 - val_loss: 0.6730
Epoch 272/600
150/150             20s 133ms/step -
accuracy: 0.7595 - loss: 0.6014 - val_accuracy: 0.7373 - val_loss: 0.6662
Epoch 273/600
150/150             18s 120ms/step -
accuracy: 0.7694 - loss: 0.5674 - val_accuracy: 0.7014 - val_loss: 0.7588
Epoch 274/600
150/150             19s 123ms/step -
accuracy: 0.7516 - loss: 0.6219 - val_accuracy: 0.7223 - val_loss: 0.6828
Epoch 275/600
150/150             18s 119ms/step -
```

```
accuracy: 0.7438 - loss: 0.6201 - val_accuracy: 0.7289 - val_loss: 0.6627
Epoch 276/600
150/150             18s 122ms/step -
accuracy: 0.7330 - loss: 0.6442 - val_accuracy: 0.7623 - val_loss: 0.6340
Epoch 277/600
150/150             18s 117ms/step -
accuracy: 0.7563 - loss: 0.5899 - val_accuracy: 0.7389 - val_loss: 0.6502
Epoch 278/600
150/150             21s 121ms/step -
accuracy: 0.7526 - loss: 0.6075 - val_accuracy: 0.7381 - val_loss: 0.6368
Epoch 279/600
150/150             18s 121ms/step -
accuracy: 0.7501 - loss: 0.6099 - val_accuracy: 0.7406 - val_loss: 0.6298
Epoch 280/600
150/150             20s 118ms/step -
accuracy: 0.7444 - loss: 0.6066 - val_accuracy: 0.7431 - val_loss: 0.6786
Epoch 281/600
150/150             18s 121ms/step -
accuracy: 0.7612 - loss: 0.5913 - val_accuracy: 0.7123 - val_loss: 0.7212
Epoch 282/600
150/150             19s 123ms/step -
accuracy: 0.7638 - loss: 0.5985 - val_accuracy: 0.7173 - val_loss: 0.6850
Epoch 283/600
150/150             20s 132ms/step -
accuracy: 0.7493 - loss: 0.6060 - val_accuracy: 0.7048 - val_loss: 0.7197
Epoch 284/600
150/150             19s 129ms/step -
accuracy: 0.7633 - loss: 0.5733 - val_accuracy: 0.7364 - val_loss: 0.6456
Epoch 285/600
150/150             19s 128ms/step -
accuracy: 0.7672 - loss: 0.5766 - val_accuracy: 0.7506 - val_loss: 0.6519
Epoch 286/600
150/150             19s 128ms/step -
accuracy: 0.7601 - loss: 0.5668 - val_accuracy: 0.6914 - val_loss: 0.7773
Epoch 287/600
150/150             19s 128ms/step -
accuracy: 0.7562 - loss: 0.6043 - val_accuracy: 0.7606 - val_loss: 0.6110
Epoch 288/600
150/150             18s 123ms/step -
accuracy: 0.7562 - loss: 0.5990 - val_accuracy: 0.7473 - val_loss: 0.6081
Epoch 291/600
150/150             19s 127ms/step -
accuracy: 0.7682 - loss: 0.5642 - val_accuracy: 0.7323 - val_loss: 0.6869
Epoch 292/600
150/150             19s 127ms/step -
accuracy: 0.7603 - loss: 0.5881 - val_accuracy: 0.7456 - val_loss: 0.6127
Epoch 293/600
150/150             19s 128ms/step -
```

```
accuracy: 0.7646 - loss: 0.5720 - val_accuracy: 0.7573 - val_loss: 0.6228
Epoch 294/600
150/150             19s 123ms/step -
accuracy: 0.7812 - loss: 0.5675 - val_accuracy: 0.7581 - val_loss: 0.6483
Epoch 295/600
150/150             21s 128ms/step -
accuracy: 0.7675 - loss: 0.5995 - val_accuracy: 0.7373 - val_loss: 0.6414
Epoch 296/600
150/150             20s 136ms/step -
accuracy: 0.7723 - loss: 0.5789 - val_accuracy: 0.7298 - val_loss: 0.6748
Epoch 297/600
150/150             19s 123ms/step -
accuracy: 0.7837 - loss: 0.5542 - val_accuracy: 0.7573 - val_loss: 0.6263
Epoch 298/600
150/150             19s 124ms/step -
accuracy: 0.7548 - loss: 0.5924 - val_accuracy: 0.7364 - val_loss: 0.6699
Epoch 299/600
150/150             19s 124ms/step -
accuracy: 0.7766 - loss: 0.5502 - val_accuracy: 0.7398 - val_loss: 0.6625
Epoch 300/600
150/150             19s 129ms/step -
accuracy: 0.7780 - loss: 0.5585 - val_accuracy: 0.7189 - val_loss: 0.7067
Epoch 301/600
150/150             19s 124ms/step -
accuracy: 0.7585 - loss: 0.5915 - val_accuracy: 0.7640 - val_loss: 0.6171
Epoch 302/600
150/150             19s 125ms/step -
accuracy: 0.7666 - loss: 0.5806 - val_accuracy: 0.7223 - val_loss: 0.6982
Epoch 303/600
150/150             19s 125ms/step -
accuracy: 0.7590 - loss: 0.5896 - val_accuracy: 0.7106 - val_loss: 0.7171
Epoch 304/600
150/150             19s 123ms/step -
accuracy: 0.7691 - loss: 0.5684 - val_accuracy: 0.7573 - val_loss: 0.6338
Epoch 305/600
150/150             18s 122ms/step -
accuracy: 0.7788 - loss: 0.5539 - val_accuracy: 0.7573 - val_loss: 0.6411
Epoch 306/600
150/150             18s 120ms/step -
accuracy: 0.7696 - loss: 0.5688 - val_accuracy: 0.7381 - val_loss: 0.6408
Epoch 307/600
150/150             18s 120ms/step -
accuracy: 0.7727 - loss: 0.5561 - val_accuracy: 0.7331 - val_loss: 0.7480
Epoch 308/600
150/150             18s 119ms/step -
accuracy: 0.7611 - loss: 0.6218 - val_accuracy: 0.7573 - val_loss: 0.6361
Epoch 309/600
150/150             19s 124ms/step -
```

```
accuracy: 0.7690 - loss: 0.5675 - val_accuracy: 0.7615 - val_loss: 0.5978
Epoch 310/600
150/150             18s 120ms/step -
accuracy: 0.7869 - loss: 0.5406 - val_accuracy: 0.7573 - val_loss: 0.6492
Epoch 311/600
150/150             18s 120ms/step -
accuracy: 0.7919 - loss: 0.5134 - val_accuracy: 0.7556 - val_loss: 0.6613
Epoch 312/600
150/150             18s 121ms/step -
accuracy: 0.7568 - loss: 0.6089 - val_accuracy: 0.7239 - val_loss: 0.7126
Epoch 313/600
150/150             18s 121ms/step -
accuracy: 0.7806 - loss: 0.5706 - val_accuracy: 0.7740 - val_loss: 0.6108
Epoch 314/600
150/150             18s 120ms/step -
accuracy: 0.7721 - loss: 0.5736 - val_accuracy: 0.7723 - val_loss: 0.6152
Epoch 315/600
150/150             18s 117ms/step -
accuracy: 0.7821 - loss: 0.5429 - val_accuracy: 0.7648 - val_loss: 0.6076
Epoch 316/600
150/150             18s 121ms/step -
accuracy: 0.7730 - loss: 0.5809 - val_accuracy: 0.7440 - val_loss: 0.6701
Epoch 317/600
150/150             20s 117ms/step -
accuracy: 0.7684 - loss: 0.5781 - val_accuracy: 0.7773 - val_loss: 0.5940
Epoch 318/600
150/150             18s 120ms/step -
accuracy: 0.7734 - loss: 0.5453 - val_accuracy: 0.7640 - val_loss: 0.6143
Epoch 319/600
150/150             18s 118ms/step -
accuracy: 0.7664 - loss: 0.6113 - val_accuracy: 0.7448 - val_loss: 0.6240
Epoch 320/600
150/150             19s 124ms/step -
accuracy: 0.7890 - loss: 0.5207 - val_accuracy: 0.7748 - val_loss: 0.5930
Epoch 321/600
150/150             19s 124ms/step -
accuracy: 0.7834 - loss: 0.5188 - val_accuracy: 0.7531 - val_loss: 0.6502
Epoch 322/600
150/150             18s 120ms/step -
accuracy: 0.7822 - loss: 0.5343 - val_accuracy: 0.7498 - val_loss: 0.6354
Epoch 323/600
150/150             18s 121ms/step -
accuracy: 0.7531 - loss: 0.6023 - val_accuracy: 0.7173 - val_loss: 0.7203
Epoch 324/600
150/150             17s 116ms/step -
accuracy: 0.7720 - loss: 0.5661 - val_accuracy: 0.7873 - val_loss: 0.5798
Epoch 325/600
150/150             22s 127ms/step -
```

```
accuracy: 0.7840 - loss: 0.5406 - val_accuracy: 0.7598 - val_loss: 0.6372
Epoch 326/600
150/150             19s 128ms/step -
accuracy: 0.7911 - loss: 0.5354 - val_accuracy: 0.7415 - val_loss: 0.6690
Epoch 327/600
150/150             20s 122ms/step -
accuracy: 0.7514 - loss: 0.6309 - val_accuracy: 0.7223 - val_loss: 0.6909
Epoch 328/600
150/150             20s 131ms/step -
accuracy: 0.7761 - loss: 0.5547 - val_accuracy: 0.7314 - val_loss: 0.7035
Epoch 329/600
150/150             18s 123ms/step -
accuracy: 0.7853 - loss: 0.5413 - val_accuracy: 0.7606 - val_loss: 0.6469
Epoch 330/600
150/150             20s 130ms/step -
accuracy: 0.7892 - loss: 0.5436 - val_accuracy: 0.7756 - val_loss: 0.5981
Epoch 331/600
 61/150             9s 107ms/step -
accuracy: 0.7839 - loss: 0.5075

IOPub message rate exceeded.
The notebook server will temporarily stop sending output
to the client in order to avoid crashing it.
To change this limit, set the config variable
`--NotebookApp.iopub_msg_rate_limit`.

Current values:
NotebookApp.iopub_msg_rate_limit=1000.0 (msgs/sec)
NotebookApp.rate_limit_window=3.0 (secs)


150/150             19s 128ms/step -
accuracy: 0.7904 - loss: 0.5396 - val_accuracy: 0.7531 - val_loss: 0.6324
Epoch 336/600
150/150             18s 120ms/step -
accuracy: 0.7909 - loss: 0.5107 - val_accuracy: 0.7556 - val_loss: 0.6512
Epoch 337/600
150/150             22s 147ms/step -
accuracy: 0.7826 - loss: 0.5479 - val_accuracy: 0.7498 - val_loss: 0.6352
Epoch 338/600
150/150             26s 171ms/step -
accuracy: 0.7906 - loss: 0.5175 - val_accuracy: 0.7665 - val_loss: 0.6202
Epoch 339/600
150/150             22s 149ms/step -
accuracy: 0.8053 - loss: 0.5215 - val_accuracy: 0.7598 - val_loss: 0.6852
Epoch 340/600
150/150             19s 129ms/step -
accuracy: 0.8156 - loss: 0.4866 - val_accuracy: 0.7431 - val_loss: 0.6583
Epoch 341/600
```

```
150/150            20s 133ms/step -
accuracy: 0.7865 - loss: 0.5315 - val_accuracy: 0.7798 - val_loss: 0.5972
Epoch 342/600
150/150            19s 121ms/step -
accuracy: 0.7796 - loss: 0.5481 - val_accuracy: 0.7873 - val_loss: 0.5697
Epoch 343/600
150/150            19s 124ms/step -
accuracy: 0.8153 - loss: 0.4812 - val_accuracy: 0.7907 - val_loss: 0.5754
Epoch 344/600
150/150            19s 127ms/step -
accuracy: 0.8089 - loss: 0.4968 - val_accuracy: 0.7773 - val_loss: 0.5782
Epoch 345/600
150/150            19s 128ms/step -
accuracy: 0.7849 - loss: 0.5313 - val_accuracy: 0.7606 - val_loss: 0.6322
Epoch 346/600
150/150            20s 134ms/step -
accuracy: 0.7851 - loss: 0.5271 - val_accuracy: 0.7440 - val_loss: 0.6499
Epoch 347/600
150/150            19s 130ms/step -
accuracy: 0.8011 - loss: 0.5065 - val_accuracy: 0.7648 - val_loss: 0.5974
Epoch 348/600
150/150            20s 124ms/step -
accuracy: 0.7966 - loss: 0.5209 - val_accuracy: 0.7356 - val_loss: 0.6600
Epoch 349/600
150/150            19s 125ms/step -
accuracy: 0.8000 - loss: 0.5114 - val_accuracy: 0.7773 - val_loss: 0.6437
Epoch 350/600
150/150            21s 143ms/step -
accuracy: 0.8050 - loss: 0.4898 - val_accuracy: 0.7406 - val_loss: 0.6841
Epoch 351/600
150/150            19s 124ms/step -
accuracy: 0.7960 - loss: 0.5052 - val_accuracy: 0.7807 - val_loss: 0.5735
Epoch 352/600
150/150            21s 126ms/step -
accuracy: 0.8007 - loss: 0.4864 - val_accuracy: 0.7756 - val_loss: 0.5644
Epoch 353/600
150/150            20s 134ms/step -
accuracy: 0.7976 - loss: 0.5160 - val_accuracy: 0.7573 - val_loss: 0.6264
Epoch 354/600
150/150            18s 120ms/step -
accuracy: 0.8060 - loss: 0.5138 - val_accuracy: 0.7214 - val_loss: 0.7082
Epoch 355/600
150/150            21s 124ms/step -
accuracy: 0.7869 - loss: 0.5128 - val_accuracy: 0.7882 - val_loss: 0.5835
Epoch 356/600
150/150            18s 122ms/step -
accuracy: 0.8007 - loss: 0.5054 - val_accuracy: 0.7890 - val_loss: 0.5675
Epoch 357/600
```

```
150/150            21s 127ms/step -
accuracy: 0.8119 - loss: 0.4835 - val_accuracy: 0.7873 - val_loss: 0.5856
Epoch 358/600
150/150            19s 124ms/step -
accuracy: 0.8145 - loss: 0.4700 - val_accuracy: 0.7740 - val_loss: 0.6393
Epoch 359/600
150/150            18s 122ms/step -
accuracy: 0.8052 - loss: 0.5104 - val_accuracy: 0.7473 - val_loss: 0.6702
Epoch 360/600
150/150            19s 127ms/step -
accuracy: 0.7842 - loss: 0.5469 - val_accuracy: 0.7331 - val_loss: 0.7230
Epoch 361/600
150/150            19s 125ms/step -
accuracy: 0.7908 - loss: 0.5469 - val_accuracy: 0.7773 - val_loss: 0.5945
Epoch 362/600
150/150            22s 135ms/step -
accuracy: 0.7949 - loss: 0.4932 - val_accuracy: 0.7957 - val_loss: 0.5636
Epoch 363/600
150/150            21s 142ms/step -
accuracy: 0.8036 - loss: 0.4835 - val_accuracy: 0.8040 - val_loss: 0.5714
Epoch 364/600
150/150            19s 128ms/step -
accuracy: 0.8053 - loss: 0.4856 - val_accuracy: 0.7957 - val_loss: 0.5555
Epoch 365/600
150/150            19s 128ms/step -
accuracy: 0.8209 - loss: 0.4543 - val_accuracy: 0.7756 - val_loss: 0.6113
Epoch 366/600
150/150            18s 122ms/step -
accuracy: 0.8178 - loss: 0.4626 - val_accuracy: 0.7398 - val_loss: 0.6554
Epoch 367/600
150/150            18s 120ms/step -
accuracy: 0.7819 - loss: 0.5353 - val_accuracy: 0.7590 - val_loss: 0.6658
Epoch 368/600
150/150            21s 137ms/step -
accuracy: 0.7993 - loss: 0.4883 - val_accuracy: 0.8023 - val_loss: 0.5826
Epoch 369/600
150/150            21s 138ms/step -
accuracy: 0.8024 - loss: 0.5036 - val_accuracy: 0.7882 - val_loss: 0.5696
Epoch 370/600
150/150            22s 144ms/step -
accuracy: 0.8198 - loss: 0.4782 - val_accuracy: 0.7373 - val_loss: 0.6843
Epoch 371/600
150/150            20s 133ms/step -
accuracy: 0.8045 - loss: 0.5025 - val_accuracy: 0.7214 - val_loss: 0.7018
Epoch 372/600
150/150            20s 136ms/step -
accuracy: 0.8001 - loss: 0.4923 - val_accuracy: 0.7923 - val_loss: 0.5883
Epoch 373/600
```

```
150/150            20s 136ms/step -
accuracy: 0.8304 - loss: 0.4448 - val_accuracy: 0.7765 - val_loss: 0.6115
Epoch 374/600
150/150            20s 132ms/step -
accuracy: 0.8006 - loss: 0.5243 - val_accuracy: 0.7807 - val_loss: 0.5845
Epoch 375/600
150/150            21s 141ms/step -
accuracy: 0.8162 - loss: 0.4494 - val_accuracy: 0.7690 - val_loss: 0.6353
Epoch 376/600
150/150            21s 138ms/step -
accuracy: 0.8154 - loss: 0.4901 - val_accuracy: 0.7923 - val_loss: 0.6227
Epoch 377/600
150/150            20s 135ms/step -
accuracy: 0.8085 - loss: 0.4782 - val_accuracy: 0.8023 - val_loss: 0.5819
Epoch 378/600
150/150            23s 152ms/step -
accuracy: 0.8243 - loss: 0.4489 - val_accuracy: 0.7765 - val_loss: 0.5824
Epoch 379/600
150/150            21s 142ms/step -
accuracy: 0.8138 - loss: 0.4727 - val_accuracy: 0.7923 - val_loss: 0.5805
Epoch 380/600
150/150            22s 150ms/step -
accuracy: 0.8253 - loss: 0.4515 - val_accuracy: 0.8073 - val_loss: 0.5609
Epoch 381/600
150/150            21s 139ms/step -
accuracy: 0.8051 - loss: 0.5055 - val_accuracy: 0.7865 - val_loss: 0.5621
Epoch 382/600
150/150            22s 147ms/step -
accuracy: 0.8186 - loss: 0.4322 - val_accuracy: 0.7256 - val_loss: 0.7463
Epoch 383/600
150/150            20s 135ms/step -
accuracy: 0.7925 - loss: 0.5040 - val_accuracy: 0.7998 - val_loss: 0.6192
Epoch 384/600
150/150            20s 133ms/step -
accuracy: 0.8166 - loss: 0.4750 - val_accuracy: 0.7973 - val_loss: 0.6046
Epoch 385/600
150/150            20s 134ms/step -
accuracy: 0.8151 - loss: 0.4736 - val_accuracy: 0.7531 - val_loss: 0.6625
Epoch 386/600
150/150            21s 141ms/step -
accuracy: 0.8202 - loss: 0.4616 - val_accuracy: 0.7923 - val_loss: 0.5978
Epoch 387/600
150/150            23s 155ms/step -
accuracy: 0.8193 - loss: 0.4524 - val_accuracy: 0.7173 - val_loss: 0.7913
Epoch 388/600
150/150            21s 139ms/step -
accuracy: 0.7406 - loss: 0.7398 - val_accuracy: 0.7948 - val_loss: 0.5880
Epoch 389/600
```

```
150/150            40s 132ms/step -
accuracy: 0.8163 - loss: 0.4526 - val_accuracy: 0.7598 - val_loss: 0.6898
Epoch 390/600
150/150            20s 134ms/step -
accuracy: 0.8298 - loss: 0.4364 - val_accuracy: 0.7656 - val_loss: 0.6743
Epoch 391/600
150/150            22s 145ms/step -
accuracy: 0.7822 - loss: 0.5684 - val_accuracy: 0.7898 - val_loss: 0.5961
Epoch 392/600
150/150            23s 156ms/step -
accuracy: 0.8251 - loss: 0.4493 - val_accuracy: 0.7898 - val_loss: 0.5965
Epoch 393/600
150/150            23s 155ms/step -
accuracy: 0.8327 - loss: 0.4284 - val_accuracy: 0.7598 - val_loss: 0.6688
Epoch 394/600
150/150            21s 141ms/step -
accuracy: 0.8179 - loss: 0.4614 - val_accuracy: 0.7848 - val_loss: 0.6206
Epoch 395/600
150/150            21s 139ms/step -
accuracy: 0.8195 - loss: 0.4599 - val_accuracy: 0.7873 - val_loss: 0.5743
Epoch 396/600
150/150            21s 138ms/step -
accuracy: 0.8344 - loss: 0.4254 - val_accuracy: 0.7982 - val_loss: 0.6107
Epoch 397/600
150/150            19s 126ms/step -
accuracy: 0.8263 - loss: 0.4240 - val_accuracy: 0.7990 - val_loss: 0.5863
Epoch 398/600
150/150            19s 130ms/step -
accuracy: 0.8180 - loss: 0.4666 - val_accuracy: 0.7781 - val_loss: 0.6059
Epoch 399/600
150/150            19s 129ms/step -
accuracy: 0.8026 - loss: 0.4950 - val_accuracy: 0.7915 - val_loss: 0.5754
Epoch 400/600
150/150            20s 131ms/step -
accuracy: 0.8286 - loss: 0.4390 - val_accuracy: 0.7756 - val_loss: 0.6028
Epoch 401/600
150/150            18s 119ms/step -
accuracy: 0.8273 - loss: 0.4550 - val_accuracy: 0.7656 - val_loss: 0.6306
Epoch 402/600
150/150            19s 127ms/step -
accuracy: 0.8201 - loss: 0.4525 - val_accuracy: 0.7631 - val_loss: 0.6386
Epoch 403/600
150/150            19s 129ms/step -
accuracy: 0.8320 - loss: 0.4222 - val_accuracy: 0.7923 - val_loss: 0.5707
Epoch 404/600
150/150            21s 132ms/step -
accuracy: 0.8234 - loss: 0.4357 - val_accuracy: 0.8065 - val_loss: 0.5607
Epoch 405/600
```

```
150/150            19s 130ms/step -
accuracy: 0.8215 - loss: 0.4609 - val_accuracy: 0.7807 - val_loss: 0.5632
Epoch 406/600
150/150            18s 121ms/step -
accuracy: 0.8294 - loss: 0.4417 - val_accuracy: 0.7857 - val_loss: 0.6134
Epoch 407/600
150/150            21s 123ms/step -
accuracy: 0.8257 - loss: 0.4394 - val_accuracy: 0.7865 - val_loss: 0.5569
Epoch 408/600
150/150            19s 126ms/step -
accuracy: 0.8184 - loss: 0.4710 - val_accuracy: 0.7798 - val_loss: 0.6397
Epoch 409/600
150/150            20s 132ms/step -
accuracy: 0.8246 - loss: 0.4452 - val_accuracy: 0.8015 - val_loss: 0.5754
Epoch 410/600
150/150            18s 120ms/step -
accuracy: 0.8211 - loss: 0.4692 - val_accuracy: 0.8073 - val_loss: 0.5402
Epoch 411/600
150/150            19s 126ms/step -
accuracy: 0.8515 - loss: 0.4158 - val_accuracy: 0.7681 - val_loss: 0.6286
Epoch 412/600
150/150            19s 128ms/step -
accuracy: 0.8369 - loss: 0.4033 - val_accuracy: 0.7865 - val_loss: 0.6056
Epoch 413/600
150/150            18s 123ms/step -
accuracy: 0.8256 - loss: 0.4330 - val_accuracy: 0.8040 - val_loss: 0.5800
Epoch 414/600
150/150            19s 125ms/step -
accuracy: 0.8258 - loss: 0.4370 - val_accuracy: 0.7706 - val_loss: 0.6420
Epoch 415/600
150/150            19s 125ms/step -
accuracy: 0.8250 - loss: 0.4366 - val_accuracy: 0.7932 - val_loss: 0.5764
Epoch 416/600
150/150            19s 124ms/step -
accuracy: 0.8319 - loss: 0.4539 - val_accuracy: 0.8098 - val_loss: 0.5504
Epoch 417/600
150/150            19s 126ms/step -
accuracy: 0.8422 - loss: 0.4321 - val_accuracy: 0.7640 - val_loss: 0.6272
Epoch 418/600
150/150            19s 128ms/step -
accuracy: 0.8411 - loss: 0.4212 - val_accuracy: 0.7898 - val_loss: 0.5720
Epoch 419/600
150/150            20s 130ms/step -
accuracy: 0.8313 - loss: 0.4322 - val_accuracy: 0.7998 - val_loss: 0.5612
Epoch 420/600
150/150            19s 126ms/step -
accuracy: 0.8360 - loss: 0.4352 - val_accuracy: 0.8057 - val_loss: 0.5603
Epoch 421/600
```

```
150/150            19s 125ms/step -
accuracy: 0.8261 - loss: 0.4654 - val_accuracy: 0.7898 - val_loss: 0.5959
Epoch 422/600
150/150            18s 123ms/step -
accuracy: 0.8418 - loss: 0.4075 - val_accuracy: 0.7957 - val_loss: 0.5571
Epoch 423/600
150/150            19s 127ms/step -
accuracy: 0.8386 - loss: 0.4133 - val_accuracy: 0.7932 - val_loss: 0.5794
Epoch 424/600
150/150            20s 131ms/step -
accuracy: 0.8261 - loss: 0.4512 - val_accuracy: 0.7915 - val_loss: 0.5762
Epoch 425/600
150/150            18s 121ms/step -
accuracy: 0.8439 - loss: 0.4242 - val_accuracy: 0.8015 - val_loss: 0.5866
Epoch 426/600
150/150            19s 129ms/step -
accuracy: 0.8344 - loss: 0.4268 - val_accuracy: 0.7882 - val_loss: 0.5862
Epoch 427/600
150/150            17s 116ms/step -
accuracy: 0.8525 - loss: 0.3897 - val_accuracy: 0.8107 - val_loss: 0.6051
Epoch 428/600
150/150            18s 120ms/step -
accuracy: 0.8321 - loss: 0.4479 - val_accuracy: 0.8090 - val_loss: 0.5758
Epoch 429/600
150/150            18s 117ms/step -
accuracy: 0.8309 - loss: 0.4124 - val_accuracy: 0.7857 - val_loss: 0.6401
Epoch 430/600
150/150            18s 122ms/step -
accuracy: 0.8252 - loss: 0.4484 - val_accuracy: 0.7982 - val_loss: 0.5791
Epoch 431/600
150/150            20s 120ms/step -
accuracy: 0.8467 - loss: 0.4112 - val_accuracy: 0.7932 - val_loss: 0.6109
Epoch 432/600
150/150            19s 128ms/step -
accuracy: 0.8452 - loss: 0.3970 - val_accuracy: 0.7957 - val_loss: 0.6011
Epoch 434/600
150/150            19s 127ms/step -
accuracy: 0.8372 - loss: 0.4126 - val_accuracy: 0.7790 - val_loss: 0.7113
Epoch 435/600
150/150            19s 127ms/step -
accuracy: 0.8355 - loss: 0.4267 - val_accuracy: 0.7990 - val_loss: 0.5812
Epoch 436/600
150/150            18s 122ms/step -
accuracy: 0.8348 - loss: 0.4227 - val_accuracy: 0.8182 - val_loss: 0.5381
Epoch 437/600
150/150            20s 133ms/step -
accuracy: 0.8559 - loss: 0.4032 - val_accuracy: 0.8107 - val_loss: 0.5640
Epoch 438/600
```

```
150/150             19s 123ms/step -
accuracy: 0.8513 - loss: 0.3982 - val_accuracy: 0.8182 - val_loss: 0.5546
Epoch 439/600
150/150             18s 118ms/step -
accuracy: 0.8385 - loss: 0.4226 - val_accuracy: 0.7631 - val_loss: 0.6557
Epoch 440/600
150/150             19s 129ms/step -
accuracy: 0.8150 - loss: 0.4830 - val_accuracy: 0.8040 - val_loss: 0.5959
Epoch 441/600
150/150             18s 119ms/step -
accuracy: 0.8268 - loss: 0.4509 - val_accuracy: 0.7389 - val_loss: 0.7342
Epoch 442/600
150/150             18s 123ms/step -
accuracy: 0.8282 - loss: 0.4568 - val_accuracy: 0.8165 - val_loss: 0.5416
Epoch 443/600
150/150             19s 124ms/step -
accuracy: 0.8484 - loss: 0.4031 - val_accuracy: 0.7523 - val_loss: 0.7132
Epoch 444/600
150/150             19s 124ms/step -
accuracy: 0.8307 - loss: 0.4159 - val_accuracy: 0.7982 - val_loss: 0.6062
Epoch 445/600
150/150             18s 117ms/step -
accuracy: 0.8228 - loss: 0.4810 - val_accuracy: 0.7948 - val_loss: 0.5634
Epoch 446/600
150/150             19s 128ms/step -
accuracy: 0.8364 - loss: 0.4150 - val_accuracy: 0.7915 - val_loss: 0.6355
Epoch 447/600
150/150             20s 132ms/step -
accuracy: 0.8485 - loss: 0.3946 - val_accuracy: 0.7898 - val_loss: 0.6005
Epoch 448/600
150/150             20s 130ms/step -
accuracy: 0.8456 - loss: 0.4047 - val_accuracy: 0.7807 - val_loss: 0.6406
Epoch 449/600
150/150             20s 135ms/step -
accuracy: 0.8246 - loss: 0.4526 - val_accuracy: 0.8015 - val_loss: 0.5621
Epoch 450/600
150/150             20s 132ms/step -
accuracy: 0.8495 - loss: 0.3841 - val_accuracy: 0.8165 - val_loss: 0.5534
Epoch 451/600
150/150             19s 128ms/step -
accuracy: 0.8577 - loss: 0.3713 - val_accuracy: 0.8140 - val_loss: 0.5714
Epoch 452/600
150/150             20s 134ms/step -
accuracy: 0.8456 - loss: 0.3809 - val_accuracy: 0.6922 - val_loss: 0.9182
Epoch 453/600
150/150             19s 128ms/step -
accuracy: 0.8093 - loss: 0.5220 - val_accuracy: 0.8232 - val_loss: 0.5590
Epoch 454/600
```

```
150/150            21s 137ms/step -
accuracy: 0.8525 - loss: 0.3883 - val_accuracy: 0.8090 - val_loss: 0.5754
Epoch 455/600
150/150            20s 131ms/step -
accuracy: 0.8500 - loss: 0.3827 - val_accuracy: 0.7890 - val_loss: 0.5937
Epoch 456/600
150/150            19s 126ms/step -
accuracy: 0.8198 - loss: 0.4703 - val_accuracy: 0.7823 - val_loss: 0.6276
Epoch 457/600
150/150            18s 122ms/step -
accuracy: 0.8465 - loss: 0.4122 - val_accuracy: 0.7756 - val_loss: 0.6917
Epoch 458/600
150/150            20s 120ms/step -
accuracy: 0.8189 - loss: 0.4513 - val_accuracy: 0.7973 - val_loss: 0.5816
Epoch 459/600
150/150            19s 126ms/step -
accuracy: 0.8553 - loss: 0.3797 - val_accuracy: 0.8082 - val_loss: 0.5373
Epoch 460/600
150/150            19s 125ms/step -
accuracy: 0.8447 - loss: 0.4125 - val_accuracy: 0.8148 - val_loss: 0.5593
Epoch 461/600
150/150            20s 130ms/step -
accuracy: 0.8596 - loss: 0.3821 - val_accuracy: 0.7915 - val_loss: 0.6373
Epoch 462/600
150/150            19s 128ms/step -
accuracy: 0.8636 - loss: 0.3742 - val_accuracy: 0.8165 - val_loss: 0.5679
Epoch 463/600
150/150            19s 129ms/step -
accuracy: 0.8601 - loss: 0.3870 - val_accuracy: 0.7932 - val_loss: 0.6250
Epoch 464/600
150/150            19s 124ms/step -
accuracy: 0.8340 - loss: 0.4433 - val_accuracy: 0.7998 - val_loss: 0.5930
Epoch 465/600
150/150            18s 120ms/step -
accuracy: 0.8369 - loss: 0.4269 - val_accuracy: 0.8340 - val_loss: 0.5416
Epoch 466/600
150/150            20s 130ms/step -
accuracy: 0.8456 - loss: 0.4051 - val_accuracy: 0.8332 - val_loss: 0.5385
Epoch 467/600
150/150            19s 124ms/step -
accuracy: 0.8565 - loss: 0.3785 - val_accuracy: 0.7990 - val_loss: 0.5894
Epoch 468/600
150/150            19s 127ms/step -
accuracy: 0.8455 - loss: 0.4200 - val_accuracy: 0.7848 - val_loss: 0.6272
Epoch 469/600
150/150            19s 127ms/step -
accuracy: 0.8362 - loss: 0.4280 - val_accuracy: 0.8198 - val_loss: 0.5415
Epoch 470/600
```

```
150/150            19s 120ms/step -
accuracy: 0.8597 - loss: 0.3731 - val_accuracy: 0.8023 - val_loss: 0.5854
Epoch 471/600
150/150            19s 129ms/step -
accuracy: 0.8565 - loss: 0.3841 - val_accuracy: 0.8032 - val_loss: 0.6196
Epoch 472/600
150/150            19s 124ms/step -
accuracy: 0.8552 - loss: 0.3852 - val_accuracy: 0.8132 - val_loss: 0.5823
Epoch 473/600
150/150            21s 137ms/step -
accuracy: 0.8450 - loss: 0.4210 - val_accuracy: 0.8007 - val_loss: 0.5974
Epoch 474/600
150/150            19s 127ms/step -
accuracy: 0.8618 - loss: 0.3705 - val_accuracy: 0.8324 - val_loss: 0.5209
Epoch 475/600
150/150            21s 128ms/step -
accuracy: 0.8598 - loss: 0.3566 - val_accuracy: 0.8032 - val_loss: 0.5947
Epoch 476/600
150/150            20s 131ms/step -
accuracy: 0.8643 - loss: 0.3628 - val_accuracy: 0.8157 - val_loss: 0.5533
Epoch 477/600
150/150            20s 133ms/step -
accuracy: 0.8465 - loss: 0.4308 - val_accuracy: 0.7923 - val_loss: 0.5963
Epoch 478/600
150/150            20s 132ms/step -
accuracy: 0.8719 - loss: 0.3454 - val_accuracy: 0.8115 - val_loss: 0.5723
Epoch 479/600
150/150            20s 134ms/step -
accuracy: 0.8680 - loss: 0.3683 - val_accuracy: 0.7565 - val_loss: 0.6818
Epoch 480/600
150/150            19s 129ms/step -
accuracy: 0.8381 - loss: 0.4270 - val_accuracy: 0.8232 - val_loss: 0.5423
Epoch 481/600
150/150            21s 133ms/step -
accuracy: 0.8047 - loss: 0.5331 - val_accuracy: 0.6856 - val_loss: 0.7732
Epoch 482/600
150/150            19s 127ms/step -
accuracy: 0.7425 - loss: 0.6688 - val_accuracy: 0.7423 - val_loss: 0.6637
Epoch 483/600
150/150            19s 126ms/step -
accuracy: 0.8105 - loss: 0.4793 - val_accuracy: 0.8274 - val_loss: 0.5073
Epoch 484/600
150/150            18s 123ms/step -
accuracy: 0.8471 - loss: 0.4015 - val_accuracy: 0.8349 - val_loss: 0.5177
Epoch 485/600
150/150            20s 119ms/step -
accuracy: 0.8552 - loss: 0.3915 - val_accuracy: 0.7982 - val_loss: 0.5537
Epoch 486/600
```

```
150/150            18s 122ms/step -
accuracy: 0.8733 - loss: 0.3479 - val_accuracy: 0.7798 - val_loss: 0.6374
Epoch 487/600
150/150            18s 120ms/step -
accuracy: 0.8503 - loss: 0.4074 - val_accuracy: 0.8048 - val_loss: 0.5717
Epoch 488/600
150/150            18s 119ms/step -
accuracy: 0.8563 - loss: 0.3742 - val_accuracy: 0.8207 - val_loss: 0.5317
Epoch 489/600
150/150            17s 114ms/step -
accuracy: 0.8606 - loss: 0.3652 - val_accuracy: 0.8332 - val_loss: 0.5379
Epoch 490/600
150/150            18s 117ms/step -
accuracy: 0.8530 - loss: 0.3880 - val_accuracy: 0.7915 - val_loss: 0.5879
Epoch 491/600
150/150            17s 115ms/step -
accuracy: 0.8598 - loss: 0.3491 - val_accuracy: 0.7990 - val_loss: 0.6010
Epoch 492/600
150/150            17s 116ms/step -
accuracy: 0.8512 - loss: 0.4090 - val_accuracy: 0.8357 - val_loss: 0.5312
Epoch 493/600
150/150            21s 118ms/step -
accuracy: 0.8629 - loss: 0.3584 - val_accuracy: 0.8140 - val_loss: 0.5701
Epoch 494/600
150/150            21s 119ms/step -
accuracy: 0.8818 - loss: 0.3200 - val_accuracy: 0.8140 - val_loss: 0.6011
Epoch 495/600
150/150            18s 120ms/step -
accuracy: 0.8638 - loss: 0.3604 - val_accuracy: 0.8182 - val_loss: 0.5700
Epoch 496/600
150/150            17s 115ms/step -
accuracy: 0.8460 - loss: 0.4105 - val_accuracy: 0.8073 - val_loss: 0.5856
Epoch 497/600
150/150            19s 127ms/step -
accuracy: 0.8716 - loss: 0.3409 - val_accuracy: 0.8090 - val_loss: 0.5432
Epoch 498/600
150/150            17s 116ms/step -
accuracy: 0.8655 - loss: 0.3577 - val_accuracy: 0.7398 - val_loss: 0.8352
Epoch 499/600
150/150            18s 118ms/step -
accuracy: 0.8413 - loss: 0.4440 - val_accuracy: 0.8040 - val_loss: 0.5962
Epoch 500/600
150/150            17s 116ms/step -
accuracy: 0.8694 - loss: 0.3493 - val_accuracy: 0.8090 - val_loss: 0.5826
Epoch 501/600
150/150            17s 117ms/step -
accuracy: 0.8655 - loss: 0.3496 - val_accuracy: 0.8073 - val_loss: 0.5595
Epoch 502/600
```

```
150/150            17s 115ms/step -
accuracy: 0.8518 - loss: 0.3724 - val_accuracy: 0.8332 - val_loss: 0.5391
Epoch 503/600
150/150            18s 120ms/step -
accuracy: 0.8755 - loss: 0.3341 - val_accuracy: 0.8265 - val_loss: 0.5355
Epoch 504/600
150/150            18s 118ms/step -
accuracy: 0.8781 - loss: 0.3291 - val_accuracy: 0.8390 - val_loss: 0.5430
Epoch 505/600
150/150            17s 116ms/step -
accuracy: 0.8617 - loss: 0.3669 - val_accuracy: 0.7948 - val_loss: 0.5863
Epoch 506/600
150/150            18s 119ms/step -
accuracy: 0.8710 - loss: 0.3486 - val_accuracy: 0.7698 - val_loss: 0.7081
Epoch 507/600
150/150            18s 118ms/step -
accuracy: 0.8642 - loss: 0.3714 - val_accuracy: 0.8090 - val_loss: 0.5701
Epoch 508/600
150/150            18s 118ms/step -
accuracy: 0.8654 - loss: 0.3596 - val_accuracy: 0.8390 - val_loss: 0.5248
Epoch 509/600
150/150            17s 115ms/step -
accuracy: 0.8716 - loss: 0.3318 - val_accuracy: 0.7940 - val_loss: 0.6674
Epoch 510/600
150/150            18s 119ms/step -
accuracy: 0.8779 - loss: 0.3361 - val_accuracy: 0.8123 - val_loss: 0.5775
Epoch 511/600
150/150            18s 118ms/step -
accuracy: 0.8462 - loss: 0.4140 - val_accuracy: 0.8299 - val_loss: 0.5303
Epoch 512/600
150/150            19s 126ms/step -
accuracy: 0.8558 - loss: 0.3736 - val_accuracy: 0.8282 - val_loss: 0.5266
Epoch 513/600
150/150            18s 119ms/step -
accuracy: 0.8657 - loss: 0.3637 - val_accuracy: 0.8098 - val_loss: 0.5715
Epoch 514/600
150/150            19s 124ms/step -
accuracy: 0.8534 - loss: 0.3958 - val_accuracy: 0.8040 - val_loss: 0.5946
Epoch 515/600
150/150            20s 134ms/step -
accuracy: 0.8585 - loss: 0.3814 - val_accuracy: 0.8357 - val_loss: 0.5318
Epoch 516/600
150/150            28s 187ms/step -
accuracy: 0.8888 - loss: 0.3103 - val_accuracy: 0.8007 - val_loss: 0.5935
Epoch 517/600
150/150            26s 176ms/step -
accuracy: 0.8838 - loss: 0.3204 - val_accuracy: 0.8015 - val_loss: 0.6299
Epoch 518/600
```

```
150/150            23s 152ms/step -
accuracy: 0.8790 - loss: 0.3186 - val_accuracy: 0.7740 - val_loss: 0.7239
Epoch 519/600
150/150            28s 188ms/step -
accuracy: 0.8565 - loss: 0.3845 - val_accuracy: 0.8282 - val_loss: 0.5552
Epoch 520/600
150/150            26s 175ms/step -
accuracy: 0.8708 - loss: 0.3519 - val_accuracy: 0.8274 - val_loss: 0.5044
Epoch 521/600
150/150            23s 150ms/step -
accuracy: 0.8613 - loss: 0.3598 - val_accuracy: 0.8307 - val_loss: 0.5223
Epoch 522/600
150/150            21s 139ms/step -
accuracy: 0.8632 - loss: 0.3489 - val_accuracy: 0.7865 - val_loss: 0.6437
Epoch 523/600
150/150            21s 139ms/step -
accuracy: 0.8620 - loss: 0.3518 - val_accuracy: 0.8198 - val_loss: 0.5413
Epoch 524/600
150/150            21s 140ms/step -
accuracy: 0.8714 - loss: 0.3440 - val_accuracy: 0.8290 - val_loss: 0.5784
Epoch 525/600
150/150            43s 154ms/step -
accuracy: 0.8680 - loss: 0.3638 - val_accuracy: 0.8407 - val_loss: 0.4819
Epoch 526/600
150/150            23s 154ms/step -
accuracy: 0.8772 - loss: 0.3307 - val_accuracy: 0.7790 - val_loss: 0.7174
Epoch 527/600
150/150            21s 137ms/step -
accuracy: 0.8703 - loss: 0.3629 - val_accuracy: 0.8173 - val_loss: 0.5601
Epoch 528/600
150/150            20s 136ms/step -
accuracy: 0.8820 - loss: 0.3302 - val_accuracy: 0.8399 - val_loss: 0.5224
Epoch 529/600
150/150            21s 141ms/step -
accuracy: 0.8666 - loss: 0.3641 - val_accuracy: 0.8224 - val_loss: 0.5439
Epoch 530/600
150/150            20s 136ms/step -
accuracy: 0.8691 - loss: 0.3495 - val_accuracy: 0.8324 - val_loss: 0.5307
Epoch 531/600
150/150            19s 129ms/step -
accuracy: 0.8665 - loss: 0.3305 - val_accuracy: 0.8057 - val_loss: 0.5768
Epoch 532/600
150/150            19s 125ms/step -
accuracy: 0.8830 - loss: 0.3184 - val_accuracy: 0.8023 - val_loss: 0.6791
Epoch 533/600
150/150            18s 123ms/step -
accuracy: 0.8463 - loss: 0.3816 - val_accuracy: 0.8082 - val_loss: 0.6075
Epoch 534/600
```

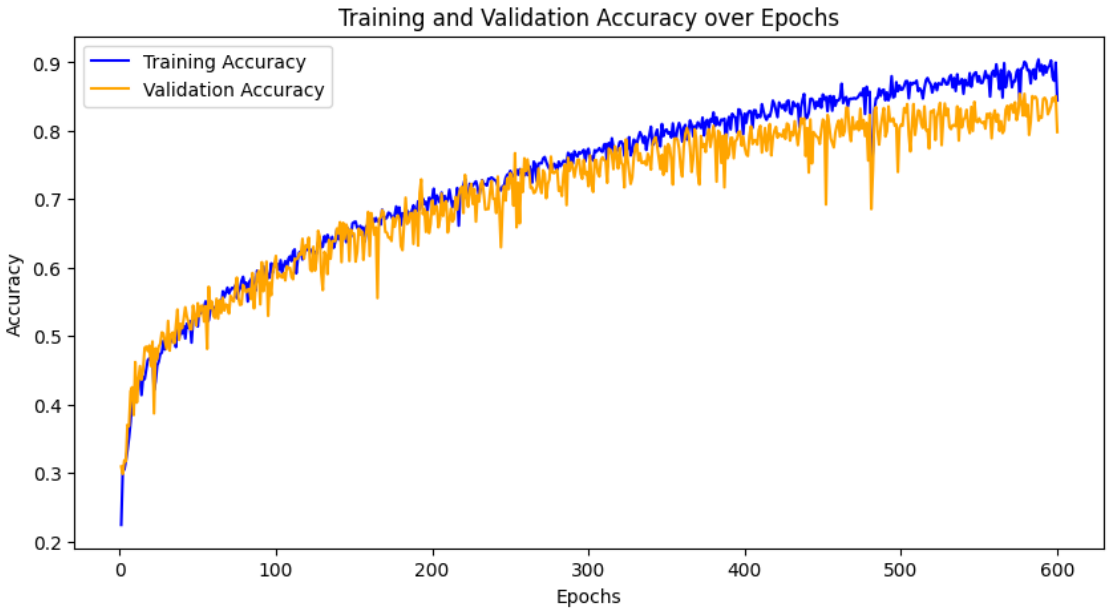
```
150/150            19s 125ms/step -
accuracy: 0.8813 - loss: 0.3325 - val_accuracy: 0.8082 - val_loss: 0.6063
Epoch 535/600
150/150            19s 125ms/step -
accuracy: 0.8575 - loss: 0.3955 - val_accuracy: 0.8065 - val_loss: 0.5734
Epoch 536/600
150/150            18s 118ms/step -
accuracy: 0.8861 - loss: 0.3108 - val_accuracy: 0.8357 - val_loss: 0.4968
Epoch 537/600
150/150            19s 125ms/step -
accuracy: 0.8683 - loss: 0.3498 - val_accuracy: 0.7857 - val_loss: 0.6503
Epoch 538/600
150/150            20s 131ms/step -
accuracy: 0.8663 - loss: 0.3761 - val_accuracy: 0.8324 - val_loss: 0.5108
Epoch 539/600
150/150            19s 125ms/step -
accuracy: 0.8780 - loss: 0.3142 - val_accuracy: 0.8048 - val_loss: 0.5734
Epoch 540/600
150/150            18s 119ms/step -
accuracy: 0.8348 - loss: 0.4597 - val_accuracy: 0.8157 - val_loss: 0.5636
Epoch 541/600
150/150            18s 123ms/step -
accuracy: 0.8680 - loss: 0.3457 - val_accuracy: 0.8198 - val_loss: 0.5688
Epoch 542/600
150/150            19s 126ms/step -
accuracy: 0.8545 - loss: 0.4088 - val_accuracy: 0.8307 - val_loss: 0.5434
Epoch 543/600
150/150            19s 124ms/step -
accuracy: 0.8782 - loss: 0.3173 - val_accuracy: 0.8065 - val_loss: 0.5879
Epoch 544/600
150/150            19s 125ms/step -
accuracy: 0.8787 - loss: 0.3102 - val_accuracy: 0.7965 - val_loss: 0.7079
Epoch 545/600
150/150            18s 121ms/step -
accuracy: 0.8506 - loss: 0.4258 - val_accuracy: 0.8349 - val_loss: 0.5243
Epoch 546/600
150/150            19s 126ms/step -
accuracy: 0.8865 - loss: 0.3068 - val_accuracy: 0.7998 - val_loss: 0.6141
Epoch 547/600
150/150            18s 122ms/step -
accuracy: 0.8741 - loss: 0.3390 - val_accuracy: 0.8424 - val_loss: 0.5341
Epoch 548/600
150/150            18s 122ms/step -
accuracy: 0.8877 - loss: 0.3057 - val_accuracy: 0.8140 - val_loss: 0.5352
Epoch 549/600
150/150            18s 118ms/step -
accuracy: 0.8687 - loss: 0.3686 - val_accuracy: 0.8123 - val_loss: 0.5399
Epoch 550/600
```

```
150/150            21s 119ms/step -
accuracy: 0.8623 - loss: 0.3616 - val_accuracy: 0.8182 - val_loss: 0.5681
Epoch 551/600
150/150            18s 121ms/step -
accuracy: 0.8976 - loss: 0.2884 - val_accuracy: 0.8132 - val_loss: 0.5285
Epoch 552/600
150/150            18s 118ms/step -
accuracy: 0.8824 - loss: 0.3224 - val_accuracy: 0.8115 - val_loss: 0.5811
Epoch 553/600
150/150            18s 120ms/step -
accuracy: 0.8857 - loss: 0.3224 - val_accuracy: 0.8132 - val_loss: 0.5404
Epoch 554/600
150/150            18s 117ms/step -
accuracy: 0.8805 - loss: 0.3232 - val_accuracy: 0.8032 - val_loss: 0.6517
Epoch 555/600
150/150            18s 120ms/step -
accuracy: 0.8818 - loss: 0.3262 - val_accuracy: 0.8249 - val_loss: 0.5755
Epoch 556/600
150/150            18s 118ms/step -
accuracy: 0.8888 - loss: 0.2986 - val_accuracy: 0.8198 - val_loss: 0.5614
Epoch 557/600
150/150            18s 121ms/step -
accuracy: 0.8428 - loss: 0.4226 - val_accuracy: 0.8257 - val_loss: 0.5311
Epoch 558/600
150/150            18s 118ms/step -
accuracy: 0.8762 - loss: 0.3202 - val_accuracy: 0.7890 - val_loss: 0.6532
Epoch 559/600
150/150            21s 120ms/step -
accuracy: 0.8767 - loss: 0.3166 - val_accuracy: 0.8207 - val_loss: 0.5864
Epoch 560/600
150/150            18s 118ms/step -
accuracy: 0.8734 - loss: 0.3368 - val_accuracy: 0.8299 - val_loss: 0.5477
Epoch 561/600
150/150            17s 116ms/step -
accuracy: 0.8960 - loss: 0.3032 - val_accuracy: 0.8132 - val_loss: 0.5936
Epoch 562/600
150/150            18s 117ms/step -
accuracy: 0.8858 - loss: 0.3104 - val_accuracy: 0.8240 - val_loss: 0.5964
Epoch 563/600
150/150            20s 114ms/step -
accuracy: 0.8715 - loss: 0.3432 - val_accuracy: 0.7998 - val_loss: 0.6293
Epoch 564/600
150/150            21s 117ms/step -
accuracy: 0.8819 - loss: 0.3328 - val_accuracy: 0.8140 - val_loss: 0.5854
Epoch 565/600
150/150            20s 130ms/step -
accuracy: 0.8165 - loss: 0.5349 - val_accuracy: 0.7965 - val_loss: 0.6136
Epoch 566/600
```

```
150/150            22s 147ms/step -
accuracy: 0.9022 - loss: 0.2552 - val_accuracy: 0.8007 - val_loss: 0.6372
Epoch 567/600
150/150            24s 161ms/step -
accuracy: 0.8665 - loss: 0.3473 - val_accuracy: 0.8307 - val_loss: 0.5378
Epoch 568/600
150/150            29s 192ms/step -
accuracy: 0.8727 - loss: 0.3489 - val_accuracy: 0.8365 - val_loss: 0.5024
Epoch 569/600
150/150            22s 150ms/step -
accuracy: 0.8965 - loss: 0.2853 - val_accuracy: 0.8157 - val_loss: 0.5894
Epoch 570/600
150/150            19s 127ms/step -
accuracy: 0.8774 - loss: 0.3193 - val_accuracy: 0.8374 - val_loss: 0.5563
Epoch 571/600
150/150            20s 133ms/step -
accuracy: 0.8688 - loss: 0.3739 - val_accuracy: 0.8382 - val_loss: 0.5242
Epoch 572/600
150/150            20s 131ms/step -
accuracy: 0.8746 - loss: 0.3294 - val_accuracy: 0.8265 - val_loss: 0.5375
Epoch 573/600
150/150            20s 132ms/step -
accuracy: 0.8745 - loss: 0.3414 - val_accuracy: 0.8415 - val_loss: 0.5017
Epoch 574/600
150/150            20s 131ms/step -
accuracy: 0.8882 - loss: 0.2964 - val_accuracy: 0.8157 - val_loss: 0.5717
Epoch 575/600
150/150            20s 131ms/step -
accuracy: 0.8881 - loss: 0.2806 - val_accuracy: 0.8265 - val_loss: 0.5768
Epoch 576/600
150/150            19s 130ms/step -
accuracy: 0.8138 - loss: 0.5443 - val_accuracy: 0.8540 - val_loss: 0.4833
Epoch 577/600
150/150            19s 128ms/step -
accuracy: 0.8972 - loss: 0.2754 - val_accuracy: 0.8415 - val_loss: 0.5079
Epoch 578/600
150/150            19s 129ms/step -
accuracy: 0.8900 - loss: 0.2856 - val_accuracy: 0.8224 - val_loss: 0.5474
Epoch 579/600
150/150            19s 129ms/step -
accuracy: 0.9120 - loss: 0.2453 - val_accuracy: 0.8540 - val_loss: 0.5180
Epoch 580/600
150/150            21s 129ms/step -
accuracy: 0.9044 - loss: 0.2684 - val_accuracy: 0.8215 - val_loss: 0.5624
Epoch 581/600
150/150            19s 124ms/step -
accuracy: 0.8940 - loss: 0.3066 - val_accuracy: 0.8382 - val_loss: 0.5443
Epoch 582/600
```

```
150/150            18s 121ms/step -
accuracy: 0.9047 - loss: 0.2492 - val_accuracy: 0.7940 - val_loss: 0.7281
Epoch 583/600
150/150            18s 120ms/step -
accuracy: 0.8572 - loss: 0.4084 - val_accuracy: 0.8132 - val_loss: 0.6235
Epoch 584/600
150/150            18s 121ms/step -
accuracy: 0.8712 - loss: 0.3574 - val_accuracy: 0.8507 - val_loss: 0.5294
Epoch 585/600
150/150            18s 122ms/step -
accuracy: 0.8935 - loss: 0.2890 - val_accuracy: 0.8474 - val_loss: 0.5349
Epoch 586/600
150/150            18s 118ms/step -
accuracy: 0.8864 - loss: 0.3480 - val_accuracy: 0.8499 - val_loss: 0.4892
Epoch 587/600
150/150            18s 117ms/step -
accuracy: 0.9073 - loss: 0.2557 - val_accuracy: 0.8457 - val_loss: 0.5065
Epoch 588/600
150/150            18s 117ms/step -
accuracy: 0.9018 - loss: 0.2651 - val_accuracy: 0.8148 - val_loss: 0.6268
Epoch 589/600
150/150            20s 117ms/step -
accuracy: 0.8903 - loss: 0.3053 - val_accuracy: 0.8207 - val_loss: 0.5999
Epoch 590/600
150/150            21s 118ms/step -
accuracy: 0.9085 - loss: 0.2667 - val_accuracy: 0.8190 - val_loss: 0.5842
Epoch 591/600
150/150            18s 118ms/step -
accuracy: 0.8935 - loss: 0.2988 - val_accuracy: 0.8465 - val_loss: 0.5197
Epoch 592/600
150/150            18s 119ms/step -
accuracy: 0.9041 - loss: 0.2788 - val_accuracy: 0.8482 - val_loss: 0.5000
Epoch 593/600
150/150            17s 114ms/step -
accuracy: 0.8802 - loss: 0.3263 - val_accuracy: 0.8440 - val_loss: 0.5286
Epoch 594/600
150/150            18s 118ms/step -
accuracy: 0.9051 - loss: 0.2601 - val_accuracy: 0.8240 - val_loss: 0.5663
Epoch 595/600
150/150            20s 117ms/step -
accuracy: 0.9062 - loss: 0.2705 - val_accuracy: 0.8299 - val_loss: 0.5637
Epoch 596/600
150/150            17s 113ms/step -
accuracy: 0.8960 - loss: 0.2663 - val_accuracy: 0.8365 - val_loss: 0.5479
Epoch 597/600
150/150            17s 117ms/step -
accuracy: 0.8901 - loss: 0.3108 - val_accuracy: 0.8482 - val_loss: 0.4989
Epoch 598/600
```

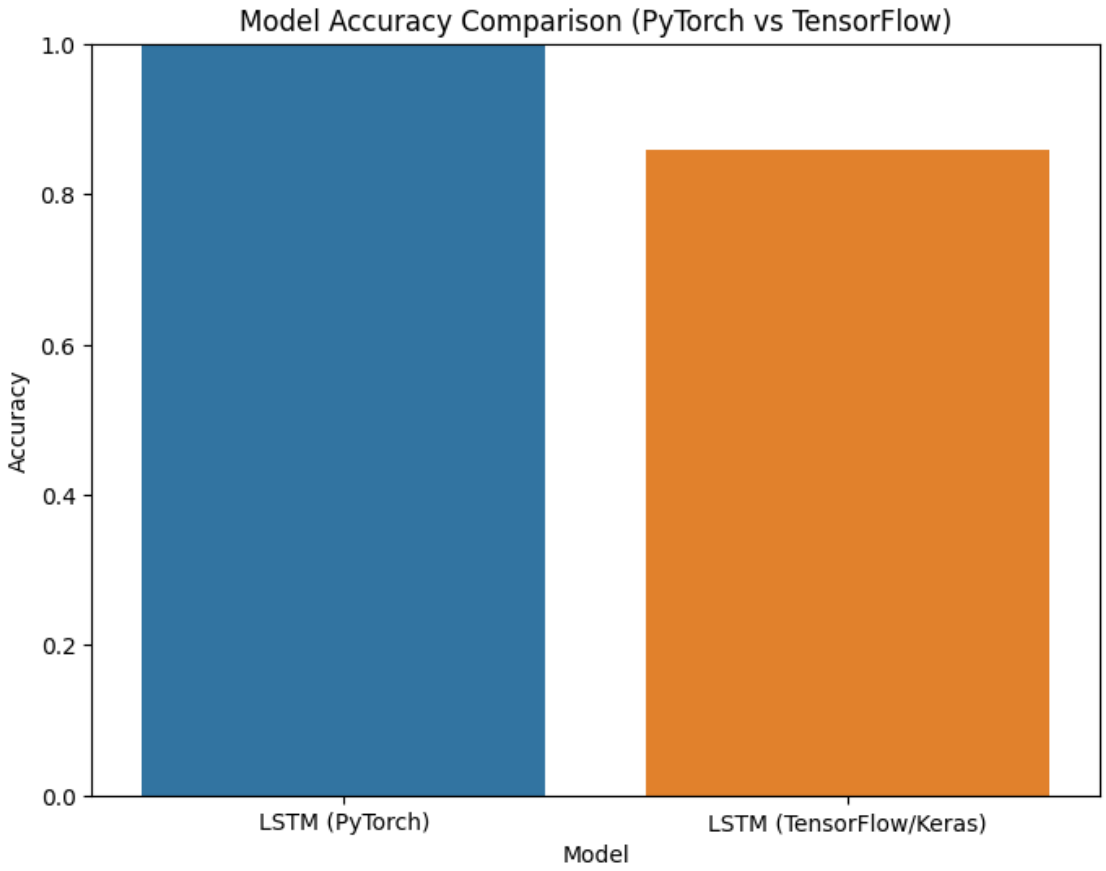
```
150/150             17s 114ms/step -
accuracy: 0.8746 - loss: 0.3267 - val_accuracy: 0.8432 - val_loss: 0.4857
Epoch 599/600
150/150             17s 115ms/step -
accuracy: 0.9018 - loss: 0.2730 - val_accuracy: 0.8507 - val_loss: 0.5108
Epoch 600/600
150/150             17s 113ms/step -
accuracy: 0.8867 - loss: 0.3210 - val_accuracy: 0.7982 - val_loss: 0.5441
```




[ ]:
```python
# Evaluate the TensorFlow/Keras model on the validation set
loss, tf_keras_val_accuracy = model.evaluate(x_val, y_val_encoded, verbose=0)
print(f'TensorFlow/Keras Model Validation Accuracy: {tf_keras_val_accuracy:.
  ↪4f}')

# Generate predictions for the validation set
y_pred = model.predict(x_val)
y_pred_classes = np.argmax(y_pred, axis=1)

# Classification Report for the TensorFlow/Keras model
print(classification_report(y_val_encoded, y_pred_classes,␣
  ↪target_names=label_encoder.classes_))
```

```
TensorFlow/Keras Model Validation Accuracy: 0.8582
38/38             2s 44ms/step
              precision    recall  f1-score   support

     1. loud       0.89      0.86      0.87       253
```

```
    2. quiet       0.94      0.96      0.95       236
    3. happy       0.87      0.87      0.87       229
      4. sad       0.81      0.86      0.84        95
5. Beautiful       0.72      0.76      0.74        99
     6. Ugly       0.81      0.81      0.81       119
     7. Deaf       0.81      0.82      0.81        87
     8. Blind      0.86      0.77      0.81        81

    accuracy                           0.86      1199
   macro avg       0.84      0.84      0.84      1199
weighted avg       0.86      0.86      0.86      1199
```




[ ]:
```
# Save the entire model
model.save('tf_model.h5')
```

[19]:
```
# Train the model and store the training history
history = model.fit(x_train, y_train_encoded,
                    validation_data=(x_val, y_val_encoded),
                    epochs=400, batch_size=32)
```

```python
# Extract accuracy and validation accuracy from the history
train_accuracy = history.history['accuracy']
val_accuracy = history.history['val_accuracy']
epochs = range(1, len(train_accuracy) + 1)

# Plot training and validation accuracy
plt.figure(figsize=(10, 5))
plt.plot(epochs, train_accuracy, label='Training Accuracy', color='blue')
plt.plot(epochs, val_accuracy, label='Validation Accuracy', color='orange')

# Label the graph
plt.title('Training and Validation Accuracy over Epochs')
plt.xlabel('Epochs')
plt.ylabel('Accuracy')
plt.legend()

# Show the plot
plt.show()
```

```
Epoch 1/400
150/150             20s 131ms/step -
accuracy: 0.8908 - loss: 0.3107 - val_accuracy: 0.8424 - val_loss: 0.5433
Epoch 2/400
150/150             21s 137ms/step -
accuracy: 0.9129 - loss: 0.2456 - val_accuracy: 0.8198 - val_loss: 0.6076
Epoch 3/400
150/150             19s 128ms/step -
accuracy: 0.9007 - loss: 0.2742 - val_accuracy: 0.8048 - val_loss: 0.7060
Epoch 4/400
150/150             20s 132ms/step -
accuracy: 0.8783 - loss: 0.3415 - val_accuracy: 0.8324 - val_loss: 0.5403
Epoch 5/400
150/150             20s 135ms/step -
accuracy: 0.8990 - loss: 0.2799 - val_accuracy: 0.8232 - val_loss: 0.6366
Epoch 6/400
150/150             19s 128ms/step -
accuracy: 0.9035 - loss: 0.2674 - val_accuracy: 0.8190 - val_loss: 0.5979
Epoch 7/400
150/150             19s 124ms/step -
accuracy: 0.9019 - loss: 0.2749 - val_accuracy: 0.8407 - val_loss: 0.5478
Epoch 8/400
150/150             20s 123ms/step -
accuracy: 0.9035 - loss: 0.2592 - val_accuracy: 0.8382 - val_loss: 0.5621
Epoch 9/400
150/150             20s 119ms/step -
accuracy: 0.8922 - loss: 0.3119 - val_accuracy: 0.8332 - val_loss: 0.5454
```

```
Epoch 10/400
150/150             20s 118ms/step -
accuracy: 0.8942 - loss: 0.2773 - val_accuracy: 0.8349 - val_loss: 0.5894
Epoch 11/400
150/150             17s 114ms/step -
accuracy: 0.9192 - loss: 0.2325 - val_accuracy: 0.8232 - val_loss: 0.5733
Epoch 12/400
150/150             21s 120ms/step -
accuracy: 0.8817 - loss: 0.3221 - val_accuracy: 0.8299 - val_loss: 0.5729
Epoch 13/400
150/150             18s 117ms/step -
accuracy: 0.9021 - loss: 0.2730 - val_accuracy: 0.8240 - val_loss: 0.5753
Epoch 14/400
150/150             18s 119ms/step -
accuracy: 0.9011 - loss: 0.2886 - val_accuracy: 0.8140 - val_loss: 0.6056
Epoch 15/400
150/150             18s 121ms/step -
accuracy: 0.8957 - loss: 0.2953 - val_accuracy: 0.8299 - val_loss: 0.5998
Epoch 16/400
150/150             17s 116ms/step -
accuracy: 0.9037 - loss: 0.2694 - val_accuracy: 0.7690 - val_loss: 0.7283
Epoch 17/400
150/150             18s 118ms/step -
accuracy: 0.8858 - loss: 0.3246 - val_accuracy: 0.8465 - val_loss: 0.5576
Epoch 18/400
150/150             17s 115ms/step -
accuracy: 0.8857 - loss: 0.2943 - val_accuracy: 0.8499 - val_loss: 0.5181
Epoch 19/400
150/150             18s 117ms/step -
accuracy: 0.9029 - loss: 0.2814 - val_accuracy: 0.8482 - val_loss: 0.4923
Epoch 20/400
150/150             17s 113ms/step -
accuracy: 0.9004 - loss: 0.2642 - val_accuracy: 0.8340 - val_loss: 0.5506
Epoch 21/400
150/150             17s 116ms/step -
accuracy: 0.8977 - loss: 0.2787 - val_accuracy: 0.8490 - val_loss: 0.5215
Epoch 22/400
150/150             20s 115ms/step -
accuracy: 0.8995 - loss: 0.2729 - val_accuracy: 0.8399 - val_loss: 0.5714
Epoch 23/400
150/150             17s 116ms/step -
accuracy: 0.8951 - loss: 0.3014 - val_accuracy: 0.8290 - val_loss: 0.5505
Epoch 24/400
150/150             17s 115ms/step -
accuracy: 0.9154 - loss: 0.2494 - val_accuracy: 0.8257 - val_loss: 0.6384
Epoch 25/400
150/150             20s 112ms/step -
accuracy: 0.9060 - loss: 0.2668 - val_accuracy: 0.8540 - val_loss: 0.5120
```

```
Epoch 26/400
150/150             17s 116ms/step -
accuracy: 0.9037 - loss: 0.2762 - val_accuracy: 0.8173 - val_loss: 0.6369
Epoch 27/400
150/150             17s 112ms/step -
accuracy: 0.8959 - loss: 0.2753 - val_accuracy: 0.8023 - val_loss: 0.6032
Epoch 28/400
150/150             17s 115ms/step -
accuracy: 0.8997 - loss: 0.2733 - val_accuracy: 0.8274 - val_loss: 0.5535
Epoch 29/400
150/150             17s 112ms/step -
accuracy: 0.9026 - loss: 0.2721 - val_accuracy: 0.8540 - val_loss: 0.5087
Epoch 30/400
150/150             17s 116ms/step -
accuracy: 0.9147 - loss: 0.2507 - val_accuracy: 0.8257 - val_loss: 0.5709
Epoch 31/400
150/150             17s 114ms/step -
accuracy: 0.8852 - loss: 0.3100 - val_accuracy: 0.8507 - val_loss: 0.5345
Epoch 32/400
150/150             17s 116ms/step -
accuracy: 0.9066 - loss: 0.2463 - val_accuracy: 0.8040 - val_loss: 0.6539
Epoch 33/400
150/150             20s 115ms/step -
accuracy: 0.8862 - loss: 0.3305 - val_accuracy: 0.8449 - val_loss: 0.5765
Epoch 34/400
150/150             18s 122ms/step -
accuracy: 0.9076 - loss: 0.2566 - val_accuracy: 0.8382 - val_loss: 0.5841
Epoch 35/400
150/150             18s 117ms/step -
accuracy: 0.9035 - loss: 0.2672 - val_accuracy: 0.7415 - val_loss: 0.8556
Epoch 36/400
150/150             18s 118ms/step -
accuracy: 0.8775 - loss: 0.3634 - val_accuracy: 0.8515 - val_loss: 0.5331
Epoch 37/400
150/150             19s 123ms/step -
accuracy: 0.9139 - loss: 0.2283 - val_accuracy: 0.8090 - val_loss: 0.6240
Epoch 38/400
150/150             29s 181ms/step -
accuracy: 0.8838 - loss: 0.3119 - val_accuracy: 0.8382 - val_loss: 0.5409
Epoch 39/400
150/150             23s 154ms/step -
accuracy: 0.9221 - loss: 0.2248 - val_accuracy: 0.8490 - val_loss: 0.4953
Epoch 40/400
150/150             21s 142ms/step -
accuracy: 0.9098 - loss: 0.2530 - val_accuracy: 0.8415 - val_loss: 0.5491
Epoch 41/400
150/150             21s 142ms/step -
accuracy: 0.9117 - loss: 0.2503 - val_accuracy: 0.8357 - val_loss: 0.5148
```

```
Epoch 42/400
150/150             18s 120ms/step -
accuracy: 0.9050 - loss: 0.2582 - val_accuracy: 0.8224 - val_loss: 0.6271
Epoch 43/400
150/150             19s 123ms/step -
accuracy: 0.8978 - loss: 0.2766 - val_accuracy: 0.8482 - val_loss: 0.5433
Epoch 44/400
150/150             18s 117ms/step -
accuracy: 0.9098 - loss: 0.2480 - val_accuracy: 0.8190 - val_loss: 0.5611
Epoch 45/400
150/150             18s 119ms/step -
accuracy: 0.9039 - loss: 0.2662 - val_accuracy: 0.8107 - val_loss: 0.5830
Epoch 46/400
150/150             17s 115ms/step -
accuracy: 0.8847 - loss: 0.3035 - val_accuracy: 0.8590 - val_loss: 0.4990
Epoch 47/400
150/150             18s 121ms/step -
accuracy: 0.9119 - loss: 0.2502 - val_accuracy: 0.8148 - val_loss: 0.5463
Epoch 48/400
150/150             18s 120ms/step -
accuracy: 0.9016 - loss: 0.2688 - val_accuracy: 0.8449 - val_loss: 0.5468
Epoch 49/400
150/150             18s 119ms/step -
accuracy: 0.9094 - loss: 0.2542 - val_accuracy: 0.8599 - val_loss: 0.5000
Epoch 50/400
150/150             17s 115ms/step -
accuracy: 0.9228 - loss: 0.2203 - val_accuracy: 0.8507 - val_loss: 0.5239
Epoch 51/400
150/150             17s 116ms/step -
accuracy: 0.8790 - loss: 0.3583 - val_accuracy: 0.8357 - val_loss: 0.5033
Epoch 52/400
150/150             17s 116ms/step -
accuracy: 0.8993 - loss: 0.2768 - val_accuracy: 0.8349 - val_loss: 0.5531
Epoch 53/400
150/150             19s 123ms/step -
accuracy: 0.9030 - loss: 0.2584 - val_accuracy: 0.8490 - val_loss: 0.5144
Epoch 54/400
150/150             18s 118ms/step -
accuracy: 0.9129 - loss: 0.2477 - val_accuracy: 0.8324 - val_loss: 0.5503
Epoch 55/400
150/150             18s 119ms/step -
accuracy: 0.9139 - loss: 0.2420 - val_accuracy: 0.8490 - val_loss: 0.4989
Epoch 56/400
150/150             18s 117ms/step -
accuracy: 0.9293 - loss: 0.2038 - val_accuracy: 0.8073 - val_loss: 0.6085
Epoch 57/400
150/150             17s 116ms/step -
accuracy: 0.9118 - loss: 0.2539 - val_accuracy: 0.8107 - val_loss: 0.6672
```

```
Epoch 58/400
150/150             18s 117ms/step -
accuracy: 0.9083 - loss: 0.2531 - val_accuracy: 0.8090 - val_loss: 0.6390
Epoch 59/400
150/150             17s 115ms/step -
accuracy: 0.8948 - loss: 0.2679 - val_accuracy: 0.7798 - val_loss: 0.7253
Epoch 60/400
150/150             18s 117ms/step -
accuracy: 0.8107 - loss: 0.5361 - val_accuracy: 0.8607 - val_loss: 0.4552
Epoch 61/400
150/150             18s 117ms/step -
accuracy: 0.9024 - loss: 0.2782 - val_accuracy: 0.8432 - val_loss: 0.5370
Epoch 62/400
150/150             18s 119ms/step -
accuracy: 0.9077 - loss: 0.2676 - val_accuracy: 0.8390 - val_loss: 0.5526
Epoch 63/400
150/150             18s 117ms/step -
accuracy: 0.9003 - loss: 0.2830 - val_accuracy: 0.8582 - val_loss: 0.5114
Epoch 64/400
150/150             18s 119ms/step -
accuracy: 0.9136 - loss: 0.2405 - val_accuracy: 0.8565 - val_loss: 0.4884
Epoch 65/400
150/150             17s 115ms/step -
accuracy: 0.9132 - loss: 0.2447 - val_accuracy: 0.8140 - val_loss: 0.6141
Epoch 66/400
150/150             18s 120ms/step -
accuracy: 0.9008 - loss: 0.2871 - val_accuracy: 0.8616 - val_loss: 0.4794
Epoch 67/400
150/150             17s 114ms/step -
accuracy: 0.9128 - loss: 0.2645 - val_accuracy: 0.8515 - val_loss: 0.5422
Epoch 68/400
150/150             18s 117ms/step -
accuracy: 0.9137 - loss: 0.2446 - val_accuracy: 0.8424 - val_loss: 0.5423
Epoch 69/400
150/150             17s 115ms/step -
accuracy: 0.9143 - loss: 0.2308 - val_accuracy: 0.8082 - val_loss: 0.6173
Epoch 70/400
150/150             21s 117ms/step -
accuracy: 0.9147 - loss: 0.2325 - val_accuracy: 0.8165 - val_loss: 0.6112
Epoch 71/400
150/150             21s 117ms/step -
accuracy: 0.9246 - loss: 0.2177 - val_accuracy: 0.8440 - val_loss: 0.5523
Epoch 72/400
150/150             17s 115ms/step -
accuracy: 0.8780 - loss: 0.3500 - val_accuracy: 0.8549 - val_loss: 0.5111
Epoch 73/400
150/150             18s 118ms/step -
accuracy: 0.9135 - loss: 0.2444 - val_accuracy: 0.8440 - val_loss: 0.5515
```

```
Epoch 74/400
150/150             17s 113ms/step -
accuracy: 0.9105 - loss: 0.2562 - val_accuracy: 0.8590 - val_loss: 0.5023
Epoch 75/400
150/150             18s 119ms/step -
accuracy: 0.9140 - loss: 0.2397 - val_accuracy: 0.8691 - val_loss: 0.4918
Epoch 76/400
150/150             17s 115ms/step -
accuracy: 0.9162 - loss: 0.2156 - val_accuracy: 0.8265 - val_loss: 0.5913
Epoch 77/400
150/150             18s 117ms/step -
accuracy: 0.8567 - loss: 0.4120 - val_accuracy: 0.8524 - val_loss: 0.5139
Epoch 78/400
150/150             19s 126ms/step -
accuracy: 0.9128 - loss: 0.2398 - val_accuracy: 0.8524 - val_loss: 0.5228
Epoch 79/400
150/150             25s 158ms/step -
accuracy: 0.9006 - loss: 0.2765 - val_accuracy: 0.8073 - val_loss: 0.6262
Epoch 80/400
150/150             24s 160ms/step -
accuracy: 0.9063 - loss: 0.2689 - val_accuracy: 0.8507 - val_loss: 0.4833
Epoch 81/400
150/150             24s 160ms/step -
accuracy: 0.9154 - loss: 0.2434 - val_accuracy: 0.8524 - val_loss: 0.4966
Epoch 82/400
150/150             24s 160ms/step -
accuracy: 0.9220 - loss: 0.2189 - val_accuracy: 0.8157 - val_loss: 0.6554
Epoch 83/400
150/150             20s 135ms/step -
accuracy: 0.9031 - loss: 0.2753 - val_accuracy: 0.8457 - val_loss: 0.5716
Epoch 84/400
150/150             19s 126ms/step -
accuracy: 0.9297 - loss: 0.2015 - val_accuracy: 0.8157 - val_loss: 0.6563
Epoch 85/400
150/150             20s 123ms/step -
accuracy: 0.9121 - loss: 0.2691 - val_accuracy: 0.8499 - val_loss: 0.5389
Epoch 86/400
150/150             18s 120ms/step -
accuracy: 0.9125 - loss: 0.2427 - val_accuracy: 0.8515 - val_loss: 0.4974
Epoch 87/400
150/150             18s 117ms/step -
accuracy: 0.9230 - loss: 0.2291 - val_accuracy: 0.8590 - val_loss: 0.5042
Epoch 88/400
150/150             18s 117ms/step -
accuracy: 0.9200 - loss: 0.2295 - val_accuracy: 0.8224 - val_loss: 0.5994
Epoch 89/400
150/150             17s 114ms/step -
accuracy: 0.8961 - loss: 0.2864 - val_accuracy: 0.8282 - val_loss: 0.6136
```

```
Epoch 90/400
150/150             17s 116ms/step -
accuracy: 0.8878 - loss: 0.3337 - val_accuracy: 0.8741 - val_loss: 0.4284
Epoch 91/400
150/150             17s 115ms/step -
accuracy: 0.8989 - loss: 0.2742 - val_accuracy: 0.8274 - val_loss: 0.5939
Epoch 92/400
150/150             18s 117ms/step -
accuracy: 0.8967 - loss: 0.2712 - val_accuracy: 0.8148 - val_loss: 0.6487
Epoch 93/400
150/150             18s 120ms/step -
accuracy: 0.9071 - loss: 0.2667 - val_accuracy: 0.8182 - val_loss: 0.6249
Epoch 94/400
150/150             18s 118ms/step -
accuracy: 0.9107 - loss: 0.2572 - val_accuracy: 0.8299 - val_loss: 0.6422
Epoch 95/400
150/150             20s 118ms/step -
accuracy: 0.9272 - loss: 0.2113 - val_accuracy: 0.8440 - val_loss: 0.5143
Epoch 96/400
150/150             17s 115ms/step -
accuracy: 0.9182 - loss: 0.2261 - val_accuracy: 0.8399 - val_loss: 0.5197
Epoch 97/400
150/150             17s 116ms/step -
accuracy: 0.9358 - loss: 0.1905 - val_accuracy: 0.8482 - val_loss: 0.5433
Epoch 98/400
150/150             17s 114ms/step -
accuracy: 0.9013 - loss: 0.2788 - val_accuracy: 0.8732 - val_loss: 0.4644
Epoch 99/400
150/150             18s 118ms/step -
accuracy: 0.9286 - loss: 0.1917 - val_accuracy: 0.8274 - val_loss: 0.6018
Epoch 100/400
150/150             20s 114ms/step -
accuracy: 0.8745 - loss: 0.3763 - val_accuracy: 0.8382 - val_loss: 0.5536
Epoch 101/400
150/150             17s 116ms/step -
accuracy: 0.9103 - loss: 0.2581 - val_accuracy: 0.8407 - val_loss: 0.5873
Epoch 102/400
150/150             17s 115ms/step -
accuracy: 0.9033 - loss: 0.2685 - val_accuracy: 0.8374 - val_loss: 0.5505
Epoch 103/400
150/150             20s 114ms/step -
accuracy: 0.9235 - loss: 0.2150 - val_accuracy: 0.8432 - val_loss: 0.5608
Epoch 104/400
150/150             17s 114ms/step -
accuracy: 0.8893 - loss: 0.3295 - val_accuracy: 0.8716 - val_loss: 0.5132
Epoch 105/400
150/150             17s 114ms/step -
accuracy: 0.9333 - loss: 0.2017 - val_accuracy: 0.8482 - val_loss: 0.5273
```

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Epoch 106/400
150/150             18s 117ms/step -
accuracy: 0.9278 - loss: 0.2136 - val_accuracy: 0.8415 - val_loss: 0.4970
Epoch 107/400
150/150             17s 113ms/step -
accuracy: 0.9261 - loss: 0.2167 - val_accuracy: 0.8774 - val_loss: 0.4429
Epoch 108/400
150/150             17s 116ms/step -
accuracy: 0.9287 - loss: 0.1931 - val_accuracy: 0.8148 - val_loss: 0.6546
Epoch 109/400
150/150             17s 113ms/step -
accuracy: 0.9085 - loss: 0.2745 - val_accuracy: 0.8565 - val_loss: 0.5243
Epoch 110/400
150/150             17s 116ms/step -
accuracy: 0.9155 - loss: 0.2461 - val_accuracy: 0.8641 - val_loss: 0.4981
Epoch 111/400
150/150             17s 114ms/step -
accuracy: 0.9269 - loss: 0.2141 - val_accuracy: 0.7798 - val_loss: 0.8114
Epoch 112/400
150/150             18s 117ms/step -
accuracy: 0.9037 - loss: 0.2876 - val_accuracy: 0.8549 - val_loss: 0.5163
Epoch 113/400
150/150             20s 114ms/step -
accuracy: 0.9029 - loss: 0.2873 - val_accuracy: 0.8290 - val_loss: 0.5870
Epoch 114/400
150/150             17s 115ms/step -
accuracy: 0.8990 - loss: 0.2914 - val_accuracy: 0.8190 - val_loss: 0.6088
Epoch 115/400
150/150             18s 119ms/step -
accuracy: 0.9148 - loss: 0.2323 - val_accuracy: 0.8440 - val_loss: 0.5485
Epoch 116/400
150/150             18s 119ms/step -
accuracy: 0.9192 - loss: 0.2271 - val_accuracy: 0.8499 - val_loss: 0.5718
Epoch 117/400
150/150             18s 122ms/step -
accuracy: 0.9188 - loss: 0.2323 - val_accuracy: 0.7715 - val_loss: 0.8426
Epoch 118/400
150/150             25s 154ms/step -
accuracy: 0.8884 - loss: 0.3205 - val_accuracy: 0.8532 - val_loss: 0.5271
Epoch 119/400
150/150             26s 172ms/step -
accuracy: 0.8920 - loss: 0.3439 - val_accuracy: 0.8465 - val_loss: 0.5137
Epoch 120/400
150/150             23s 154ms/step -
accuracy: 0.9189 - loss: 0.2403 - val_accuracy: 0.8641 - val_loss: 0.4808
Epoch 121/400
150/150             21s 139ms/step -
accuracy: 0.9298 - loss: 0.1952 - val_accuracy: 0.8499 - val_loss: 0.5755
```

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Epoch 122/400
150/150             21s 142ms/step -
accuracy: 0.9138 - loss: 0.2264 - val_accuracy: 0.8457 - val_loss: 0.6021
Epoch 123/400
150/150             20s 133ms/step -
accuracy: 0.8964 - loss: 0.2903 - val_accuracy: 0.8524 - val_loss: 0.5023
Epoch 124/400
150/150             20s 134ms/step -
accuracy: 0.9258 - loss: 0.2102 - val_accuracy: 0.8532 - val_loss: 0.5317
Epoch 125/400
150/150             22s 149ms/step -
accuracy: 0.9215 - loss: 0.2257 - val_accuracy: 0.8632 - val_loss: 0.4991
Epoch 126/400
150/150             20s 136ms/step -
accuracy: 0.9302 - loss: 0.2039 - val_accuracy: 0.8624 - val_loss: 0.5162
Epoch 127/400
150/150             19s 129ms/step -
accuracy: 0.9254 - loss: 0.2172 - val_accuracy: 0.8440 - val_loss: 0.6033
Epoch 128/400
150/150             20s 125ms/step -
accuracy: 0.9251 - loss: 0.2203 - val_accuracy: 0.8699 - val_loss: 0.5101
Epoch 129/400
150/150             18s 118ms/step -
accuracy: 0.9283 - loss: 0.2123 - val_accuracy: 0.8490 - val_loss: 0.5244
Epoch 130/400
150/150             18s 123ms/step -
accuracy: 0.9193 - loss: 0.2329 - val_accuracy: 0.8549 - val_loss: 0.5180
Epoch 131/400
150/150             19s 124ms/step -
accuracy: 0.9381 - loss: 0.1837 - val_accuracy: 0.8590 - val_loss: 0.5196
Epoch 132/400
150/150             20s 122ms/step -
accuracy: 0.9214 - loss: 0.2173 - val_accuracy: 0.8324 - val_loss: 0.6431
Epoch 133/400
150/150             19s 125ms/step -
accuracy: 0.9002 - loss: 0.2885 - val_accuracy: 0.8524 - val_loss: 0.5905
Epoch 134/400
150/150             19s 125ms/step -
accuracy: 0.9347 - loss: 0.1817 - val_accuracy: 0.8440 - val_loss: 0.6056
Epoch 135/400
150/150             18s 121ms/step -
accuracy: 0.8983 - loss: 0.2969 - val_accuracy: 0.8357 - val_loss: 0.5161
Epoch 136/400
150/150             20s 119ms/step -
accuracy: 0.9134 - loss: 0.2330 - val_accuracy: 0.8490 - val_loss: 0.5275
Epoch 137/400
150/150             21s 121ms/step -
accuracy: 0.9173 - loss: 0.2284 - val_accuracy: 0.8657 - val_loss: 0.4893
```

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Epoch 138/400
150/150             18s 118ms/step -
accuracy: 0.9360 - loss: 0.1770 - val_accuracy: 0.8540 - val_loss: 0.5774
Epoch 139/400
150/150             20s 117ms/step -
accuracy: 0.9129 - loss: 0.2516 - val_accuracy: 0.8557 - val_loss: 0.5129
Epoch 140/400
150/150             18s 120ms/step -
accuracy: 0.9362 - loss: 0.1848 - val_accuracy: 0.8407 - val_loss: 0.5786
Epoch 141/400
150/150             18s 118ms/step -
accuracy: 0.9248 - loss: 0.2086 - val_accuracy: 0.8449 - val_loss: 0.5050
Epoch 142/400
150/150             18s 118ms/step -
accuracy: 0.9247 - loss: 0.2257 - val_accuracy: 0.8440 - val_loss: 0.5098
Epoch 143/400
150/150             18s 119ms/step -
accuracy: 0.9298 - loss: 0.2090 - val_accuracy: 0.8707 - val_loss: 0.4858
Epoch 144/400
150/150             20s 118ms/step -
accuracy: 0.9197 - loss: 0.2316 - val_accuracy: 0.8607 - val_loss: 0.4927
Epoch 145/400
150/150             18s 120ms/step -
accuracy: 0.9234 - loss: 0.2114 - val_accuracy: 0.8507 - val_loss: 0.5441
Epoch 146/400
150/150             18s 121ms/step -
accuracy: 0.9267 - loss: 0.2063 - val_accuracy: 0.8724 - val_loss: 0.4818
Epoch 147/400
150/150             18s 118ms/step -
accuracy: 0.9387 - loss: 0.1931 - val_accuracy: 0.8224 - val_loss: 0.6408
Epoch 148/400
150/150             18s 117ms/step -
accuracy: 0.8344 - loss: 0.6135 - val_accuracy: 0.8515 - val_loss: 0.5476
Epoch 149/400
150/150             22s 128ms/step -
accuracy: 0.9287 - loss: 0.2081 - val_accuracy: 0.8649 - val_loss: 0.4909
Epoch 150/400
150/150             19s 127ms/step -
accuracy: 0.9448 - loss: 0.1646 - val_accuracy: 0.8232 - val_loss: 0.7215
Epoch 151/400
150/150             19s 125ms/step -
accuracy: 0.9132 - loss: 0.2595 - val_accuracy: 0.8741 - val_loss: 0.5125
Epoch 152/400
150/150             19s 125ms/step -
accuracy: 0.9225 - loss: 0.2293 - val_accuracy: 0.8432 - val_loss: 0.4946
Epoch 153/400
150/150             18s 120ms/step -
accuracy: 0.9360 - loss: 0.1951 - val_accuracy: 0.8666 - val_loss: 0.5061
```

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Epoch 154/400
150/150             18s 120ms/step -
accuracy: 0.9421 - loss: 0.1637 - val_accuracy: 0.8699 - val_loss: 0.5232
Epoch 155/400
150/150             20s 117ms/step -
accuracy: 0.8905 - loss: 0.3347 - val_accuracy: 0.8407 - val_loss: 0.5123
Epoch 156/400
150/150             18s 118ms/step -
accuracy: 0.9223 - loss: 0.2295 - val_accuracy: 0.8641 - val_loss: 0.4750
Epoch 157/400
150/150             18s 117ms/step -
accuracy: 0.9371 - loss: 0.1817 - val_accuracy: 0.8549 - val_loss: 0.5796
Epoch 158/400
150/150             18s 121ms/step -
accuracy: 0.9324 - loss: 0.2005 - val_accuracy: 0.8440 - val_loss: 0.5244
Epoch 159/400
150/150             20s 120ms/step -
accuracy: 0.9155 - loss: 0.2553 - val_accuracy: 0.8707 - val_loss: 0.4767
Epoch 160/400
150/150             17s 115ms/step -
accuracy: 0.9414 - loss: 0.1738 - val_accuracy: 0.8607 - val_loss: 0.4668
Epoch 161/400
150/150             18s 118ms/step -
accuracy: 0.9306 - loss: 0.1997 - val_accuracy: 0.8649 - val_loss: 0.4825
Epoch 162/400
150/150             18s 117ms/step -
accuracy: 0.9417 - loss: 0.1740 - val_accuracy: 0.8582 - val_loss: 0.5112
Epoch 163/400
150/150             21s 120ms/step -
accuracy: 0.9364 - loss: 0.1788 - val_accuracy: 0.8515 - val_loss: 0.4760
Epoch 164/400
150/150             17s 116ms/step -
accuracy: 0.9020 - loss: 0.2891 - val_accuracy: 0.8632 - val_loss: 0.4984
Epoch 165/400
150/150             18s 120ms/step -
accuracy: 0.9367 - loss: 0.1819 - val_accuracy: 0.8524 - val_loss: 0.4923
Epoch 166/400
150/150             18s 120ms/step -
accuracy: 0.9329 - loss: 0.1963 - val_accuracy: 0.8490 - val_loss: 0.5795
Epoch 167/400
150/150             18s 117ms/step -
accuracy: 0.9218 - loss: 0.2458 - val_accuracy: 0.8365 - val_loss: 0.6068
Epoch 168/400
150/150             18s 123ms/step -
accuracy: 0.9204 - loss: 0.2301 - val_accuracy: 0.8691 - val_loss: 0.4663
Epoch 169/400
150/150             18s 123ms/step -
accuracy: 0.9201 - loss: 0.2367 - val_accuracy: 0.8782 - val_loss: 0.4199
```

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Epoch 170/400
150/150             18s 123ms/step -
accuracy: 0.9444 - loss: 0.1690 - val_accuracy: 0.8590 - val_loss: 0.4931
Epoch 171/400
150/150             18s 123ms/step -
accuracy: 0.9238 - loss: 0.2273 - val_accuracy: 0.8649 - val_loss: 0.4818
Epoch 172/400
150/150             19s 125ms/step -
accuracy: 0.9395 - loss: 0.1866 - val_accuracy: 0.8474 - val_loss: 0.4924
Epoch 173/400
150/150             18s 122ms/step -
accuracy: 0.9221 - loss: 0.2187 - val_accuracy: 0.8565 - val_loss: 0.5384
Epoch 174/400
150/150             18s 122ms/step -
accuracy: 0.9417 - loss: 0.1814 - val_accuracy: 0.8641 - val_loss: 0.4733
Epoch 175/400
150/150             18s 123ms/step -
accuracy: 0.9295 - loss: 0.2140 - val_accuracy: 0.8549 - val_loss: 0.5168
Epoch 176/400
150/150             18s 123ms/step -
accuracy: 0.9251 - loss: 0.2269 - val_accuracy: 0.8766 - val_loss: 0.4649
Epoch 177/400
150/150             20s 119ms/step -
accuracy: 0.9353 - loss: 0.1846 - val_accuracy: 0.8374 - val_loss: 0.5924
Epoch 178/400
150/150             18s 117ms/step -
accuracy: 0.9459 - loss: 0.1612 - val_accuracy: 0.8857 - val_loss: 0.4845
Epoch 179/400
150/150             18s 120ms/step -
accuracy: 0.9156 - loss: 0.2575 - val_accuracy: 0.8691 - val_loss: 0.4636
Epoch 180/400
150/150             18s 117ms/step -
accuracy: 0.9415 - loss: 0.1617 - val_accuracy: 0.8674 - val_loss: 0.5109
Epoch 181/400
150/150             18s 120ms/step -
accuracy: 0.9232 - loss: 0.2269 - val_accuracy: 0.8857 - val_loss: 0.4233
Epoch 182/400
150/150             18s 122ms/step -
accuracy: 0.9312 - loss: 0.1908 - val_accuracy: 0.8407 - val_loss: 0.5658
Epoch 183/400
150/150             18s 120ms/step -
accuracy: 0.9098 - loss: 0.2542 - val_accuracy: 0.8549 - val_loss: 0.5248
Epoch 184/400
150/150             21s 123ms/step -
accuracy: 0.9311 - loss: 0.2095 - val_accuracy: 0.8265 - val_loss: 0.6118
Epoch 185/400
150/150             19s 124ms/step -
accuracy: 0.9281 - loss: 0.1923 - val_accuracy: 0.8657 - val_loss: 0.5356
```

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Epoch 186/400
150/150             18s 122ms/step -
accuracy: 0.9403 - loss: 0.1848 - val_accuracy: 0.8674 - val_loss: 0.4878
Epoch 187/400
150/150             18s 120ms/step -
accuracy: 0.9228 - loss: 0.2344 - val_accuracy: 0.8766 - val_loss: 0.4586
Epoch 188/400
150/150             18s 123ms/step -
accuracy: 0.9460 - loss: 0.1644 - val_accuracy: 0.8766 - val_loss: 0.4881
Epoch 189/400
150/150             23s 155ms/step -
accuracy: 0.9304 - loss: 0.1958 - val_accuracy: 0.8424 - val_loss: 0.6278
Epoch 190/400
150/150             24s 162ms/step -
accuracy: 0.9311 - loss: 0.2018 - val_accuracy: 0.8198 - val_loss: 0.5726
Epoch 191/400
150/150             26s 176ms/step -
accuracy: 0.9186 - loss: 0.2557 - val_accuracy: 0.8282 - val_loss: 0.5510
Epoch 192/400
150/150             23s 152ms/step -
accuracy: 0.9387 - loss: 0.1757 - val_accuracy: 0.8332 - val_loss: 0.6122
Epoch 193/400
150/150             22s 147ms/step -
accuracy: 0.9261 - loss: 0.2212 - val_accuracy: 0.8374 - val_loss: 0.5970
Epoch 194/400
150/150             22s 148ms/step -
accuracy: 0.9113 - loss: 0.2485 - val_accuracy: 0.8749 - val_loss: 0.4728
Epoch 195/400
150/150             42s 152ms/step -
accuracy: 0.9303 - loss: 0.1951 - val_accuracy: 0.8757 - val_loss: 0.4839
Epoch 196/400
150/150             20s 134ms/step -
accuracy: 0.9409 - loss: 0.1771 - val_accuracy: 0.8691 - val_loss: 0.5010
Epoch 197/400
150/150             19s 126ms/step -
accuracy: 0.9389 - loss: 0.1890 - val_accuracy: 0.8782 - val_loss: 0.4544
Epoch 198/400
150/150             19s 123ms/step -
accuracy: 0.9433 - loss: 0.1700 - val_accuracy: 0.8307 - val_loss: 0.6346
Epoch 199/400
150/150             19s 125ms/step -
accuracy: 0.9049 - loss: 0.2783 - val_accuracy: 0.8707 - val_loss: 0.5066
Epoch 200/400
150/150             18s 122ms/step -
accuracy: 0.9392 - loss: 0.1721 - val_accuracy: 0.8449 - val_loss: 0.5552
Epoch 201/400
150/150             18s 122ms/step -
accuracy: 0.9354 - loss: 0.1893 - val_accuracy: 0.8390 - val_loss: 0.5843
```

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Epoch 202/400
150/150             18s 120ms/step -
accuracy: 0.9376 - loss: 0.1758 - val_accuracy: 0.8357 - val_loss: 0.6789
Epoch 203/400
150/150             18s 123ms/step -
accuracy: 0.8712 - loss: 0.4385 - val_accuracy: 0.8649 - val_loss: 0.4950
Epoch 204/400
150/150             21s 124ms/step -
accuracy: 0.9347 - loss: 0.1967 - val_accuracy: 0.8424 - val_loss: 0.4706
Epoch 205/400
150/150             18s 122ms/step -
accuracy: 0.9266 - loss: 0.2120 - val_accuracy: 0.8674 - val_loss: 0.4676
Epoch 206/400
150/150             19s 124ms/step -
accuracy: 0.9436 - loss: 0.1677 - val_accuracy: 0.8349 - val_loss: 0.6148
Epoch 207/400
150/150             18s 120ms/step -
accuracy: 0.9257 - loss: 0.2060 - val_accuracy: 0.8215 - val_loss: 0.6983
Epoch 208/400
150/150             18s 122ms/step -
accuracy: 0.8933 - loss: 0.3147 - val_accuracy: 0.8682 - val_loss: 0.4938
Epoch 209/400
150/150             18s 119ms/step -
accuracy: 0.9364 - loss: 0.1846 - val_accuracy: 0.8324 - val_loss: 0.6201
Epoch 210/400
150/150             18s 123ms/step -
accuracy: 0.9357 - loss: 0.1924 - val_accuracy: 0.8632 - val_loss: 0.5070
Epoch 211/400
150/150             19s 123ms/step -
accuracy: 0.9332 - loss: 0.1741 - val_accuracy: 0.8549 - val_loss: 0.5679
Epoch 212/400
150/150             18s 120ms/step -
accuracy: 0.9257 - loss: 0.2242 - val_accuracy: 0.8599 - val_loss: 0.5026
Epoch 213/400
150/150             21s 143ms/step -
accuracy: 0.9334 - loss: 0.1826 - val_accuracy: 0.8574 - val_loss: 0.5827
Epoch 214/400
150/150             18s 122ms/step -
accuracy: 0.9422 - loss: 0.1807 - val_accuracy: 0.8616 - val_loss: 0.5312
Epoch 215/400
150/150             19s 126ms/step -
accuracy: 0.9239 - loss: 0.2177 - val_accuracy: 0.8599 - val_loss: 0.5518
Epoch 216/400
150/150             18s 122ms/step -
accuracy: 0.9251 - loss: 0.2225 - val_accuracy: 0.8599 - val_loss: 0.5612
Epoch 217/400
150/150             20s 133ms/step -
accuracy: 0.9397 - loss: 0.1788 - val_accuracy: 0.8282 - val_loss: 0.6558
```

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Epoch 218/400
150/150             19s 130ms/step -
accuracy: 0.9083 - loss: 0.2873 - val_accuracy: 0.8849 - val_loss: 0.4446
Epoch 219/400
150/150             18s 123ms/step -
accuracy: 0.9516 - loss: 0.1551 - val_accuracy: 0.8649 - val_loss: 0.5251
Epoch 220/400
150/150             19s 127ms/step -
accuracy: 0.9367 - loss: 0.1710 - val_accuracy: 0.8565 - val_loss: 0.5421
Epoch 221/400
150/150             18s 123ms/step -
accuracy: 0.9307 - loss: 0.2023 - val_accuracy: 0.8365 - val_loss: 0.5565
Epoch 222/400
150/150             18s 121ms/step -
accuracy: 0.9244 - loss: 0.2401 - val_accuracy: 0.8666 - val_loss: 0.5173
Epoch 223/400
150/150             20s 116ms/step -
accuracy: 0.9443 - loss: 0.1641 - val_accuracy: 0.8832 - val_loss: 0.4989
Epoch 224/400
150/150             18s 119ms/step -
accuracy: 0.9467 - loss: 0.1520 - val_accuracy: 0.8524 - val_loss: 0.6331
Epoch 225/400
150/150             18s 122ms/step -
accuracy: 0.9188 - loss: 0.2500 - val_accuracy: 0.8624 - val_loss: 0.5078
Epoch 226/400
150/150             18s 121ms/step -
accuracy: 0.9397 - loss: 0.1865 - val_accuracy: 0.8407 - val_loss: 0.6129
Epoch 227/400
150/150             19s 125ms/step -
accuracy: 0.9422 - loss: 0.1831 - val_accuracy: 0.8616 - val_loss: 0.5482
Epoch 228/400
150/150             18s 117ms/step -
accuracy: 0.9344 - loss: 0.1974 - val_accuracy: 0.8549 - val_loss: 0.5857
Epoch 229/400
150/150             18s 120ms/step -
accuracy: 0.9364 - loss: 0.2126 - val_accuracy: 0.8782 - val_loss: 0.5052
Epoch 230/400
150/150             18s 122ms/step -
accuracy: 0.9377 - loss: 0.1651 - val_accuracy: 0.8198 - val_loss: 0.6303
Epoch 231/400
150/150             19s 124ms/step -
accuracy: 0.9246 - loss: 0.2381 - val_accuracy: 0.8649 - val_loss: 0.5028
Epoch 232/400
150/150             17s 116ms/step -
accuracy: 0.9307 - loss: 0.2027 - val_accuracy: 0.8607 - val_loss: 0.5383
Epoch 233/400
150/150             18s 121ms/step -
accuracy: 0.9358 - loss: 0.1916 - val_accuracy: 0.8616 - val_loss: 0.4950
```

```
Epoch 234/400
150/150             19s 124ms/step -
accuracy: 0.9463 - loss: 0.1666 - val_accuracy: 0.8691 - val_loss: 0.5598
Epoch 235/400
150/150             18s 120ms/step -
accuracy: 0.9260 - loss: 0.2335 - val_accuracy: 0.8641 - val_loss: 0.4900
Epoch 236/400
150/150             18s 120ms/step -
accuracy: 0.9339 - loss: 0.1868 - val_accuracy: 0.8749 - val_loss: 0.4983
Epoch 237/400
150/150             18s 118ms/step -
accuracy: 0.9339 - loss: 0.1788 - val_accuracy: 0.8707 - val_loss: 0.4874
Epoch 238/400
150/150             19s 128ms/step -
accuracy: 0.9321 - loss: 0.2023 - val_accuracy: 0.8707 - val_loss: 0.5073
Epoch 239/400
150/150             20s 124ms/step -
accuracy: 0.8751 - loss: 0.4048 - val_accuracy: 0.8849 - val_loss: 0.4295
Epoch 240/400
150/150             21s 127ms/step -
accuracy: 0.9435 - loss: 0.1590 - val_accuracy: 0.8657 - val_loss: 0.4980
Epoch 241/400
150/150             18s 118ms/step -
accuracy: 0.9430 - loss: 0.1642 - val_accuracy: 0.8682 - val_loss: 0.4986
Epoch 242/400
150/150             17s 116ms/step -
accuracy: 0.9303 - loss: 0.1961 - val_accuracy: 0.8699 - val_loss: 0.4894
Epoch 243/400
150/150             19s 129ms/step -
accuracy: 0.9477 - loss: 0.1591 - val_accuracy: 0.8716 - val_loss: 0.4736
Epoch 244/400
150/150             18s 120ms/step -
accuracy: 0.9340 - loss: 0.1762 - val_accuracy: 0.8599 - val_loss: 0.5303
Epoch 245/400
150/150             18s 120ms/step -
accuracy: 0.9467 - loss: 0.1484 - val_accuracy: 0.8482 - val_loss: 0.5700
Epoch 246/400
150/150             18s 122ms/step -
accuracy: 0.9207 - loss: 0.2387 - val_accuracy: 0.8657 - val_loss: 0.5002
Epoch 247/400
150/150             20s 122ms/step -
accuracy: 0.9362 - loss: 0.1905 - val_accuracy: 0.8666 - val_loss: 0.5148
Epoch 248/400
150/150             18s 120ms/step -
accuracy: 0.9326 - loss: 0.1816 - val_accuracy: 0.8632 - val_loss: 0.5293
Epoch 249/400
150/150             18s 120ms/step -
accuracy: 0.9454 - loss: 0.1658 - val_accuracy: 0.8040 - val_loss: 0.7412
```

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Epoch 250/400
150/150             18s 121ms/step -
accuracy: 0.9013 - loss: 0.3197 - val_accuracy: 0.8749 - val_loss: 0.4634
Epoch 251/400
150/150             20s 121ms/step -
accuracy: 0.9377 - loss: 0.1948 - val_accuracy: 0.8607 - val_loss: 0.5389
Epoch 252/400
150/150             19s 128ms/step -
accuracy: 0.9392 - loss: 0.1795 - val_accuracy: 0.8691 - val_loss: 0.5406
Epoch 253/400
150/150             20s 123ms/step -
accuracy: 0.9382 - loss: 0.2013 - val_accuracy: 0.8732 - val_loss: 0.5298
Epoch 254/400
150/150             18s 121ms/step -
accuracy: 0.9466 - loss: 0.1612 - val_accuracy: 0.7907 - val_loss: 0.7905
Epoch 255/400
150/150             18s 120ms/step -
accuracy: 0.9280 - loss: 0.2082 - val_accuracy: 0.8916 - val_loss: 0.5002
Epoch 256/400
150/150             20s 117ms/step -
accuracy: 0.9454 - loss: 0.1663 - val_accuracy: 0.8432 - val_loss: 0.6276
Epoch 257/400
150/150             19s 126ms/step -
accuracy: 0.9340 - loss: 0.1966 - val_accuracy: 0.8699 - val_loss: 0.4961
Epoch 258/400
150/150             18s 120ms/step -
accuracy: 0.9387 - loss: 0.1827 - val_accuracy: 0.8557 - val_loss: 0.5492
Epoch 259/400
150/150             21s 138ms/step -
accuracy: 0.9411 - loss: 0.1682 - val_accuracy: 0.8657 - val_loss: 0.5465
Epoch 260/400
150/150             22s 150ms/step -
accuracy: 0.9406 - loss: 0.1866 - val_accuracy: 0.8732 - val_loss: 0.5221
Epoch 261/400
150/150             21s 143ms/step -
accuracy: 0.9264 - loss: 0.2092 - val_accuracy: 0.8616 - val_loss: 0.4996
Epoch 262/400
150/150             23s 150ms/step -
accuracy: 0.9413 - loss: 0.1562 - val_accuracy: 0.8674 - val_loss: 0.5493
Epoch 263/400
150/150             24s 161ms/step -
accuracy: 0.9483 - loss: 0.1584 - val_accuracy: 0.8657 - val_loss: 0.5578
Epoch 264/400
150/150             18s 123ms/step -
accuracy: 0.9514 - loss: 0.1498 - val_accuracy: 0.8549 - val_loss: 0.6033
Epoch 265/400
150/150             19s 128ms/step -
accuracy: 0.9379 - loss: 0.1825 - val_accuracy: 0.8557 - val_loss: 0.5519
```

```
Epoch 266/400
150/150             18s 118ms/step -
accuracy: 0.9470 - loss: 0.1515 - val_accuracy: 0.8449 - val_loss: 0.5739
Epoch 267/400
150/150             19s 124ms/step -
accuracy: 0.9432 - loss: 0.1715 - val_accuracy: 0.8349 - val_loss: 0.6396
Epoch 268/400
150/150             19s 124ms/step -
accuracy: 0.9401 - loss: 0.1698 - val_accuracy: 0.8649 - val_loss: 0.5311
Epoch 269/400
150/150             19s 126ms/step -
accuracy: 0.9438 - loss: 0.1648 - val_accuracy: 0.8682 - val_loss: 0.5008
Epoch 270/400
150/150             18s 122ms/step -
accuracy: 0.9499 - loss: 0.1524 - val_accuracy: 0.8440 - val_loss: 0.5598
Epoch 271/400
150/150             18s 120ms/step -
accuracy: 0.9354 - loss: 0.1839 - val_accuracy: 0.8632 - val_loss: 0.5427
Epoch 272/400
150/150             19s 125ms/step -
accuracy: 0.9526 - loss: 0.1498 - val_accuracy: 0.8707 - val_loss: 0.5172
Epoch 273/400
150/150             18s 120ms/step -
accuracy: 0.9390 - loss: 0.1827 - val_accuracy: 0.8532 - val_loss: 0.6192
Epoch 274/400
150/150             19s 129ms/step -
accuracy: 0.9411 - loss: 0.1867 - val_accuracy: 0.8624 - val_loss: 0.5011
Epoch 275/400
150/150             18s 123ms/step -
accuracy: 0.9409 - loss: 0.1738 - val_accuracy: 0.8691 - val_loss: 0.5128
Epoch 276/400
150/150             19s 125ms/step -
accuracy: 0.9514 - loss: 0.1458 - val_accuracy: 0.8782 - val_loss: 0.4449
Epoch 277/400
150/150             18s 122ms/step -
accuracy: 0.9495 - loss: 0.1485 - val_accuracy: 0.8657 - val_loss: 0.4833
Epoch 278/400
150/150             21s 123ms/step -
accuracy: 0.9290 - loss: 0.2232 - val_accuracy: 0.8766 - val_loss: 0.4491
Epoch 279/400
150/150             20s 133ms/step -
accuracy: 0.9400 - loss: 0.1763 - val_accuracy: 0.8590 - val_loss: 0.5591
Epoch 280/400
150/150             19s 127ms/step -
accuracy: 0.9482 - loss: 0.1534 - val_accuracy: 0.8557 - val_loss: 0.5535
Epoch 281/400
150/150             22s 146ms/step -
accuracy: 0.9482 - loss: 0.1644 - val_accuracy: 0.8757 - val_loss: 0.4897
```

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Epoch 282/400
150/150             21s 139ms/step -
accuracy: 0.9477 - loss: 0.1626 - val_accuracy: 0.8741 - val_loss: 0.4721
Epoch 283/400
150/150             20s 130ms/step -
accuracy: 0.9565 - loss: 0.1252 - val_accuracy: 0.8515 - val_loss: 0.5949
Epoch 284/400
150/150             20s 135ms/step -
accuracy: 0.9293 - loss: 0.2185 - val_accuracy: 0.8791 - val_loss: 0.5448
Epoch 285/400
150/150             19s 128ms/step -
accuracy: 0.9478 - loss: 0.1667 - val_accuracy: 0.8674 - val_loss: 0.5114
Epoch 286/400
150/150             19s 129ms/step -
accuracy: 0.9445 - loss: 0.1733 - val_accuracy: 0.8716 - val_loss: 0.4696
Epoch 287/400
150/150             20s 134ms/step -
accuracy: 0.9545 - loss: 0.1389 - val_accuracy: 0.8699 - val_loss: 0.5278
Epoch 288/400
150/150             19s 127ms/step -
accuracy: 0.9376 - loss: 0.1708 - val_accuracy: 0.8749 - val_loss: 0.4956
Epoch 289/400
150/150             19s 130ms/step -
accuracy: 0.9420 - loss: 0.1832 - val_accuracy: 0.8507 - val_loss: 0.5850
Epoch 290/400
150/150             19s 129ms/step -
accuracy: 0.9369 - loss: 0.1869 - val_accuracy: 0.8374 - val_loss: 0.6449
Epoch 291/400
150/150             19s 130ms/step -
accuracy: 0.9219 - loss: 0.2438 - val_accuracy: 0.8857 - val_loss: 0.4451
Epoch 292/400
150/150             19s 125ms/step -
accuracy: 0.9469 - loss: 0.1429 - val_accuracy: 0.8699 - val_loss: 0.4751
Epoch 293/400
150/150             20s 132ms/step -
accuracy: 0.9487 - loss: 0.1435 - val_accuracy: 0.8457 - val_loss: 0.5533
Epoch 294/400
150/150             19s 129ms/step -
accuracy: 0.9408 - loss: 0.1704 - val_accuracy: 0.8390 - val_loss: 0.6170
Epoch 295/400
150/150             19s 125ms/step -
accuracy: 0.9214 - loss: 0.2437 - val_accuracy: 0.8724 - val_loss: 0.5438
Epoch 296/400
150/150             19s 128ms/step -
accuracy: 0.9506 - loss: 0.1458 - val_accuracy: 0.8540 - val_loss: 0.5267
Epoch 297/400
150/150             18s 122ms/step -
accuracy: 0.9503 - loss: 0.1375 - val_accuracy: 0.8741 - val_loss: 0.4941
```

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Epoch 298/400
150/150             19s 127ms/step -
accuracy: 0.9454 - loss: 0.1615 - val_accuracy: 0.8674 - val_loss: 0.5791
Epoch 299/400
150/150             19s 125ms/step -
accuracy: 0.9352 - loss: 0.2015 - val_accuracy: 0.8674 - val_loss: 0.4672
Epoch 300/400
150/150             20s 132ms/step -
accuracy: 0.9469 - loss: 0.1504 - val_accuracy: 0.8507 - val_loss: 0.6116
Epoch 301/400
150/150             19s 128ms/step -
accuracy: 0.9545 - loss: 0.1512 - val_accuracy: 0.8666 - val_loss: 0.5532
Epoch 302/400
150/150             19s 126ms/step -
accuracy: 0.9496 - loss: 0.1526 - val_accuracy: 0.8674 - val_loss: 0.5458
Epoch 303/400
150/150             19s 126ms/step -
accuracy: 0.9415 - loss: 0.1664 - val_accuracy: 0.8707 - val_loss: 0.5074
Epoch 304/400
150/150             19s 124ms/step -
accuracy: 0.9419 - loss: 0.1702 - val_accuracy: 0.8682 - val_loss: 0.5133
Epoch 305/400
150/150             19s 126ms/step -
accuracy: 0.9452 - loss: 0.1648 - val_accuracy: 0.8682 - val_loss: 0.5185
Epoch 306/400
150/150             20s 133ms/step -
accuracy: 0.9567 - loss: 0.1388 - val_accuracy: 0.8716 - val_loss: 0.4876
Epoch 307/400
150/150             19s 124ms/step -
accuracy: 0.9477 - loss: 0.1652 - val_accuracy: 0.8616 - val_loss: 0.5451
Epoch 308/400
150/150             19s 127ms/step -
accuracy: 0.9598 - loss: 0.1195 - val_accuracy: 0.8757 - val_loss: 0.5515
Epoch 309/400
150/150             19s 124ms/step -
accuracy: 0.9409 - loss: 0.1882 - val_accuracy: 0.8524 - val_loss: 0.5555
Epoch 310/400
150/150             19s 126ms/step -
accuracy: 0.9469 - loss: 0.1680 - val_accuracy: 0.8524 - val_loss: 0.6685
Epoch 311/400
150/150             19s 124ms/step -
accuracy: 0.9244 - loss: 0.2191 - val_accuracy: 0.8641 - val_loss: 0.5487
Epoch 312/400
150/150             19s 127ms/step -
accuracy: 0.9421 - loss: 0.1630 - val_accuracy: 0.8766 - val_loss: 0.5581
Epoch 313/400
150/150             19s 126ms/step -
accuracy: 0.9485 - loss: 0.1667 - val_accuracy: 0.8666 - val_loss: 0.5156
```

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Epoch 314/400
150/150             20s 133ms/step -
accuracy: 0.9568 - loss: 0.1245 - val_accuracy: 0.8565 - val_loss: 0.6404
Epoch 315/400
150/150             27s 179ms/step -
accuracy: 0.9415 - loss: 0.1955 - val_accuracy: 0.8557 - val_loss: 0.5520
Epoch 316/400
150/150             27s 180ms/step -
accuracy: 0.9517 - loss: 0.1486 - val_accuracy: 0.8716 - val_loss: 0.5710
Epoch 317/400
150/150             23s 150ms/step -
accuracy: 0.9422 - loss: 0.1697 - val_accuracy: 0.8691 - val_loss: 0.5298
Epoch 318/400
150/150             20s 136ms/step -
accuracy: 0.9631 - loss: 0.1085 - val_accuracy: 0.8749 - val_loss: 0.5391
Epoch 319/400
150/150             21s 139ms/step -
accuracy: 0.9577 - loss: 0.1173 - val_accuracy: 0.8707 - val_loss: 0.5415
Epoch 320/400
150/150             20s 130ms/step -
accuracy: 0.9306 - loss: 0.2084 - val_accuracy: 0.8549 - val_loss: 0.5767
Epoch 321/400
150/150             19s 128ms/step -
accuracy: 0.9469 - loss: 0.1677 - val_accuracy: 0.8841 - val_loss: 0.4823
Epoch 322/400
150/150             19s 129ms/step -
accuracy: 0.9646 - loss: 0.1097 - val_accuracy: 0.8707 - val_loss: 0.5561
Epoch 323/400
150/150             20s 132ms/step -
accuracy: 0.9580 - loss: 0.1236 - val_accuracy: 0.8616 - val_loss: 0.5696
Epoch 324/400
150/150             20s 136ms/step -
accuracy: 0.9419 - loss: 0.1792 - val_accuracy: 0.8849 - val_loss: 0.4923
Epoch 325/400
150/150             20s 131ms/step -
accuracy: 0.9489 - loss: 0.1557 - val_accuracy: 0.8682 - val_loss: 0.5095
Epoch 326/400
150/150             20s 130ms/step -
accuracy: 0.9236 - loss: 0.2475 - val_accuracy: 0.8857 - val_loss: 0.4790
Epoch 327/400
150/150             19s 130ms/step -
accuracy: 0.9393 - loss: 0.1786 - val_accuracy: 0.8757 - val_loss: 0.5153
Epoch 328/400
150/150             19s 126ms/step -
accuracy: 0.9582 - loss: 0.1284 - val_accuracy: 0.8616 - val_loss: 0.5717
Epoch 329/400
150/150             20s 131ms/step -
accuracy: 0.9562 - loss: 0.1304 - val_accuracy: 0.8707 - val_loss: 0.5337
```

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Epoch 330/400
150/150             20s 135ms/step -
accuracy: 0.9455 - loss: 0.1593 - val_accuracy: 0.8574 - val_loss: 0.5683
Epoch 331/400
150/150             19s 127ms/step -
accuracy: 0.9435 - loss: 0.1658 - val_accuracy: 0.8624 - val_loss: 0.5693
Epoch 332/400
150/150             21s 128ms/step -
accuracy: 0.9426 - loss: 0.1943 - val_accuracy: 0.8791 - val_loss: 0.4775
Epoch 333/400
150/150             20s 135ms/step -
accuracy: 0.9688 - loss: 0.1007 - val_accuracy: 0.8657 - val_loss: 0.5362
Epoch 334/400
150/150             19s 128ms/step -
accuracy: 0.9375 - loss: 0.2041 - val_accuracy: 0.8649 - val_loss: 0.4704
Epoch 335/400
150/150             20s 131ms/step -
accuracy: 0.9549 - loss: 0.1300 - val_accuracy: 0.8841 - val_loss: 0.4644
Epoch 336/400
150/150             20s 132ms/step -
accuracy: 0.9615 - loss: 0.1141 - val_accuracy: 0.8732 - val_loss: 0.5049
Epoch 337/400
150/150             20s 133ms/step -
accuracy: 0.9565 - loss: 0.1312 - val_accuracy: 0.8474 - val_loss: 0.6071
Epoch 338/400
150/150             20s 130ms/step -
accuracy: 0.9509 - loss: 0.1439 - val_accuracy: 0.8632 - val_loss: 0.5908
Epoch 339/400
150/150             20s 132ms/step -
accuracy: 0.9563 - loss: 0.1275 - val_accuracy: 0.8749 - val_loss: 0.5418
Epoch 340/400
150/150             19s 124ms/step -
accuracy: 0.9465 - loss: 0.1451 - val_accuracy: 0.8716 - val_loss: 0.5156
Epoch 341/400
150/150             21s 125ms/step -
accuracy: 0.9444 - loss: 0.1607 - val_accuracy: 0.8807 - val_loss: 0.5129
Epoch 342/400
150/150             19s 125ms/step -
accuracy: 0.9606 - loss: 0.1256 - val_accuracy: 0.8590 - val_loss: 0.6304
Epoch 343/400
150/150             19s 124ms/step -
accuracy: 0.9444 - loss: 0.1571 - val_accuracy: 0.8507 - val_loss: 0.6129
Epoch 344/400
150/150             19s 128ms/step -
accuracy: 0.9326 - loss: 0.2036 - val_accuracy: 0.8699 - val_loss: 0.4812
Epoch 345/400
150/150             19s 127ms/step -
accuracy: 0.9426 - loss: 0.1717 - val_accuracy: 0.8832 - val_loss: 0.4951
```

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Epoch 346/400
150/150             20s 122ms/step -
accuracy: 0.9564 - loss: 0.1386 - val_accuracy: 0.8616 - val_loss: 0.5136
Epoch 347/400
150/150             19s 129ms/step -
accuracy: 0.9367 - loss: 0.1771 - val_accuracy: 0.8666 - val_loss: 0.4953
Epoch 348/400
150/150             19s 126ms/step -
accuracy: 0.9231 - loss: 0.2607 - val_accuracy: 0.8807 - val_loss: 0.4190
Epoch 349/400
150/150             19s 130ms/step -
accuracy: 0.9599 - loss: 0.1276 - val_accuracy: 0.8123 - val_loss: 0.7450
Epoch 350/400
150/150             20s 136ms/step -
accuracy: 0.9329 - loss: 0.2152 - val_accuracy: 0.8724 - val_loss: 0.5395
Epoch 351/400
150/150             20s 129ms/step -
accuracy: 0.9666 - loss: 0.1091 - val_accuracy: 0.8507 - val_loss: 0.6505
Epoch 352/400
150/150             20s 127ms/step -
accuracy: 0.9463 - loss: 0.1593 - val_accuracy: 0.8657 - val_loss: 0.5322
Epoch 353/400
150/150             18s 122ms/step -
accuracy: 0.9456 - loss: 0.1629 - val_accuracy: 0.8857 - val_loss: 0.4695
Epoch 354/400
150/150             19s 123ms/step -
accuracy: 0.9525 - loss: 0.1556 - val_accuracy: 0.8682 - val_loss: 0.5243
Epoch 355/400
150/150             19s 124ms/step -
accuracy: 0.9497 - loss: 0.1397 - val_accuracy: 0.8365 - val_loss: 0.5923
Epoch 356/400
150/150             18s 123ms/step -
accuracy: 0.9326 - loss: 0.2030 - val_accuracy: 0.8657 - val_loss: 0.4763
Epoch 357/400
150/150             19s 125ms/step -
accuracy: 0.9623 - loss: 0.1217 - val_accuracy: 0.8849 - val_loss: 0.4940
Epoch 358/400
150/150             20s 122ms/step -
accuracy: 0.9581 - loss: 0.1223 - val_accuracy: 0.8841 - val_loss: 0.4942
Epoch 359/400
150/150             20s 134ms/step -
accuracy: 0.9612 - loss: 0.1228 - val_accuracy: 0.8707 - val_loss: 0.5094
Epoch 360/400
150/150             21s 139ms/step -
accuracy: 0.9481 - loss: 0.1598 - val_accuracy: 0.8724 - val_loss: 0.4680
Epoch 361/400
150/150             20s 132ms/step -
accuracy: 0.9543 - loss: 0.1406 - val_accuracy: 0.8791 - val_loss: 0.4842
```

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Epoch 362/400
150/150             20s 135ms/step -
accuracy: 0.9589 - loss: 0.1234 - val_accuracy: 0.8574 - val_loss: 0.5704
Epoch 363/400
150/150             20s 129ms/step -
accuracy: 0.9077 - loss: 0.2980 - val_accuracy: 0.8966 - val_loss: 0.4078
Epoch 364/400
150/150             19s 130ms/step -
accuracy: 0.9646 - loss: 0.1129 - val_accuracy: 0.8832 - val_loss: 0.5297
Epoch 365/400
150/150             20s 126ms/step -
accuracy: 0.9103 - loss: 0.2938 - val_accuracy: 0.8782 - val_loss: 0.4377
Epoch 366/400
150/150             22s 150ms/step -
accuracy: 0.9540 - loss: 0.1439 - val_accuracy: 0.8966 - val_loss: 0.4079
Epoch 367/400
150/150             21s 140ms/step -
accuracy: 0.9519 - loss: 0.1346 - val_accuracy: 0.8882 - val_loss: 0.4925
Epoch 368/400
150/150             21s 141ms/step -
accuracy: 0.9639 - loss: 0.1145 - val_accuracy: 0.8465 - val_loss: 0.6693
Epoch 369/400
150/150             21s 139ms/step -
accuracy: 0.9474 - loss: 0.1734 - val_accuracy: 0.8849 - val_loss: 0.4802
Epoch 370/400
150/150             21s 138ms/step -
accuracy: 0.9584 - loss: 0.1335 - val_accuracy: 0.8774 - val_loss: 0.4314
Epoch 371/400
150/150             19s 125ms/step -
accuracy: 0.9611 - loss: 0.1242 - val_accuracy: 0.8907 - val_loss: 0.4281
Epoch 372/400
150/150             20s 132ms/step -
accuracy: 0.9541 - loss: 0.1342 - val_accuracy: 0.8582 - val_loss: 0.4843
Epoch 373/400
150/150             19s 128ms/step -
accuracy: 0.9571 - loss: 0.1453 - val_accuracy: 0.8791 - val_loss: 0.4826
Epoch 374/400
150/150             20s 132ms/step -
accuracy: 0.9384 - loss: 0.1774 - val_accuracy: 0.8882 - val_loss: 0.4405
Epoch 375/400
150/150             20s 133ms/step -
accuracy: 0.9613 - loss: 0.1077 - val_accuracy: 0.8741 - val_loss: 0.5194
Epoch 376/400
150/150             20s 127ms/step -
accuracy: 0.9578 - loss: 0.1338 - val_accuracy: 0.8691 - val_loss: 0.4818
Epoch 377/400
150/150             19s 125ms/step -
accuracy: 0.9555 - loss: 0.1289 - val_accuracy: 0.8716 - val_loss: 0.5070
```

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Epoch 378/400
150/150             19s 127ms/step -
accuracy: 0.9476 - loss: 0.1555 - val_accuracy: 0.8782 - val_loss: 0.4847
Epoch 379/400
150/150             19s 127ms/step -
accuracy: 0.9578 - loss: 0.1253 - val_accuracy: 0.8440 - val_loss: 0.5661
Epoch 380/400
150/150             20s 135ms/step -
accuracy: 0.9499 - loss: 0.1449 - val_accuracy: 0.8807 - val_loss: 0.4338
Epoch 381/400
150/150             20s 136ms/step -
accuracy: 0.9536 - loss: 0.1632 - val_accuracy: 0.8741 - val_loss: 0.5165
Epoch 382/400
150/150             20s 134ms/step -
accuracy: 0.9584 - loss: 0.1305 - val_accuracy: 0.8716 - val_loss: 0.4870
Epoch 383/400
150/150             20s 130ms/step -
accuracy: 0.9544 - loss: 0.1387 - val_accuracy: 0.8716 - val_loss: 0.5119
Epoch 384/400
150/150             19s 128ms/step -
accuracy: 0.9365 - loss: 0.1864 - val_accuracy: 0.8757 - val_loss: 0.5150
Epoch 385/400
150/150             20s 130ms/step -
accuracy: 0.9661 - loss: 0.1107 - val_accuracy: 0.8799 - val_loss: 0.4832
Epoch 386/400
150/150             19s 126ms/step -
accuracy: 0.9499 - loss: 0.1482 - val_accuracy: 0.8716 - val_loss: 0.4837
Epoch 387/400
150/150             19s 128ms/step -
accuracy: 0.9460 - loss: 0.1420 - val_accuracy: 0.8624 - val_loss: 0.5386
Epoch 388/400
150/150             19s 130ms/step -
accuracy: 0.9499 - loss: 0.1475 - val_accuracy: 0.8791 - val_loss: 0.4624
Epoch 389/400
150/150             20s 131ms/step -
accuracy: 0.9517 - loss: 0.1475 - val_accuracy: 0.8565 - val_loss: 0.5374
Epoch 390/400
150/150             20s 133ms/step -
accuracy: 0.9295 - loss: 0.2139 - val_accuracy: 0.8691 - val_loss: 0.4931
Epoch 391/400
150/150             20s 133ms/step -
accuracy: 0.9609 - loss: 0.1141 - val_accuracy: 0.8741 - val_loss: 0.5273
Epoch 392/400
150/150             19s 126ms/step -
accuracy: 0.9563 - loss: 0.1269 - val_accuracy: 0.8699 - val_loss: 0.5455
Epoch 393/400
150/150             20s 126ms/step -
accuracy: 0.9580 - loss: 0.1331 - val_accuracy: 0.8574 - val_loss: 0.5400
```

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Epoch 394/400
150/150             19s 126ms/step -
accuracy: 0.9457 - loss: 0.1628 - val_accuracy: 0.8590 - val_loss: 0.5567
Epoch 395/400
150/150             19s 124ms/step -
accuracy: 0.9619 - loss: 0.1160 - val_accuracy: 0.8590 - val_loss: 0.5865
Epoch 396/400
150/150             19s 128ms/step -
accuracy: 0.9299 - loss: 0.2082 - val_accuracy: 0.8482 - val_loss: 0.5718
Epoch 397/400
150/150             20s 132ms/step -
accuracy: 0.9460 - loss: 0.1574 - val_accuracy: 0.8674 - val_loss: 0.5152
Epoch 398/400
150/150             19s 125ms/step -
accuracy: 0.9510 - loss: 0.1463 - val_accuracy: 0.8857 - val_loss: 0.4629
Epoch 399/400
150/150             19s 129ms/step -
accuracy: 0.9651 - loss: 0.1095 - val_accuracy: 0.8674 - val_loss: 0.5484
Epoch 400/400
150/150             18s 123ms/step -
accuracy: 0.9483 - loss: 0.1501 - val_accuracy: 0.8582 - val_loss: 0.5925
```