rps_process_003M05_1000e_80b_224i_ADAM

August 26, 2021

[1]:
```
from tensorflow.python.client import device_lib
print(device_lib.list_local_devices())

import tensorflow as tf
import keras_preprocessing
from keras_preprocessing import image
from keras_preprocessing.image import ImageDataGenerator
import os, sys, glob

#https://stackoverflow.com/questions/45662253/can-i-run-keras-model-on-gpu


###
### INIT VARIABLES
###

# Base folder
DATA_FOLDER = 'E:\\TFM_MUESTRAS\\'

# Name of the test folder
TEST_FOLDER = "Test_003\\"

# Folder with city folders images
TRAINING_DIR = DATA_FOLDER + TEST_FOLDER + "images\\"

# New folder to be created with joined images
PROCESS_NAME = 'process_003'
EJECUTION_NAME = 'M05_1000e_80b_224i_ADAM'

NEW_TRAINING_FOLDER = DATA_FOLDER + TEST_FOLDER + 'training_' + PROCESS_NAME
NEW_VALIDATION_FOLDER = DATA_FOLDER + TEST_FOLDER + 'validation_' + PROCESS_NAME



### PROCESS

batch_size = 50
```

```
image_size = 224 #150

training_datagen = ImageDataGenerator(
      rescale = 1./255,
            rotation_range=40,
      width_shift_range=0.2,
      height_shift_range=0.2,
      shear_range=0.2,
      zoom_range=0.2,
      horizontal_flip=True,
      fill_mode='nearest')


validation_datagen = ImageDataGenerator(rescale = 1./255)

train_generator = training_datagen.flow_from_directory(
        NEW_TRAINING_FOLDER,
        target_size=(image_size,image_size),
        class_mode='categorical',
  batch_size=batch_size,
  shuffle=True
)

validation_generator = validation_datagen.flow_from_directory(
        NEW_VALIDATION_FOLDER,
        target_size=(image_size,image_size),
        class_mode='categorical',
  batch_size=batch_size,
  shuffle=True
)


model = tf.keras.models.Sequential([
      tf.keras.layers.Conv2D(200, (3,3), activation='relu',␣
 ↪input_shape=(image_size, image_size, 3)),
      tf.keras.layers.MaxPooling2D(2, 2),

      tf.keras.layers.Conv2D(128, (3,3), activation='relu'),#,␣
 ↪input_shape=(image_size, image_size, 3)),
      tf.keras.layers.MaxPooling2D(2, 2),

      tf.keras.layers.Conv2D(64, (3,3), activation='relu'), #␣
 ↪input_shape=(image_size, image_size, 3)),
      tf.keras.layers.MaxPooling2D(2, 2),

      tf.keras.layers.Conv2D(32, (3,3), activation='relu'),
      tf.keras.layers.MaxPooling2D(2,2),
```

```
      tf.keras.layers.Flatten(),
      tf.keras.layers.Dropout(0.5),

      tf.keras.layers.Dense(200, activation='relu'),
      tf.keras.layers.Dense(128, activation='relu'),
      tf.keras.layers.Dense(64, activation='relu'),
      tf.keras.layers.Dense(4, activation='softmax')
  ])


model.summary()


from tensorflow.keras.utils import to_categorical

print (NEW_TRAINING_FOLDER)
print (NEW_VALIDATION_FOLDER)
training_files = glob.glob(NEW_TRAINING_FOLDER+"\\*\\*.tif")
validation_files = glob.glob(NEW_VALIDATION_FOLDER+"\\*\\*.tif")


total_count_training =len(training_files)
total_count_validation =len(validation_files)

print (total_count_training ,total_count_validation )


steps_per_epoch = total_count_training//batch_size
validation_steps = total_count_validation//batch_size
print("Validation steps:", validation_steps)
print("Steps per epoch: ", steps_per_epoch)


model.compile(
    loss = 'categorical_crossentropy',
    optimizer='ADAM',#tf.keras.optimizers.SGD(),
    metrics=['accuracy']
    )

#model = tf.keras.models.load_model('E:
 ↪\\TFM_URBANPROJECT\\desarrollo\\rps_process_003_200e_plus1layer_plussteps.
 ↪h5')



history = model.fit(
```

```
    train_generator,
    epochs=1000,
    steps_per_epoch=50,
    validation_data=validation_generator,
    verbose=1,
    validation_steps=30
    )

model.save("rps_"+PROCESS_NAME+EJECUTION_NAME+".h5")
```

```
[name: "/device:CPU:0"
device_type: "CPU"
memory_limit: 268435456
locality {
}
incarnation: 8582662686802109472
, name: "/device:GPU:0"
device_type: "GPU"
memory_limit: 6961823744
locality {
  bus_id: 1
  links {
  }
}
incarnation: 17995312004302034971
physical_device_desc: "device: 0, name: NVIDIA GeForce GTX 1070, pci bus id:
0000:01:00.0, compute capability: 6.1"
]
Found 9917 images belonging to 4 classes.
Found 2486 images belonging to 4 classes.
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d (Conv2D)              (None, 222, 222, 200)     5600
_________________________________________________________________
max_pooling2d (MaxPooling2D) (None, 111, 111, 200)     0
_________________________________________________________________
conv2d_1 (Conv2D)            (None, 109, 109, 128)     230528
_________________________________________________________________
max_pooling2d_1 (MaxPooling2 (None, 54, 54, 128)       0
_________________________________________________________________
conv2d_2 (Conv2D)            (None, 52, 52, 64)        73792
_________________________________________________________________
max_pooling2d_2 (MaxPooling2 (None, 26, 26, 64)        0
_________________________________________________________________
conv2d_3 (Conv2D)            (None, 24, 24, 32)        18464
_________________________________________________________________
```

```
max_pooling2d_3 (MaxPooling2 (None, 12, 12, 32)        0
_________________________________________________________________
flatten (Flatten)            (None, 4608)              0
_________________________________________________________________
dropout (Dropout)            (None, 4608)              0
_________________________________________________________________
dense (Dense)                (None, 200)               921800
_________________________________________________________________
dense_1 (Dense)              (None, 128)               25728
_________________________________________________________________
dense_2 (Dense)              (None, 64)                8256
_________________________________________________________________
dense_3 (Dense)              (None, 4)                 260
=================================================================
Total params: 1,284,428
Trainable params: 1,284,428
Non-trainable params: 0
_________________________________________________________________
E:\TFM_MUESTRAS\Test_003\training_process_003
E:\TFM_MUESTRAS\Test_003\validation_process_003
9917 2486
Validation steps: 49
Steps per epoch:  198
Epoch 1/1000
50/50 [==============================] - ETA: 0s - loss: 1.3584 - accuracy:
0.2996

C:\Users\oskmo\.conda\envs\masterall\lib\site-packages\PIL\Image.py:2855:
DecompressionBombWarning: Image size (171081905 pixels) exceeds limit of
89478485 pixels, could be decompression bomb DOS attack.
  warnings.warn(

50/50 [==============================] - 319s 6s/step - loss: 1.3584 - accuracy:
0.2996 - val_loss: 1.3006 - val_accuracy: 0.4587
Epoch 2/1000
50/50 [==============================] - 134s 3s/step - loss: 1.2335 - accuracy:
0.4380 - val_loss: 1.0952 - val_accuracy: 0.4980
Epoch 3/1000
50/50 [==============================] - 93s 2s/step - loss: 1.0461 - accuracy:
0.5338 - val_loss: 1.0455 - val_accuracy: 0.5227
Epoch 4/1000
50/50 [==============================] - 79s 2s/step - loss: 1.0606 - accuracy:
0.5224 - val_loss: 0.9757 - val_accuracy: 0.5427
Epoch 5/1000
50/50 [==============================] - 71s 1s/step - loss: 0.9931 - accuracy:
0.5476 - val_loss: 0.9430 - val_accuracy: 0.5667
Epoch 6/1000
50/50 [==============================] - 65s 1s/step - loss: 0.9267 - accuracy:
0.5636 - val_loss: 0.9725 - val_accuracy: 0.5527
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Epoch 7/1000
50/50 [==============================] - 64s 1s/step - loss: 0.9056 - accuracy:
0.5996 - val_loss: 0.8246 - val_accuracy: 0.6427
Epoch 8/1000
50/50 [==============================] - 76s 2s/step - loss: 0.8688 - accuracy:
0.6100 - val_loss: 0.8222 - val_accuracy: 0.6460
Epoch 9/1000
50/50 [==============================] - 52s 1s/step - loss: 0.8851 - accuracy:
0.6044 - val_loss: 0.8022 - val_accuracy: 0.6453
Epoch 10/1000
50/50 [==============================] - 51s 1s/step - loss: 0.8652 - accuracy:
0.6024 - val_loss: 0.8253 - val_accuracy: 0.6107
Epoch 11/1000
50/50 [==============================] - 50s 1s/step - loss: 0.8623 - accuracy:
0.6112 - val_loss: 0.8260 - val_accuracy: 0.6487
Epoch 12/1000
50/50 [==============================] - 49s 980ms/step - loss: 0.8268 -
accuracy: 0.6429 - val_loss: 0.8085 - val_accuracy: 0.6340
Epoch 13/1000
50/50 [==============================] - 101s 2s/step - loss: 0.8121 - accuracy:
0.6364 - val_loss: 0.7820 - val_accuracy: 0.6600
Epoch 14/1000
50/50 [==============================] - 152s 3s/step - loss: 0.8732 - accuracy:
0.6036 - val_loss: 0.8391 - val_accuracy: 0.6320
Epoch 15/1000
50/50 [==============================] - 127s 3s/step - loss: 0.8486 - accuracy:
0.6173 - val_loss: 0.7618 - val_accuracy: 0.6740
Epoch 16/1000
50/50 [==============================] - 125s 3s/step - loss: 0.8041 - accuracy:
0.6464 - val_loss: 0.7374 - val_accuracy: 0.6707
Epoch 17/1000
50/50 [==============================] - 98s 2s/step - loss: 0.7819 - accuracy:
0.6584 - val_loss: 0.8437 - val_accuracy: 0.6153
Epoch 18/1000
50/50 [==============================] - 65s 1s/step - loss: 0.7854 - accuracy:
0.6640 - val_loss: 0.7971 - val_accuracy: 0.6860
Epoch 19/1000
50/50 [==============================] - 57s 1s/step - loss: 0.7968 - accuracy:
0.6544 - val_loss: 0.6958 - val_accuracy: 0.7053
Epoch 20/1000
50/50 [==============================] - 55s 1s/step - loss: 0.7835 - accuracy:
0.6696 - val_loss: 0.7429 - val_accuracy: 0.6887
Epoch 21/1000
50/50 [==============================] - 57s 1s/step - loss: 0.7811 - accuracy:
0.6648 - val_loss: 0.7299 - val_accuracy: 0.6973
Epoch 22/1000
50/50 [==============================] - 59s 1s/step - loss: 0.7637 - accuracy:
0.6780 - val_loss: 0.7671 - val_accuracy: 0.6727
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Epoch 23/1000
50/50 [==============================] - 57s 1s/step - loss: 0.7429 - accuracy:
0.6912 - val_loss: 0.6917 - val_accuracy: 0.7060
Epoch 24/1000
50/50 [==============================] - 53s 1s/step - loss: 0.7191 - accuracy:
0.6924 - val_loss: 0.6695 - val_accuracy: 0.7253
Epoch 25/1000
50/50 [==============================] - 52s 1s/step - loss: 0.7939 - accuracy:
0.6684 - val_loss: 0.7276 - val_accuracy: 0.6840
Epoch 26/1000
50/50 [==============================] - 63s 1s/step - loss: 0.7324 - accuracy:
0.6996 - val_loss: 0.7966 - val_accuracy: 0.6660
Epoch 27/1000
50/50 [==============================] - 64s 1s/step - loss: 0.7654 - accuracy:
0.6608 - val_loss: 0.7515 - val_accuracy: 0.6347
Epoch 28/1000
50/50 [==============================] - 55s 1s/step - loss: 0.7099 - accuracy:
0.7016 - val_loss: 0.6774 - val_accuracy: 0.6940
Epoch 29/1000
50/50 [==============================] - 51s 1s/step - loss: 0.6965 - accuracy:
0.7171 - val_loss: 0.6824 - val_accuracy: 0.7167
Epoch 30/1000
50/50 [==============================] - 55s 1s/step - loss: 0.7161 - accuracy:
0.7072 - val_loss: 0.6828 - val_accuracy: 0.7153
Epoch 31/1000
50/50 [==============================] - 53s 1s/step - loss: 0.7508 - accuracy:
0.6932 - val_loss: 0.6441 - val_accuracy: 0.7427
Epoch 32/1000
50/50 [==============================] - 51s 1s/step - loss: 0.7215 - accuracy:
0.7116 - val_loss: 0.7300 - val_accuracy: 0.7080
Epoch 33/1000
50/50 [==============================] - 56s 1s/step - loss: 0.6974 - accuracy:
0.7130 - val_loss: 0.6506 - val_accuracy: 0.7407
Epoch 34/1000
50/50 [==============================] - 67s 1s/step - loss: 0.7120 - accuracy:
0.7048 - val_loss: 0.6850 - val_accuracy: 0.7087
Epoch 35/1000
50/50 [==============================] - 68s 1s/step - loss: 0.6874 - accuracy:
0.7064 - val_loss: 0.6506 - val_accuracy: 0.7387
Epoch 36/1000
50/50 [==============================] - 58s 1s/step - loss: 0.6830 - accuracy:
0.7044 - val_loss: 0.7079 - val_accuracy: 0.6900
Epoch 37/1000
50/50 [==============================] - 59s 1s/step - loss: 0.6925 - accuracy:
0.7184 - val_loss: 0.6512 - val_accuracy: 0.7293
Epoch 38/1000
50/50 [==============================] - 53s 1s/step - loss: 0.6743 - accuracy:
0.7268 - val_loss: 0.7301 - val_accuracy: 0.6993
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Epoch 39/1000
50/50 [==============================] - 46s 927ms/step - loss: 0.6629 -
accuracy: 0.7284 - val_loss: 0.6309 - val_accuracy: 0.7520
Epoch 40/1000
50/50 [==============================] - 46s 923ms/step - loss: 0.6791 -
accuracy: 0.7207 - val_loss: 0.7334 - val_accuracy: 0.6907
Epoch 41/1000
50/50 [==============================] - 54s 1s/step - loss: 0.6414 - accuracy:
0.7484 - val_loss: 0.6963 - val_accuracy: 0.7147
Epoch 42/1000
50/50 [==============================] - 59s 1s/step - loss: 0.6975 - accuracy:
0.7096 - val_loss: 0.6509 - val_accuracy: 0.7393
Epoch 43/1000
50/50 [==============================] - 52s 1s/step - loss: 0.6780 - accuracy:
0.7308 - val_loss: 0.6271 - val_accuracy: 0.7620
Epoch 44/1000
50/50 [==============================] - 51s 1s/step - loss: 0.7224 - accuracy:
0.7016 - val_loss: 0.7229 - val_accuracy: 0.7147
Epoch 45/1000
50/50 [==============================] - 53s 1s/step - loss: 0.6571 - accuracy:
0.7369 - val_loss: 0.6032 - val_accuracy: 0.7607
Epoch 46/1000
50/50 [==============================] - 53s 1s/step - loss: 0.6750 - accuracy:
0.7353 - val_loss: 0.6274 - val_accuracy: 0.7633
Epoch 47/1000
50/50 [==============================] - 60s 1s/step - loss: 0.6724 - accuracy:
0.7264 - val_loss: 0.6160 - val_accuracy: 0.7467
Epoch 48/1000
50/50 [==============================] - 58s 1s/step - loss: 0.6226 - accuracy:
0.7500 - val_loss: 0.6828 - val_accuracy: 0.7553
Epoch 49/1000
50/50 [==============================] - 53s 1s/step - loss: 0.6576 - accuracy:
0.7380 - val_loss: 0.6467 - val_accuracy: 0.7620
Epoch 50/1000
50/50 [==============================] - 52s 1s/step - loss: 0.6327 - accuracy:
0.7368 - val_loss: 0.7480 - val_accuracy: 0.7093
Epoch 51/1000
50/50 [==============================] - 53s 1s/step - loss: 0.6783 - accuracy:
0.7236 - val_loss: 0.6824 - val_accuracy: 0.7427
Epoch 52/1000
50/50 [==============================] - 55s 1s/step - loss: 0.6873 - accuracy:
0.7208 - val_loss: 0.6268 - val_accuracy: 0.7260
Epoch 53/1000
50/50 [==============================] - 50s 989ms/step - loss: 0.6573 -
accuracy: 0.7442 - val_loss: 0.5823 - val_accuracy: 0.7700
Epoch 54/1000
50/50 [==============================] - 50s 1s/step - loss: 0.6219 - accuracy:
0.7471 - val_loss: 0.7424 - val_accuracy: 0.7193
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Epoch 55/1000
50/50 [==============================] - 54s 1s/step - loss: 0.6310 - accuracy:
0.7372 - val_loss: 0.6292 - val_accuracy: 0.7500
Epoch 56/1000
50/50 [==============================] - 51s 1s/step - loss: 0.6268 - accuracy:
0.7504 - val_loss: 0.5887 - val_accuracy: 0.7620
Epoch 57/1000
50/50 [==============================] - 60s 1s/step - loss: 0.6044 - accuracy:
0.7660 - val_loss: 0.6342 - val_accuracy: 0.7573
Epoch 58/1000
50/50 [==============================] - 55s 1s/step - loss: 0.5995 - accuracy:
0.7690 - val_loss: 0.7402 - val_accuracy: 0.7100
Epoch 59/1000
50/50 [==============================] - 54s 1s/step - loss: 0.6213 - accuracy:
0.7418 - val_loss: 0.6878 - val_accuracy: 0.7260
Epoch 60/1000
50/50 [==============================] - 57s 1s/step - loss: 0.6036 - accuracy:
0.7572 - val_loss: 0.7273 - val_accuracy: 0.7427
Epoch 61/1000
50/50 [==============================] - 57s 1s/step - loss: 0.6077 - accuracy:
0.7584 - val_loss: 0.5957 - val_accuracy: 0.7547
Epoch 62/1000
50/50 [==============================] - 56s 1s/step - loss: 0.6158 - accuracy:
0.7536 - val_loss: 0.5985 - val_accuracy: 0.7780
Epoch 63/1000
50/50 [==============================] - 60s 1s/step - loss: 0.6383 - accuracy:
0.7422 - val_loss: 0.6792 - val_accuracy: 0.7380
Epoch 64/1000
50/50 [==============================] - 56s 1s/step - loss: 0.6178 - accuracy:
0.7491 - val_loss: 0.6437 - val_accuracy: 0.7487
Epoch 65/1000
50/50 [==============================] - 60s 1s/step - loss: 0.6000 - accuracy:
0.7648 - val_loss: 0.6727 - val_accuracy: 0.7400
Epoch 66/1000
50/50 [==============================] - 61s 1s/step - loss: 0.5868 - accuracy:
0.7694 - val_loss: 0.6053 - val_accuracy: 0.7693
Epoch 67/1000
50/50 [==============================] - 49s 980ms/step - loss: 0.6183 -
accuracy: 0.7438 - val_loss: 0.5992 - val_accuracy: 0.7613
Epoch 68/1000
50/50 [==============================] - 56s 1s/step - loss: 0.5862 - accuracy:
0.7624 - val_loss: 0.5727 - val_accuracy: 0.7840
Epoch 69/1000
50/50 [==============================] - 47s 932ms/step - loss: 0.5813 -
accuracy: 0.7653 - val_loss: 0.8880 - val_accuracy: 0.6833
Epoch 70/1000
50/50 [==============================] - 47s 925ms/step - loss: 0.6252 -
accuracy: 0.7440 - val_loss: 0.6245 - val_accuracy: 0.7673
```

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Epoch 71/1000
50/50 [==============================] - 46s 909ms/step - loss: 0.5776 -
accuracy: 0.7702 - val_loss: 0.5566 - val_accuracy: 0.7693
Epoch 72/1000
50/50 [==============================] - 48s 960ms/step - loss: 0.5635 -
accuracy: 0.7760 - val_loss: 0.5490 - val_accuracy: 0.7733
Epoch 73/1000
50/50 [==============================] - 45s 910ms/step - loss: 0.5856 -
accuracy: 0.7676 - val_loss: 0.6915 - val_accuracy: 0.7420
Epoch 74/1000
50/50 [==============================] - 65s 1s/step - loss: 0.5572 - accuracy:
0.7756 - val_loss: 0.6522 - val_accuracy: 0.7573
Epoch 75/1000
50/50 [==============================] - 48s 958ms/step - loss: 0.5512 -
accuracy: 0.7824 - val_loss: 0.6721 - val_accuracy: 0.7500
Epoch 76/1000
50/50 [==============================] - 46s 916ms/step - loss: 0.5519 -
accuracy: 0.7864 - val_loss: 0.5752 - val_accuracy: 0.7760
Epoch 77/1000
50/50 [==============================] - 46s 928ms/step - loss: 0.5823 -
accuracy: 0.7712 - val_loss: 0.6282 - val_accuracy: 0.7587
Epoch 78/1000
50/50 [==============================] - 44s 887ms/step - loss: 0.5619 -
accuracy: 0.7637 - val_loss: 0.5695 - val_accuracy: 0.7767
Epoch 79/1000
50/50 [==============================] - 56s 1s/step - loss: 0.5543 - accuracy:
0.7800 - val_loss: 0.5245 - val_accuracy: 0.8080
Epoch 80/1000
50/50 [==============================] - 136s 3s/step - loss: 0.6005 - accuracy:
0.7652 - val_loss: 0.6553 - val_accuracy: 0.7520
Epoch 81/1000
50/50 [==============================] - 132s 3s/step - loss: 0.5556 - accuracy:
0.7888 - val_loss: 0.6058 - val_accuracy: 0.7553
Epoch 82/1000
50/50 [==============================] - 147s 3s/step - loss: 0.5168 - accuracy:
0.8008 - val_loss: 0.5535 - val_accuracy: 0.7867
Epoch 83/1000
50/50 [==============================] - 61s 1s/step - loss: 0.5357 - accuracy:
0.7920 - val_loss: 0.6529 - val_accuracy: 0.7727
Epoch 84/1000
50/50 [==============================] - 57s 1s/step - loss: 0.5362 - accuracy:
0.7864 - val_loss: 0.5468 - val_accuracy: 0.7860
Epoch 85/1000
50/50 [==============================] - 54s 1s/step - loss: 0.5424 - accuracy:
0.7868 - val_loss: 0.6820 - val_accuracy: 0.7533
Epoch 86/1000
50/50 [==============================] - 56s 1s/step - loss: 0.5519 - accuracy:
0.7824 - val_loss: 0.5770 - val_accuracy: 0.7760
```

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Epoch 87/1000
50/50 [==============================] - 55s 1s/step - loss: 0.5423 - accuracy:
0.7904 - val_loss: 0.6560 - val_accuracy: 0.7667
Epoch 88/1000
50/50 [==============================] - 57s 1s/step - loss: 0.5575 - accuracy:
0.7908 - val_loss: 0.5586 - val_accuracy: 0.7900
Epoch 89/1000
50/50 [==============================] - 56s 1s/step - loss: 0.5319 - accuracy:
0.7961 - val_loss: 0.5301 - val_accuracy: 0.7913
Epoch 90/1000
50/50 [==============================] - 55s 1s/step - loss: 0.5505 - accuracy:
0.7912 - val_loss: 0.5271 - val_accuracy: 0.7927
Epoch 91/1000
50/50 [==============================] - 49s 974ms/step - loss: 0.5239 -
accuracy: 0.8040 - val_loss: 0.5997 - val_accuracy: 0.7647
Epoch 92/1000
50/50 [==============================] - 52s 1s/step - loss: 0.5547 - accuracy:
0.7848 - val_loss: 0.5270 - val_accuracy: 0.7967
Epoch 93/1000
50/50 [==============================] - 52s 1s/step - loss: 0.5334 - accuracy:
0.7888 - val_loss: 0.5256 - val_accuracy: 0.8033
Epoch 94/1000
50/50 [==============================] - 51s 1s/step - loss: 0.5749 - accuracy:
0.7828 - val_loss: 0.6103 - val_accuracy: 0.7813
Epoch 95/1000
50/50 [==============================] - 56s 1s/step - loss: 0.5509 - accuracy:
0.7828 - val_loss: 0.5795 - val_accuracy: 0.7753
Epoch 96/1000
50/50 [==============================] - 57s 1s/step - loss: 0.5273 - accuracy:
0.7933 - val_loss: 0.6014 - val_accuracy: 0.7813
Epoch 97/1000
50/50 [==============================] - 50s 990ms/step - loss: 0.5285 -
accuracy: 0.7888 - val_loss: 0.5532 - val_accuracy: 0.7967
Epoch 98/1000
50/50 [==============================] - 63s 1s/step - loss: 0.5185 - accuracy:
0.7969 - val_loss: 0.4764 - val_accuracy: 0.8147
Epoch 99/1000
50/50 [==============================] - 61s 1s/step - loss: 0.5168 - accuracy:
0.8044 - val_loss: 0.6671 - val_accuracy: 0.7620
Epoch 100/1000
50/50 [==============================] - 56s 1s/step - loss: 0.5610 - accuracy:
0.7856 - val_loss: 0.5827 - val_accuracy: 0.7733
Epoch 101/1000
50/50 [==============================] - 51s 1s/step - loss: 0.5108 - accuracy:
0.7948 - val_loss: 0.5156 - val_accuracy: 0.7947
Epoch 102/1000
50/50 [==============================] - 55s 1s/step - loss: 0.5384 - accuracy:
0.7808 - val_loss: 0.5440 - val_accuracy: 0.7940
```

```
Epoch 103/1000
50/50 [==============================] - 57s 1s/step - loss: 0.5022 - accuracy:
0.8050 - val_loss: 0.5796 - val_accuracy: 0.8060
Epoch 104/1000
50/50 [==============================] - 52s 1s/step - loss: 0.5202 - accuracy:
0.7964 - val_loss: 0.6112 - val_accuracy: 0.7593
Epoch 105/1000
50/50 [==============================] - 50s 1s/step - loss: 0.5399 - accuracy:
0.7832 - val_loss: 0.5769 - val_accuracy: 0.7860
Epoch 106/1000
50/50 [==============================] - 45s 899ms/step - loss: 0.5385 -
accuracy: 0.7860 - val_loss: 0.5381 - val_accuracy: 0.8000
Epoch 107/1000
50/50 [==============================] - 46s 916ms/step - loss: 0.5011 -
accuracy: 0.8020 - val_loss: 0.5284 - val_accuracy: 0.7900
Epoch 108/1000
50/50 [==============================] - 47s 931ms/step - loss: 0.5070 -
accuracy: 0.7968 - val_loss: 0.4644 - val_accuracy: 0.8227
Epoch 109/1000
50/50 [==============================] - 46s 912ms/step - loss: 0.4900 -
accuracy: 0.7960 - val_loss: 0.6559 - val_accuracy: 0.7620
Epoch 110/1000
50/50 [==============================] - 46s 925ms/step - loss: 0.5368 -
accuracy: 0.7780 - val_loss: 0.4981 - val_accuracy: 0.8060
Epoch 111/1000
50/50 [==============================] - 121s 2s/step - loss: 0.5087 - accuracy:
0.8071 - val_loss: 0.6248 - val_accuracy: 0.7687
Epoch 112/1000
50/50 [==============================] - 161s 3s/step - loss: 0.5018 - accuracy:
0.7929 - val_loss: 0.5515 - val_accuracy: 0.7860
Epoch 113/1000
50/50 [==============================] - 130s 3s/step - loss: 0.4931 - accuracy:
0.8060 - val_loss: 0.5505 - val_accuracy: 0.7960
Epoch 114/1000
50/50 [==============================] - 139s 3s/step - loss: 0.5001 - accuracy:
0.7916 - val_loss: 0.4921 - val_accuracy: 0.8033
Epoch 115/1000
50/50 [==============================] - 126s 3s/step - loss: 0.5243 - accuracy:
0.7844 - val_loss: 0.5493 - val_accuracy: 0.7927
Epoch 116/1000
50/50 [==============================] - 130s 3s/step - loss: 0.5169 - accuracy:
0.7996 - val_loss: 0.6125 - val_accuracy: 0.7553
Epoch 117/1000
50/50 [==============================] - 156s 3s/step - loss: 0.5050 - accuracy:
0.7969 - val_loss: 0.5865 - val_accuracy: 0.7700
Epoch 118/1000
50/50 [==============================] - 137s 3s/step - loss: 0.4910 - accuracy:
0.8076 - val_loss: 0.5355 - val_accuracy: 0.8080
```

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Epoch 119/1000
50/50 [==============================] - 140s 3s/step - loss: 0.5405 - accuracy:
0.7779 - val_loss: 0.5278 - val_accuracy: 0.8087
Epoch 120/1000
50/50 [==============================] - 131s 3s/step - loss: 0.4978 - accuracy:
0.8016 - val_loss: 0.5186 - val_accuracy: 0.8020
Epoch 121/1000
50/50 [==============================] - 148s 3s/step - loss: 0.4703 - accuracy:
0.8144 - val_loss: 0.5483 - val_accuracy: 0.8080
Epoch 122/1000
50/50 [==============================] - 93s 2s/step - loss: 0.5054 - accuracy:
0.7948 - val_loss: 0.4617 - val_accuracy: 0.8127
Epoch 123/1000
50/50 [==============================] - 63s 1s/step - loss: 0.4946 - accuracy:
0.8006 - val_loss: 0.5573 - val_accuracy: 0.7993
Epoch 124/1000
50/50 [==============================] - 62s 1s/step - loss: 0.4940 - accuracy:
0.8032 - val_loss: 0.5998 - val_accuracy: 0.7827
Epoch 125/1000
50/50 [==============================] - 53s 1s/step - loss: 0.4728 - accuracy:
0.8116 - val_loss: 0.4616 - val_accuracy: 0.8207
Epoch 126/1000
50/50 [==============================] - 46s 919ms/step - loss: 0.5071 -
accuracy: 0.8014 - val_loss: 0.5502 - val_accuracy: 0.7940
Epoch 127/1000
50/50 [==============================] - 48s 953ms/step - loss: 0.5386 -
accuracy: 0.7824 - val_loss: 0.7707 - val_accuracy: 0.7340
Epoch 128/1000
50/50 [==============================] - 48s 966ms/step - loss: 0.5178 -
accuracy: 0.7924 - val_loss: 0.5531 - val_accuracy: 0.7860
Epoch 129/1000
50/50 [==============================] - 49s 979ms/step - loss: 0.4781 -
accuracy: 0.8062 - val_loss: 0.5301 - val_accuracy: 0.8067
Epoch 130/1000
50/50 [==============================] - 47s 947ms/step - loss: 0.4795 -
accuracy: 0.8144 - val_loss: 0.4362 - val_accuracy: 0.8387
Epoch 131/1000
50/50 [==============================] - 55s 1s/step - loss: 0.4663 - accuracy:
0.8148 - val_loss: 0.4758 - val_accuracy: 0.8160
Epoch 132/1000
50/50 [==============================] - 49s 973ms/step - loss: 0.4706 -
accuracy: 0.8100 - val_loss: 0.5004 - val_accuracy: 0.8073
Epoch 133/1000
50/50 [==============================] - 47s 926ms/step - loss: 0.4512 -
accuracy: 0.8281 - val_loss: 0.5284 - val_accuracy: 0.8027
Epoch 134/1000
50/50 [==============================] - 49s 974ms/step - loss: 0.4944 -
accuracy: 0.8060 - val_loss: 0.4932 - val_accuracy: 0.8187
```

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Epoch 135/1000
50/50 [==============================] - 50s 996ms/step - loss: 0.5211 -
accuracy: 0.7996 - val_loss: 0.5957 - val_accuracy: 0.7727
Epoch 136/1000
50/50 [==============================] - 49s 982ms/step - loss: 0.4832 -
accuracy: 0.8036 - val_loss: 0.7283 - val_accuracy: 0.7580
Epoch 137/1000
50/50 [==============================] - 47s 933ms/step - loss: 0.4930 -
accuracy: 0.8024 - val_loss: 0.5027 - val_accuracy: 0.8120
Epoch 138/1000
50/50 [==============================] - 47s 937ms/step - loss: 0.4689 -
accuracy: 0.8204 - val_loss: 0.5294 - val_accuracy: 0.8013
Epoch 139/1000
50/50 [==============================] - 47s 944ms/step - loss: 0.5031 -
accuracy: 0.8064 - val_loss: 0.4852 - val_accuracy: 0.8067
Epoch 140/1000
50/50 [==============================] - 47s 930ms/step - loss: 0.4635 -
accuracy: 0.8128 - val_loss: 0.6085 - val_accuracy: 0.7713
Epoch 141/1000
50/50 [==============================] - 49s 988ms/step - loss: 0.4880 -
accuracy: 0.8120 - val_loss: 0.6324 - val_accuracy: 0.7700
Epoch 142/1000
50/50 [==============================] - 49s 977ms/step - loss: 0.4903 -
accuracy: 0.8028 - val_loss: 0.5630 - val_accuracy: 0.7947
Epoch 143/1000
50/50 [==============================] - 55s 1s/step - loss: 0.4663 - accuracy:
0.8140 - val_loss: 0.5288 - val_accuracy: 0.8053
Epoch 144/1000
50/50 [==============================] - 48s 966ms/step - loss: 0.4387 -
accuracy: 0.8204 - val_loss: 0.4952 - val_accuracy: 0.8213
Epoch 145/1000
50/50 [==============================] - 49s 977ms/step - loss: 0.4619 -
accuracy: 0.8148 - val_loss: 0.5351 - val_accuracy: 0.8127
Epoch 146/1000
50/50 [==============================] - 49s 972ms/step - loss: 0.4836 -
accuracy: 0.8079 - val_loss: 0.4708 - val_accuracy: 0.8300
Epoch 147/1000
50/50 [==============================] - 47s 935ms/step - loss: 0.4854 -
accuracy: 0.8099 - val_loss: 0.5091 - val_accuracy: 0.8013
Epoch 148/1000
50/50 [==============================] - 46s 928ms/step - loss: 0.4674 -
accuracy: 0.8160 - val_loss: 0.5046 - val_accuracy: 0.8120
Epoch 149/1000
50/50 [==============================] - 48s 952ms/step - loss: 0.5277 -
accuracy: 0.7904 - val_loss: 0.5659 - val_accuracy: 0.7960
Epoch 150/1000
50/50 [==============================] - 46s 923ms/step - loss: 0.4785 -
accuracy: 0.8046 - val_loss: 0.5385 - val_accuracy: 0.8107
```

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Epoch 151/1000
50/50 [==============================] - 47s 934ms/step - loss: 0.4736 -
accuracy: 0.8128 - val_loss: 0.4709 - val_accuracy: 0.8140
Epoch 152/1000
50/50 [==============================] - 50s 987ms/step - loss: 0.4895 -
accuracy: 0.8064 - val_loss: 0.5099 - val_accuracy: 0.7967
Epoch 153/1000
50/50 [==============================] - 49s 980ms/step - loss: 0.4691 -
accuracy: 0.8131 - val_loss: 0.5558 - val_accuracy: 0.7787
Epoch 154/1000
50/50 [==============================] - 46s 930ms/step - loss: 0.4579 -
accuracy: 0.8252 - val_loss: 0.4977 - val_accuracy: 0.8140
Epoch 155/1000
50/50 [==============================] - 50s 1000ms/step - loss: 0.4832 -
accuracy: 0.8148 - val_loss: 0.4592 - val_accuracy: 0.8140
Epoch 156/1000
50/50 [==============================] - 50s 965ms/step - loss: 0.4489 -
accuracy: 0.8233 - val_loss: 0.5648 - val_accuracy: 0.7967
Epoch 157/1000
50/50 [==============================] - 48s 967ms/step - loss: 0.4581 -
accuracy: 0.8245 - val_loss: 0.4794 - val_accuracy: 0.8227
Epoch 158/1000
50/50 [==============================] - 48s 950ms/step - loss: 0.4643 -
accuracy: 0.8240 - val_loss: 0.4940 - val_accuracy: 0.8027
Epoch 159/1000
50/50 [==============================] - 47s 934ms/step - loss: 0.4893 -
accuracy: 0.8107 - val_loss: 0.4797 - val_accuracy: 0.8307
Epoch 160/1000
50/50 [==============================] - 48s 958ms/step - loss: 0.4823 -
accuracy: 0.8076 - val_loss: 0.5801 - val_accuracy: 0.7800
Epoch 161/1000
50/50 [==============================] - 48s 962ms/step - loss: 0.4721 -
accuracy: 0.8144 - val_loss: 0.4658 - val_accuracy: 0.8213
Epoch 162/1000
50/50 [==============================] - 48s 970ms/step - loss: 0.4649 -
accuracy: 0.8208 - val_loss: 0.5265 - val_accuracy: 0.8080
Epoch 163/1000
50/50 [==============================] - 47s 939ms/step - loss: 0.4465 -
accuracy: 0.8256 - val_loss: 0.5315 - val_accuracy: 0.7940
Epoch 164/1000
50/50 [==============================] - 47s 943ms/step - loss: 0.4660 -
accuracy: 0.8196 - val_loss: 0.5306 - val_accuracy: 0.8067
Epoch 165/1000
50/50 [==============================] - 44s 889ms/step - loss: 0.4350 -
accuracy: 0.8293 - val_loss: 0.5953 - val_accuracy: 0.7820
Epoch 166/1000
50/50 [==============================] - 45s 904ms/step - loss: 0.4824 -
accuracy: 0.8083 - val_loss: 0.5172 - val_accuracy: 0.8007
```

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Epoch 167/1000
50/50 [==============================] - 47s 941ms/step - loss: 0.5524 -
accuracy: 0.7876 - val_loss: 0.5109 - val_accuracy: 0.7907
Epoch 168/1000
50/50 [==============================] - 51s 1s/step - loss: 0.5106 - accuracy:
0.8024 - val_loss: 0.8564 - val_accuracy: 0.7293
Epoch 169/1000
50/50 [==============================] - 47s 933ms/step - loss: 0.4797 -
accuracy: 0.8112 - val_loss: 0.6479 - val_accuracy: 0.7447
Epoch 170/1000
50/50 [==============================] - 45s 906ms/step - loss: 0.4669 -
accuracy: 0.8104 - val_loss: 0.5938 - val_accuracy: 0.7867
Epoch 171/1000
50/50 [==============================] - 47s 946ms/step - loss: 0.4435 -
accuracy: 0.8220 - val_loss: 0.5342 - val_accuracy: 0.8047
Epoch 172/1000
50/50 [==============================] - 47s 944ms/step - loss: 0.4395 -
accuracy: 0.8272 - val_loss: 0.6798 - val_accuracy: 0.7720
Epoch 173/1000
50/50 [==============================] - 47s 943ms/step - loss: 0.4511 -
accuracy: 0.8192 - val_loss: 0.4729 - val_accuracy: 0.8067
Epoch 174/1000
50/50 [==============================] - 47s 947ms/step - loss: 0.4784 -
accuracy: 0.8088 - val_loss: 0.5150 - val_accuracy: 0.7860
Epoch 175/1000
50/50 [==============================] - 46s 917ms/step - loss: 0.4571 -
accuracy: 0.8152 - val_loss: 0.5001 - val_accuracy: 0.8133
Epoch 176/1000
50/50 [==============================] - 48s 954ms/step - loss: 0.4533 -
accuracy: 0.8212 - val_loss: 0.4961 - val_accuracy: 0.8173
Epoch 177/1000
50/50 [==============================] - 48s 955ms/step - loss: 0.4619 -
accuracy: 0.8220 - val_loss: 0.4963 - val_accuracy: 0.8147
Epoch 178/1000
50/50 [==============================] - 48s 954ms/step - loss: 0.4237 -
accuracy: 0.8324 - val_loss: 0.5882 - val_accuracy: 0.7867
Epoch 179/1000
50/50 [==============================] - 48s 953ms/step - loss: 0.4712 -
accuracy: 0.8092 - val_loss: 0.4654 - val_accuracy: 0.8220
Epoch 180/1000
50/50 [==============================] - 47s 944ms/step - loss: 0.4560 -
accuracy: 0.8212 - val_loss: 0.5130 - val_accuracy: 0.7987
Epoch 181/1000
50/50 [==============================] - 50s 998ms/step - loss: 0.4493 -
accuracy: 0.8200 - val_loss: 0.4438 - val_accuracy: 0.8247
Epoch 182/1000
50/50 [==============================] - 47s 939ms/step - loss: 0.4341 -
accuracy: 0.8300 - val_loss: 0.5246 - val_accuracy: 0.8033
```

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Epoch 183/1000
50/50 [==============================] - 47s 946ms/step - loss: 0.4635 -
accuracy: 0.8116 - val_loss: 0.5070 - val_accuracy: 0.8153
Epoch 184/1000
50/50 [==============================] - 45s 904ms/step - loss: 0.4212 -
accuracy: 0.8407 - val_loss: 0.5817 - val_accuracy: 0.7880
Epoch 185/1000
50/50 [==============================] - 46s 922ms/step - loss: 0.4374 -
accuracy: 0.8240 - val_loss: 0.5038 - val_accuracy: 0.8120
Epoch 186/1000
50/50 [==============================] - 45s 906ms/step - loss: 0.4186 -
accuracy: 0.8350 - val_loss: 0.5219 - val_accuracy: 0.8100
Epoch 187/1000
50/50 [==============================] - 47s 934ms/step - loss: 0.4142 -
accuracy: 0.8324 - val_loss: 0.5125 - val_accuracy: 0.8080
Epoch 188/1000
50/50 [==============================] - 47s 935ms/step - loss: 0.4406 -
accuracy: 0.8220 - val_loss: 0.7083 - val_accuracy: 0.7573
Epoch 189/1000
50/50 [==============================] - 46s 921ms/step - loss: 0.4388 -
accuracy: 0.8316 - val_loss: 0.5872 - val_accuracy: 0.7940
Epoch 190/1000
50/50 [==============================] - 46s 915ms/step - loss: 0.4424 -
accuracy: 0.8280 - val_loss: 0.4805 - val_accuracy: 0.8107
Epoch 191/1000
50/50 [==============================] - 46s 919ms/step - loss: 0.4150 -
accuracy: 0.8484 - val_loss: 0.4948 - val_accuracy: 0.8020
Epoch 192/1000
50/50 [==============================] - 47s 939ms/step - loss: 0.4308 -
accuracy: 0.8281 - val_loss: 0.5399 - val_accuracy: 0.8047
Epoch 193/1000
50/50 [==============================] - 46s 925ms/step - loss: 0.4461 -
accuracy: 0.8252 - val_loss: 0.5916 - val_accuracy: 0.7867
Epoch 194/1000
50/50 [==============================] - 47s 932ms/step - loss: 0.4477 -
accuracy: 0.8273 - val_loss: 0.4839 - val_accuracy: 0.8200
Epoch 195/1000
50/50 [==============================] - 44s 890ms/step - loss: 0.4684 -
accuracy: 0.8172 - val_loss: 0.5434 - val_accuracy: 0.8013
Epoch 196/1000
50/50 [==============================] - 47s 936ms/step - loss: 0.4205 -
accuracy: 0.8334 - val_loss: 0.4557 - val_accuracy: 0.8247
Epoch 197/1000
50/50 [==============================] - 48s 954ms/step - loss: 0.4328 -
accuracy: 0.8332 - val_loss: 0.4597 - val_accuracy: 0.8260
Epoch 198/1000
50/50 [==============================] - 45s 907ms/step - loss: 0.4393 -
accuracy: 0.8200 - val_loss: 0.4270 - val_accuracy: 0.8267
```

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Epoch 199/1000
50/50 [==============================] - 47s 936ms/step - loss: 0.4345 -
accuracy: 0.8261 - val_loss: 0.5157 - val_accuracy: 0.8207
Epoch 200/1000
50/50 [==============================] - 46s 908ms/step - loss: 0.4156 -
accuracy: 0.8356 - val_loss: 0.5738 - val_accuracy: 0.7860
Epoch 201/1000
50/50 [==============================] - 47s 936ms/step - loss: 0.4380 -
accuracy: 0.8280 - val_loss: 0.4573 - val_accuracy: 0.8387
Epoch 202/1000
50/50 [==============================] - 46s 918ms/step - loss: 0.4482 -
accuracy: 0.8264 - val_loss: 0.5877 - val_accuracy: 0.7847
Epoch 203/1000
50/50 [==============================] - 47s 945ms/step - loss: 0.4291 -
accuracy: 0.8332 - val_loss: 0.4865 - val_accuracy: 0.8207
Epoch 204/1000
50/50 [==============================] - 46s 916ms/step - loss: 0.4215 -
accuracy: 0.8312 - val_loss: 0.4879 - val_accuracy: 0.8027
Epoch 205/1000
50/50 [==============================] - 46s 927ms/step - loss: 0.4260 -
accuracy: 0.8308 - val_loss: 0.6171 - val_accuracy: 0.7747
Epoch 206/1000
50/50 [==============================] - 48s 969ms/step - loss: 0.4382 -
accuracy: 0.8348 - val_loss: 0.4387 - val_accuracy: 0.8233
Epoch 207/1000
50/50 [==============================] - 46s 918ms/step - loss: 0.4347 -
accuracy: 0.8276 - val_loss: 0.4410 - val_accuracy: 0.8227
Epoch 208/1000
50/50 [==============================] - 46s 909ms/step - loss: 0.4332 -
accuracy: 0.8260 - val_loss: 0.4879 - val_accuracy: 0.8207
Epoch 209/1000
50/50 [==============================] - 47s 928ms/step - loss: 0.4667 -
accuracy: 0.8116 - val_loss: 0.4669 - val_accuracy: 0.8247
Epoch 210/1000
50/50 [==============================] - 47s 950ms/step - loss: 0.4118 -
accuracy: 0.8376 - val_loss: 0.5285 - val_accuracy: 0.8047
Epoch 211/1000
50/50 [==============================] - 45s 898ms/step - loss: 0.4228 -
accuracy: 0.8364 - val_loss: 0.5124 - val_accuracy: 0.8013
Epoch 212/1000
50/50 [==============================] - 46s 925ms/step - loss: 0.4339 -
accuracy: 0.8348 - val_loss: 0.5277 - val_accuracy: 0.7980
Epoch 213/1000
50/50 [==============================] - 44s 882ms/step - loss: 0.4375 -
accuracy: 0.8310 - val_loss: 0.5022 - val_accuracy: 0.8187
Epoch 214/1000
50/50 [==============================] - 47s 928ms/step - loss: 0.4003 -
accuracy: 0.8480 - val_loss: 0.6537 - val_accuracy: 0.7613
```

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Epoch 215/1000
50/50 [==============================] - 44s 878ms/step - loss: 0.5662 -
accuracy: 0.7792 - val_loss: 0.5059 - val_accuracy: 0.8087
Epoch 216/1000
50/50 [==============================] - 46s 908ms/step - loss: 0.4924 -
accuracy: 0.8092 - val_loss: 0.4998 - val_accuracy: 0.8120
Epoch 217/1000
50/50 [==============================] - 46s 918ms/step - loss: 0.4799 -
accuracy: 0.8156 - val_loss: 0.4551 - val_accuracy: 0.8233
Epoch 218/1000
50/50 [==============================] - 46s 912ms/step - loss: 0.4469 -
accuracy: 0.8244 - val_loss: 0.5788 - val_accuracy: 0.8047
Epoch 219/1000
50/50 [==============================] - 46s 923ms/step - loss: 0.4233 -
accuracy: 0.8312 - val_loss: 0.5361 - val_accuracy: 0.7973
Epoch 220/1000
50/50 [==============================] - 46s 923ms/step - loss: 0.4411 -
accuracy: 0.8196 - val_loss: 0.5090 - val_accuracy: 0.8033
Epoch 221/1000
50/50 [==============================] - 46s 912ms/step - loss: 0.4357 -
accuracy: 0.8310 - val_loss: 0.4581 - val_accuracy: 0.8320
Epoch 222/1000
50/50 [==============================] - 46s 929ms/step - loss: 0.3964 -
accuracy: 0.8370 - val_loss: 0.5276 - val_accuracy: 0.8180
Epoch 223/1000
50/50 [==============================] - 46s 911ms/step - loss: 0.4203 -
accuracy: 0.8364 - val_loss: 0.5174 - val_accuracy: 0.8027
Epoch 224/1000
50/50 [==============================] - 48s 952ms/step - loss: 0.4231 -
accuracy: 0.8326 - val_loss: 0.4776 - val_accuracy: 0.8133
Epoch 225/1000
50/50 [==============================] - 48s 957ms/step - loss: 0.4476 -
accuracy: 0.8304 - val_loss: 0.4571 - val_accuracy: 0.8220
Epoch 226/1000
50/50 [==============================] - 54s 1s/step - loss: 0.3861 - accuracy:
0.8407 - val_loss: 0.4666 - val_accuracy: 0.8220
Epoch 227/1000
50/50 [==============================] - 50s 999ms/step - loss: 0.3960 -
accuracy: 0.8436 - val_loss: 0.5545 - val_accuracy: 0.8047
Epoch 228/1000
50/50 [==============================] - 51s 1s/step - loss: 0.4303 - accuracy:
0.8276 - val_loss: 0.5102 - val_accuracy: 0.8080
Epoch 229/1000
50/50 [==============================] - 54s 1s/step - loss: 0.4317 - accuracy:
0.8289 - val_loss: 0.4700 - val_accuracy: 0.8307
Epoch 230/1000
50/50 [==============================] - 55s 1s/step - loss: 0.3916 - accuracy:
0.8460 - val_loss: 0.5267 - val_accuracy: 0.8067
```

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Epoch 231/1000
50/50 [==============================] - 55s 1s/step - loss: 0.4117 - accuracy:
0.8376 - val_loss: 0.5190 - val_accuracy: 0.8107
Epoch 232/1000
50/50 [==============================] - 60s 1s/step - loss: 0.4161 - accuracy:
0.8344 - val_loss: 0.5292 - val_accuracy: 0.8040
Epoch 233/1000
50/50 [==============================] - 62s 1s/step - loss: 0.3907 - accuracy:
0.8452 - val_loss: 0.4932 - val_accuracy: 0.8000
Epoch 234/1000
50/50 [==============================] - 65s 1s/step - loss: 0.3936 - accuracy:
0.8416 - val_loss: 0.5411 - val_accuracy: 0.8113
Epoch 235/1000
50/50 [==============================] - 57s 1s/step - loss: 0.4381 - accuracy:
0.8280 - val_loss: 0.4623 - val_accuracy: 0.8180
Epoch 236/1000
50/50 [==============================] - 57s 1s/step - loss: 0.4115 - accuracy:
0.8364 - val_loss: 0.5713 - val_accuracy: 0.7887
Epoch 237/1000
50/50 [==============================] - 53s 1s/step - loss: 0.4101 - accuracy:
0.8350 - val_loss: 0.4155 - val_accuracy: 0.8320
Epoch 238/1000
50/50 [==============================] - 59s 1s/step - loss: 0.4128 - accuracy:
0.8400 - val_loss: 0.4822 - val_accuracy: 0.8227
Epoch 239/1000
50/50 [==============================] - 64s 1s/step - loss: 0.3939 - accuracy:
0.8537 - val_loss: 0.5077 - val_accuracy: 0.8153
Epoch 240/1000
50/50 [==============================] - 47s 947ms/step - loss: 0.4046 -
accuracy: 0.8416 - val_loss: 0.4669 - val_accuracy: 0.8287
Epoch 241/1000
50/50 [==============================] - 46s 911ms/step - loss: 0.4051 -
accuracy: 0.8552 - val_loss: 0.5289 - val_accuracy: 0.8147
Epoch 242/1000
50/50 [==============================] - 51s 1s/step - loss: 0.4071 - accuracy:
0.8468 - val_loss: 0.5097 - val_accuracy: 0.8127
Epoch 243/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3761 - accuracy:
0.8577 - val_loss: 0.6875 - val_accuracy: 0.7720
Epoch 244/1000
50/50 [==============================] - 58s 1s/step - loss: 0.4102 - accuracy:
0.8432 - val_loss: 0.4901 - val_accuracy: 0.8313
Epoch 245/1000
50/50 [==============================] - 61s 1s/step - loss: 0.3899 - accuracy:
0.8384 - val_loss: 0.6635 - val_accuracy: 0.7900
Epoch 246/1000
50/50 [==============================] - 74s 1s/step - loss: 0.4049 - accuracy:
0.8408 - val_loss: 0.4624 - val_accuracy: 0.8280
```

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Epoch 247/1000
50/50 [==============================] - 51s 1s/step - loss: 0.4257 - accuracy:
0.8288 - val_loss: 0.4976 - val_accuracy: 0.8127
Epoch 248/1000
50/50 [==============================] - 48s 947ms/step - loss: 0.4122 -
accuracy: 0.8391 - val_loss: 0.4267 - val_accuracy: 0.8360
Epoch 249/1000
50/50 [==============================] - 47s 934ms/step - loss: 0.4019 -
accuracy: 0.8392 - val_loss: 0.4583 - val_accuracy: 0.8267
Epoch 250/1000
50/50 [==============================] - 47s 933ms/step - loss: 0.4206 -
accuracy: 0.8285 - val_loss: 0.4651 - val_accuracy: 0.8260
Epoch 251/1000
50/50 [==============================] - 44s 872ms/step - loss: 0.3853 -
accuracy: 0.8370 - val_loss: 0.5878 - val_accuracy: 0.7947
Epoch 252/1000
50/50 [==============================] - 61s 1s/step - loss: 0.3835 - accuracy:
0.8488 - val_loss: 0.5987 - val_accuracy: 0.7807
Epoch 253/1000
50/50 [==============================] - 144s 3s/step - loss: 0.4407 - accuracy:
0.8296 - val_loss: 0.4807 - val_accuracy: 0.8140
Epoch 254/1000
50/50 [==============================] - 120s 2s/step - loss: 0.4455 - accuracy:
0.8228 - val_loss: 0.6015 - val_accuracy: 0.7720
Epoch 255/1000
50/50 [==============================] - 128s 3s/step - loss: 0.3814 - accuracy:
0.8428 - val_loss: 0.5336 - val_accuracy: 0.7933
Epoch 256/1000
50/50 [==============================] - 135s 3s/step - loss: 0.4213 - accuracy:
0.8348 - val_loss: 0.5256 - val_accuracy: 0.8013
Epoch 257/1000
50/50 [==============================] - 159s 3s/step - loss: 0.4325 - accuracy:
0.8318 - val_loss: 0.4517 - val_accuracy: 0.8293
Epoch 258/1000
50/50 [==============================] - 131s 3s/step - loss: 0.4131 - accuracy:
0.8380 - val_loss: 0.5396 - val_accuracy: 0.7893
Epoch 259/1000
50/50 [==============================] - 46s 926ms/step - loss: 0.3862 -
accuracy: 0.8512 - val_loss: 0.5456 - val_accuracy: 0.7967
Epoch 260/1000
50/50 [==============================] - 54s 1s/step - loss: 0.3815 - accuracy:
0.8492 - val_loss: 0.5241 - val_accuracy: 0.8087
Epoch 261/1000
50/50 [==============================] - 61s 1s/step - loss: 0.4047 - accuracy:
0.8488 - val_loss: 0.4380 - val_accuracy: 0.8373
Epoch 262/1000
50/50 [==============================] - 50s 992ms/step - loss: 0.3907 -
accuracy: 0.8428 - val_loss: 0.5067 - val_accuracy: 0.8060
```

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Epoch 263/1000
50/50 [==============================] - 52s 1s/step - loss: 0.4066 - accuracy:
0.8488 - val_loss: 0.4714 - val_accuracy: 0.8300
Epoch 264/1000
50/50 [==============================] - 50s 994ms/step - loss: 0.3852 -
accuracy: 0.8468 - val_loss: 0.4551 - val_accuracy: 0.8280
Epoch 265/1000
50/50 [==============================] - 50s 992ms/step - loss: 0.3756 -
accuracy: 0.8532 - val_loss: 0.5825 - val_accuracy: 0.7967
Epoch 266/1000
50/50 [==============================] - 48s 964ms/step - loss: 0.4153 -
accuracy: 0.8320 - val_loss: 0.6484 - val_accuracy: 0.7820
Epoch 267/1000
50/50 [==============================] - 55s 1s/step - loss: 0.4137 - accuracy:
0.8336 - val_loss: 0.4418 - val_accuracy: 0.8447
Epoch 268/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3956 - accuracy:
0.8420 - val_loss: 0.5513 - val_accuracy: 0.7887
Epoch 269/1000
50/50 [==============================] - 52s 1s/step - loss: 0.4061 - accuracy:
0.8380 - val_loss: 0.4194 - val_accuracy: 0.8453
Epoch 270/1000
50/50 [==============================] - 50s 994ms/step - loss: 0.3793 -
accuracy: 0.8557 - val_loss: 0.5680 - val_accuracy: 0.7860
Epoch 271/1000
50/50 [==============================] - 50s 1s/step - loss: 0.3846 - accuracy:
0.8488 - val_loss: 0.4615 - val_accuracy: 0.8373
Epoch 272/1000
50/50 [==============================] - 49s 982ms/step - loss: 0.3782 -
accuracy: 0.8508 - val_loss: 0.5043 - val_accuracy: 0.8093
Epoch 273/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3794 - accuracy:
0.8464 - val_loss: 0.5538 - val_accuracy: 0.7980
Epoch 274/1000
50/50 [==============================] - 50s 1s/step - loss: 0.3951 - accuracy:
0.8420 - val_loss: 0.4197 - val_accuracy: 0.8420
Epoch 275/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3804 - accuracy:
0.8504 - val_loss: 0.6490 - val_accuracy: 0.7573
Epoch 276/1000
50/50 [==============================] - 48s 966ms/step - loss: 0.3972 -
accuracy: 0.8370 - val_loss: 0.5498 - val_accuracy: 0.8193
Epoch 277/1000
50/50 [==============================] - 50s 1s/step - loss: 0.3585 - accuracy:
0.8540 - val_loss: 0.5110 - val_accuracy: 0.8173
Epoch 278/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3705 - accuracy:
0.8508 - val_loss: 0.6565 - val_accuracy: 0.7640
```

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Epoch 279/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3883 - accuracy:
0.8560 - val_loss: 0.4474 - val_accuracy: 0.8340
Epoch 280/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3914 - accuracy:
0.8428 - val_loss: 0.4649 - val_accuracy: 0.8307
Epoch 281/1000
50/50 [==============================] - 49s 982ms/step - loss: 0.3891 -
accuracy: 0.8464 - val_loss: 0.6298 - val_accuracy: 0.7820
Epoch 282/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3763 - accuracy:
0.8569 - val_loss: 0.5485 - val_accuracy: 0.8067
Epoch 283/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3777 - accuracy:
0.8524 - val_loss: 0.5145 - val_accuracy: 0.8220
Epoch 284/1000
50/50 [==============================] - 51s 1s/step - loss: 0.4002 - accuracy:
0.8415 - val_loss: 0.5864 - val_accuracy: 0.7807
Epoch 285/1000
50/50 [==============================] - 51s 1s/step - loss: 0.4170 - accuracy:
0.8423 - val_loss: 0.5951 - val_accuracy: 0.7940
Epoch 286/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3874 - accuracy:
0.8452 - val_loss: 0.4328 - val_accuracy: 0.8387
Epoch 287/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3926 - accuracy:
0.8448 - val_loss: 0.5431 - val_accuracy: 0.7907
Epoch 288/1000
50/50 [==============================] - 49s 969ms/step - loss: 0.3789 -
accuracy: 0.8548 - val_loss: 0.5128 - val_accuracy: 0.8153
Epoch 289/1000
50/50 [==============================] - 50s 992ms/step - loss: 0.3855 -
accuracy: 0.8528 - val_loss: 0.4829 - val_accuracy: 0.8173
Epoch 290/1000
50/50 [==============================] - 53s 1s/step - loss: 0.4144 - accuracy:
0.8395 - val_loss: 0.5375 - val_accuracy: 0.7933
Epoch 291/1000
50/50 [==============================] - 50s 992ms/step - loss: 0.3958 -
accuracy: 0.8448 - val_loss: 0.4548 - val_accuracy: 0.8327
Epoch 292/1000
50/50 [==============================] - 50s 1s/step - loss: 0.3594 - accuracy:
0.8544 - val_loss: 0.4742 - val_accuracy: 0.8227
Epoch 293/1000
50/50 [==============================] - 48s 962ms/step - loss: 0.4105 -
accuracy: 0.8400 - val_loss: 0.5061 - val_accuracy: 0.7980
Epoch 294/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3976 - accuracy:
0.8452 - val_loss: 0.5230 - val_accuracy: 0.8073
```

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Epoch 295/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3711 - accuracy:
0.8443 - val_loss: 0.4570 - val_accuracy: 0.8320
Epoch 296/1000
50/50 [==============================] - 55s 1s/step - loss: 0.3825 - accuracy:
0.8532 - val_loss: 0.5271 - val_accuracy: 0.8167
Epoch 297/1000
50/50 [==============================] - 58s 1s/step - loss: 0.3742 - accuracy:
0.8476 - val_loss: 0.4823 - val_accuracy: 0.8253
Epoch 298/1000
50/50 [==============================] - 50s 1s/step - loss: 0.3795 - accuracy:
0.8548 - val_loss: 0.5625 - val_accuracy: 0.7933
Epoch 299/1000
50/50 [==============================] - 57s 1s/step - loss: 0.3950 - accuracy:
0.8396 - val_loss: 0.4313 - val_accuracy: 0.8287
Epoch 300/1000
50/50 [==============================] - 55s 1s/step - loss: 0.3396 - accuracy:
0.8692 - val_loss: 0.5485 - val_accuracy: 0.8193
Epoch 301/1000
50/50 [==============================] - 66s 1s/step - loss: 0.3624 - accuracy:
0.8576 - val_loss: 0.5224 - val_accuracy: 0.8227
Epoch 302/1000
50/50 [==============================] - 56s 1s/step - loss: 0.3863 - accuracy:
0.8362 - val_loss: 0.4992 - val_accuracy: 0.8227
Epoch 303/1000
50/50 [==============================] - 60s 1s/step - loss: 0.3884 - accuracy:
0.8468 - val_loss: 0.4846 - val_accuracy: 0.8200
Epoch 304/1000
50/50 [==============================] - 54s 1s/step - loss: 0.3756 - accuracy:
0.8528 - val_loss: 0.4855 - val_accuracy: 0.8280
Epoch 305/1000
50/50 [==============================] - 56s 1s/step - loss: 0.3400 - accuracy:
0.8688 - val_loss: 0.5582 - val_accuracy: 0.8107
Epoch 306/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3690 - accuracy:
0.8592 - val_loss: 0.4434 - val_accuracy: 0.8413
Epoch 307/1000
50/50 [==============================] - 61s 1s/step - loss: 0.3572 - accuracy:
0.8529 - val_loss: 0.5062 - val_accuracy: 0.8220
Epoch 308/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3961 - accuracy:
0.8444 - val_loss: 0.4079 - val_accuracy: 0.8453
Epoch 309/1000
50/50 [==============================] - 49s 976ms/step - loss: 0.3575 -
accuracy: 0.8668 - val_loss: 0.4667 - val_accuracy: 0.8400
Epoch 310/1000
50/50 [==============================] - 48s 949ms/step - loss: 0.3980 -
accuracy: 0.8400 - val_loss: 0.4829 - val_accuracy: 0.8320
```

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Epoch 311/1000
50/50 [==============================] - 47s 931ms/step - loss: 0.3791 -
accuracy: 0.8512 - val_loss: 0.5914 - val_accuracy: 0.7940
Epoch 312/1000
50/50 [==============================] - 47s 939ms/step - loss: 0.3694 -
accuracy: 0.8564 - val_loss: 0.4892 - val_accuracy: 0.8367
Epoch 313/1000
50/50 [==============================] - 62s 1s/step - loss: 0.3713 - accuracy:
0.8524 - val_loss: 0.4700 - val_accuracy: 0.8233
Epoch 314/1000
50/50 [==============================] - 48s 958ms/step - loss: 0.3901 -
accuracy: 0.8376 - val_loss: 0.5969 - val_accuracy: 0.7913
Epoch 315/1000
50/50 [==============================] - 49s 983ms/step - loss: 0.3655 -
accuracy: 0.8524 - val_loss: 0.5130 - val_accuracy: 0.8167
Epoch 316/1000
50/50 [==============================] - 50s 1s/step - loss: 0.3516 - accuracy:
0.8616 - val_loss: 0.5019 - val_accuracy: 0.8120
Epoch 317/1000
50/50 [==============================] - 48s 965ms/step - loss: 0.3534 -
accuracy: 0.8568 - val_loss: 0.7091 - val_accuracy: 0.7813
Epoch 318/1000
50/50 [==============================] - 81s 2s/step - loss: 0.3821 - accuracy:
0.8484 - val_loss: 0.5315 - val_accuracy: 0.8087
Epoch 319/1000
50/50 [==============================] - 144s 3s/step - loss: 0.3585 - accuracy:
0.8537 - val_loss: 0.5865 - val_accuracy: 0.7833
Epoch 320/1000
50/50 [==============================] - 160s 3s/step - loss: 0.3789 - accuracy:
0.8504 - val_loss: 0.4625 - val_accuracy: 0.8207
Epoch 321/1000
50/50 [==============================] - 49s 989ms/step - loss: 0.3818 -
accuracy: 0.8464 - val_loss: 0.5691 - val_accuracy: 0.7953
Epoch 322/1000
50/50 [==============================] - 47s 935ms/step - loss: 0.4112 -
accuracy: 0.8304 - val_loss: 0.4664 - val_accuracy: 0.8273
Epoch 323/1000
50/50 [==============================] - 54s 1s/step - loss: 0.3826 - accuracy:
0.8568 - val_loss: 0.6099 - val_accuracy: 0.7947
Epoch 324/1000
50/50 [==============================] - 49s 980ms/step - loss: 0.3614 -
accuracy: 0.8588 - val_loss: 0.5887 - val_accuracy: 0.8220
Epoch 325/1000
50/50 [==============================] - 53s 1s/step - loss: 0.3675 - accuracy:
0.8612 - val_loss: 0.4263 - val_accuracy: 0.8373
Epoch 326/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3627 - accuracy:
0.8545 - val_loss: 0.5452 - val_accuracy: 0.8240
```

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Epoch 327/1000
50/50 [==============================] - 50s 991ms/step - loss: 0.3596 -
accuracy: 0.8660 - val_loss: 0.6070 - val_accuracy: 0.7893
Epoch 328/1000
50/50 [==============================] - 50s 999ms/step - loss: 0.4075 -
accuracy: 0.8448 - val_loss: 0.4465 - val_accuracy: 0.8267
Epoch 329/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3525 - accuracy:
0.8628 - val_loss: 0.4749 - val_accuracy: 0.8360
Epoch 330/1000
50/50 [==============================] - 49s 985ms/step - loss: 0.3869 -
accuracy: 0.8488 - val_loss: 0.4802 - val_accuracy: 0.8360
Epoch 331/1000
50/50 [==============================] - 49s 987ms/step - loss: 0.3887 -
accuracy: 0.8476 - val_loss: 0.5133 - val_accuracy: 0.8300
Epoch 332/1000
50/50 [==============================] - 55s 1s/step - loss: 0.3660 - accuracy:
0.8614 - val_loss: 0.4591 - val_accuracy: 0.8440
Epoch 333/1000
50/50 [==============================] - 53s 1s/step - loss: 0.3353 - accuracy:
0.8696 - val_loss: 0.4902 - val_accuracy: 0.8273
Epoch 334/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3789 - accuracy:
0.8520 - val_loss: 0.4647 - val_accuracy: 0.8320
Epoch 335/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3723 - accuracy:
0.8572 - val_loss: 0.5481 - val_accuracy: 0.8060
Epoch 336/1000
50/50 [==============================] - 49s 983ms/step - loss: 0.4058 -
accuracy: 0.8288 - val_loss: 0.4875 - val_accuracy: 0.8333
Epoch 337/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3876 - accuracy:
0.8456 - val_loss: 0.4439 - val_accuracy: 0.8327
Epoch 338/1000
50/50 [==============================] - 52s 1s/step - loss: 0.3797 - accuracy:
0.8423 - val_loss: 0.4478 - val_accuracy: 0.8373
Epoch 339/1000
50/50 [==============================] - 55s 1s/step - loss: 0.3903 - accuracy:
0.8358 - val_loss: 0.4456 - val_accuracy: 0.8413
Epoch 340/1000
50/50 [==============================] - 53s 1s/step - loss: 0.3947 - accuracy:
0.8460 - val_loss: 0.4731 - val_accuracy: 0.8387
Epoch 341/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3637 - accuracy:
0.8612 - val_loss: 0.5246 - val_accuracy: 0.8093
Epoch 342/1000
50/50 [==============================] - 49s 986ms/step - loss: 0.3631 -
accuracy: 0.8572 - val_loss: 0.5653 - val_accuracy: 0.8113
```

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Epoch 343/1000
50/50 [==============================] - 58s 1s/step - loss: 0.3566 - accuracy:
0.8630 - val_loss: 0.4504 - val_accuracy: 0.8320
Epoch 344/1000
50/50 [==============================] - 54s 1s/step - loss: 0.3635 - accuracy:
0.8596 - val_loss: 0.5323 - val_accuracy: 0.8133
Epoch 345/1000
50/50 [==============================] - 47s 945ms/step - loss: 0.3514 -
accuracy: 0.8672 - val_loss: 0.4800 - val_accuracy: 0.8167
Epoch 346/1000
50/50 [==============================] - 55s 1s/step - loss: 0.3570 - accuracy:
0.8464 - val_loss: 0.4402 - val_accuracy: 0.8333
Epoch 347/1000
50/50 [==============================] - 58s 1s/step - loss: 0.3837 - accuracy:
0.8552 - val_loss: 0.4642 - val_accuracy: 0.8240
Epoch 348/1000
50/50 [==============================] - 50s 995ms/step - loss: 0.3780 -
accuracy: 0.8480 - val_loss: 0.7031 - val_accuracy: 0.7887
Epoch 349/1000
50/50 [==============================] - 62s 1s/step - loss: 0.3825 - accuracy:
0.8606 - val_loss: 0.4542 - val_accuracy: 0.8267
Epoch 350/1000
50/50 [==============================] - 50s 1s/step - loss: 0.3698 - accuracy:
0.8549 - val_loss: 0.5278 - val_accuracy: 0.8187
Epoch 351/1000
50/50 [==============================] - 45s 897ms/step - loss: 0.3690 -
accuracy: 0.8500 - val_loss: 0.4300 - val_accuracy: 0.8347
Epoch 352/1000
50/50 [==============================] - 49s 974ms/step - loss: 0.3664 -
accuracy: 0.8593 - val_loss: 0.4798 - val_accuracy: 0.8273
Epoch 353/1000
50/50 [==============================] - 50s 1s/step - loss: 0.3607 - accuracy:
0.8596 - val_loss: 0.5278 - val_accuracy: 0.8140
Epoch 354/1000
50/50 [==============================] - 49s 976ms/step - loss: 0.3608 -
accuracy: 0.8628 - val_loss: 0.4931 - val_accuracy: 0.8227
Epoch 355/1000
50/50 [==============================] - 54s 1s/step - loss: 0.3455 - accuracy:
0.8670 - val_loss: 0.4878 - val_accuracy: 0.8160
Epoch 356/1000
50/50 [==============================] - 50s 1s/step - loss: 0.4058 - accuracy:
0.8273 - val_loss: 0.5383 - val_accuracy: 0.8220
Epoch 357/1000
50/50 [==============================] - 44s 869ms/step - loss: 0.3599 -
accuracy: 0.8580 - val_loss: 0.5397 - val_accuracy: 0.8220
Epoch 358/1000
50/50 [==============================] - 50s 1s/step - loss: 0.3536 - accuracy:
0.8584 - val_loss: 0.4280 - val_accuracy: 0.8313
```

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Epoch 359/1000
50/50 [==============================] - 47s 933ms/step - loss: 0.3506 -
accuracy: 0.8628 - val_loss: 0.4412 - val_accuracy: 0.8360
Epoch 360/1000
50/50 [==============================] - 46s 913ms/step - loss: 0.3583 -
accuracy: 0.8576 - val_loss: 0.4096 - val_accuracy: 0.8367
Epoch 361/1000
50/50 [==============================] - 55s 1s/step - loss: 0.3575 - accuracy:
0.8644 - val_loss: 0.4477 - val_accuracy: 0.8373
Epoch 362/1000
50/50 [==============================] - 51s 1s/step - loss: 0.3500 - accuracy:
0.8662 - val_loss: 0.5046 - val_accuracy: 0.8300
Epoch 363/1000
50/50 [==============================] - 55s 1s/step - loss: 0.3552 - accuracy:
0.8564 - val_loss: 0.5243 - val_accuracy: 0.8173
Epoch 364/1000
50/50 [==============================] - 53s 1s/step - loss: 0.3904 - accuracy:
0.8420 - val_loss: 0.4865 - val_accuracy: 0.8147
Epoch 365/1000
50/50 [==============================] - 53s 1s/step - loss: 0.3571 - accuracy:
0.8480 - val_loss: 0.4512 - val_accuracy: 0.8280
Epoch 366/1000
50/50 [==============================] - 55s 1s/step - loss: 0.3676 - accuracy:
0.8504 - val_loss: 0.5316 - val_accuracy: 0.8080
Epoch 367/1000
50/50 [==============================] - 84s 2s/step - loss: 0.3510 - accuracy:
0.8593 - val_loss: 0.5240 - val_accuracy: 0.8347
Epoch 368/1000
50/50 [==============================] - 63s 1s/step - loss: 0.3428 - accuracy:
0.8630 - val_loss: 0.4955 - val_accuracy: 0.8113
Epoch 369/1000
50/50 [==============================] - 73s 1s/step - loss: 0.3604 - accuracy:
0.8636 - val_loss: 0.4751 - val_accuracy: 0.8287
Epoch 370/1000
50/50 [==============================] - 77s 2s/step - loss: 0.3215 - accuracy:
0.8708 - val_loss: 0.4384 - val_accuracy: 0.8367
Epoch 371/1000
50/50 [==============================] - 76s 2s/step - loss: 0.3520 - accuracy:
0.8600 - val_loss: 0.4923 - val_accuracy: 0.8260
Epoch 372/1000
50/50 [==============================] - 77s 2s/step - loss: 0.3686 - accuracy:
0.8540 - val_loss: 0.4313 - val_accuracy: 0.8447
Epoch 373/1000
50/50 [==============================] - 74s 1s/step - loss: 0.3620 - accuracy:
0.8592 - val_loss: 0.6222 - val_accuracy: 0.7960
Epoch 374/1000
50/50 [==============================] - 80s 2s/step - loss: 0.3403 - accuracy:
0.8576 - val_loss: 0.6156 - val_accuracy: 0.7833
```

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Epoch 375/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3539 - accuracy:
0.8703 - val_loss: 0.6587 - val_accuracy: 0.7720
Epoch 376/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3484 - accuracy:
0.8632 - val_loss: 0.5632 - val_accuracy: 0.8000
Epoch 377/1000
50/50 [==============================] - 103s 2s/step - loss: 0.3552 - accuracy:
0.8568 - val_loss: 0.6415 - val_accuracy: 0.7953
Epoch 378/1000
50/50 [==============================] - 86s 2s/step - loss: 0.3405 - accuracy:
0.8672 - val_loss: 0.4826 - val_accuracy: 0.8313
Epoch 379/1000
50/50 [==============================] - 86s 2s/step - loss: 0.3837 - accuracy:
0.8560 - val_loss: 0.6135 - val_accuracy: 0.7947
Epoch 380/1000
50/50 [==============================] - 83s 2s/step - loss: 0.3464 - accuracy:
0.8568 - val_loss: 0.5211 - val_accuracy: 0.8120
Epoch 381/1000
50/50 [==============================] - 99s 2s/step - loss: 0.3377 - accuracy:
0.8724 - val_loss: 0.4391 - val_accuracy: 0.8373
Epoch 382/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3642 - accuracy:
0.8548 - val_loss: 0.5669 - val_accuracy: 0.7960
Epoch 383/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3473 - accuracy:
0.8568 - val_loss: 0.5765 - val_accuracy: 0.8147
Epoch 384/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3582 - accuracy:
0.8568 - val_loss: 0.5888 - val_accuracy: 0.7993
Epoch 385/1000
50/50 [==============================] - 89s 2s/step - loss: 0.3587 - accuracy:
0.8624 - val_loss: 0.4787 - val_accuracy: 0.8320
Epoch 386/1000
50/50 [==============================] - 88s 2s/step - loss: 0.3254 - accuracy:
0.8735 - val_loss: 0.5832 - val_accuracy: 0.8153
Epoch 387/1000
50/50 [==============================] - 96s 2s/step - loss: 0.3274 - accuracy:
0.8680 - val_loss: 0.4874 - val_accuracy: 0.8307
Epoch 388/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3448 - accuracy:
0.8636 - val_loss: 0.4883 - val_accuracy: 0.8220
Epoch 389/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3402 - accuracy:
0.8628 - val_loss: 0.4833 - val_accuracy: 0.8260
Epoch 390/1000
50/50 [==============================] - 93s 2s/step - loss: 0.3283 - accuracy:
0.8692 - val_loss: 0.4925 - val_accuracy: 0.8320
```

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Epoch 391/1000
50/50 [==============================] - 88s 2s/step - loss: 0.3265 - accuracy:
0.8724 - val_loss: 0.4464 - val_accuracy: 0.8387
Epoch 392/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3360 - accuracy:
0.8700 - val_loss: 0.5140 - val_accuracy: 0.8187
Epoch 393/1000
50/50 [==============================] - 88s 2s/step - loss: 0.3357 - accuracy:
0.8719 - val_loss: 0.6797 - val_accuracy: 0.7827
Epoch 394/1000
50/50 [==============================] - 84s 2s/step - loss: 0.3580 - accuracy:
0.8600 - val_loss: 0.5092 - val_accuracy: 0.8160
Epoch 395/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3469 - accuracy:
0.8664 - val_loss: 0.4840 - val_accuracy: 0.8280
Epoch 396/1000
50/50 [==============================] - 79s 2s/step - loss: 0.3710 - accuracy:
0.8624 - val_loss: 0.4295 - val_accuracy: 0.8513
Epoch 397/1000
50/50 [==============================] - 89s 2s/step - loss: 0.3439 - accuracy:
0.8656 - val_loss: 0.5057 - val_accuracy: 0.8287
Epoch 398/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3470 - accuracy:
0.8716 - val_loss: 0.5590 - val_accuracy: 0.8180
Epoch 399/1000
50/50 [==============================] - 90s 2s/step - loss: 0.3535 - accuracy:
0.8620 - val_loss: 0.4384 - val_accuracy: 0.8393
Epoch 400/1000
50/50 [==============================] - 86s 2s/step - loss: 0.3078 - accuracy:
0.8812 - val_loss: 0.5786 - val_accuracy: 0.8013
Epoch 401/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3566 - accuracy:
0.8624 - val_loss: 0.4594 - val_accuracy: 0.8333
Epoch 402/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3407 - accuracy:
0.8656 - val_loss: 0.5410 - val_accuracy: 0.8273
Epoch 403/1000
50/50 [==============================] - 89s 2s/step - loss: 0.3682 - accuracy:
0.8568 - val_loss: 0.5166 - val_accuracy: 0.8300
Epoch 404/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3826 - accuracy:
0.8496 - val_loss: 0.5308 - val_accuracy: 0.7960
Epoch 405/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3463 - accuracy:
0.8614 - val_loss: 0.5072 - val_accuracy: 0.8227
Epoch 406/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3491 - accuracy:
0.8604 - val_loss: 0.5866 - val_accuracy: 0.8213
```

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Epoch 407/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3298 - accuracy:
0.8672 - val_loss: 0.5005 - val_accuracy: 0.8300
Epoch 408/1000
50/50 [==============================] - 104s 2s/step - loss: 0.3373 - accuracy:
0.8704 - val_loss: 0.5234 - val_accuracy: 0.8160
Epoch 409/1000
50/50 [==============================] - 83s 2s/step - loss: 0.3265 - accuracy:
0.8660 - val_loss: 0.4552 - val_accuracy: 0.8287
Epoch 410/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3623 - accuracy:
0.8600 - val_loss: 0.4635 - val_accuracy: 0.8340
Epoch 411/1000
50/50 [==============================] - 86s 2s/step - loss: 0.3289 - accuracy:
0.8716 - val_loss: 0.4740 - val_accuracy: 0.8433
Epoch 412/1000
50/50 [==============================] - 88s 2s/step - loss: 0.3339 - accuracy:
0.8654 - val_loss: 0.4448 - val_accuracy: 0.8587
Epoch 413/1000
50/50 [==============================] - 84s 2s/step - loss: 0.3539 - accuracy:
0.8664 - val_loss: 0.4041 - val_accuracy: 0.8520
Epoch 414/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3286 - accuracy:
0.8736 - val_loss: 0.4352 - val_accuracy: 0.8467
Epoch 415/1000
50/50 [==============================] - 92s 2s/step - loss: 0.3294 - accuracy:
0.8756 - val_loss: 0.5259 - val_accuracy: 0.8273
Epoch 416/1000
50/50 [==============================] - 88s 2s/step - loss: 0.3437 - accuracy:
0.8668 - val_loss: 0.6953 - val_accuracy: 0.7807
Epoch 417/1000
50/50 [==============================] - 83s 2s/step - loss: 0.3277 - accuracy:
0.8728 - val_loss: 0.5792 - val_accuracy: 0.8140
Epoch 418/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3498 - accuracy:
0.8588 - val_loss: 0.5615 - val_accuracy: 0.8140
Epoch 419/1000
50/50 [==============================] - 84s 2s/step - loss: 0.3436 - accuracy:
0.8654 - val_loss: 0.5740 - val_accuracy: 0.7973
Epoch 420/1000
50/50 [==============================] - 87s 2s/step - loss: 0.2989 - accuracy:
0.8844 - val_loss: 0.5322 - val_accuracy: 0.8160
Epoch 421/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3278 - accuracy:
0.8780 - val_loss: 0.7247 - val_accuracy: 0.7807
Epoch 422/1000
50/50 [==============================] - 92s 2s/step - loss: 0.3523 - accuracy:
0.8596 - val_loss: 0.5483 - val_accuracy: 0.8113
```

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Epoch 423/1000
50/50 [==============================] - 81s 2s/step - loss: 0.3277 - accuracy:
0.8796 - val_loss: 0.5190 - val_accuracy: 0.8273
Epoch 424/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3318 - accuracy:
0.8712 - val_loss: 0.6136 - val_accuracy: 0.7993
Epoch 425/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3571 - accuracy:
0.8636 - val_loss: 0.6348 - val_accuracy: 0.8067
Epoch 426/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3212 - accuracy:
0.8692 - val_loss: 0.4313 - val_accuracy: 0.8473
Epoch 427/1000
50/50 [==============================] - 80s 2s/step - loss: 0.3444 - accuracy:
0.8632 - val_loss: 0.4466 - val_accuracy: 0.8560
Epoch 428/1000
50/50 [==============================] - 83s 2s/step - loss: 0.3364 - accuracy:
0.8640 - val_loss: 0.5301 - val_accuracy: 0.8193
Epoch 429/1000
50/50 [==============================] - 106s 2s/step - loss: 0.3378 - accuracy:
0.8656 - val_loss: 0.4500 - val_accuracy: 0.8293
Epoch 430/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3500 - accuracy:
0.8593 - val_loss: 0.5029 - val_accuracy: 0.8273
Epoch 431/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3286 - accuracy:
0.8683 - val_loss: 0.7912 - val_accuracy: 0.7767
Epoch 432/1000
50/50 [==============================] - 92s 2s/step - loss: 0.3403 - accuracy:
0.8652 - val_loss: 0.5024 - val_accuracy: 0.8240
Epoch 433/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3255 - accuracy:
0.8764 - val_loss: 0.5205 - val_accuracy: 0.8240
Epoch 434/1000
50/50 [==============================] - 88s 2s/step - loss: 0.3366 - accuracy:
0.8626 - val_loss: 0.4203 - val_accuracy: 0.8480
Epoch 435/1000
50/50 [==============================] - 97s 2s/step - loss: 0.3316 - accuracy:
0.8715 - val_loss: 0.4519 - val_accuracy: 0.8413
Epoch 436/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3446 - accuracy:
0.8664 - val_loss: 0.4347 - val_accuracy: 0.8307
Epoch 437/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3317 - accuracy:
0.8632 - val_loss: 0.5655 - val_accuracy: 0.8120
Epoch 438/1000
50/50 [==============================] - 88s 2s/step - loss: 0.3409 - accuracy:
0.8735 - val_loss: 0.5040 - val_accuracy: 0.8287
```

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Epoch 439/1000
50/50 [==============================] - 86s 2s/step - loss: 0.3118 - accuracy:
0.8772 - val_loss: 0.4196 - val_accuracy: 0.8553
Epoch 440/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3359 - accuracy:
0.8668 - val_loss: 0.5311 - val_accuracy: 0.8093
Epoch 441/1000
50/50 [==============================] - 96s 2s/step - loss: 0.3235 - accuracy:
0.8720 - val_loss: 0.4756 - val_accuracy: 0.8380
Epoch 442/1000
50/50 [==============================] - 111s 2s/step - loss: 0.3246 - accuracy:
0.8752 - val_loss: 0.5390 - val_accuracy: 0.8167
Epoch 443/1000
50/50 [==============================] - 96s 2s/step - loss: 0.3207 - accuracy:
0.8772 - val_loss: 0.4836 - val_accuracy: 0.8347
Epoch 444/1000
50/50 [==============================] - 92s 2s/step - loss: 0.3120 - accuracy:
0.8820 - val_loss: 0.4516 - val_accuracy: 0.8480
Epoch 445/1000
50/50 [==============================] - 116s 2s/step - loss: 0.3178 - accuracy:
0.8764 - val_loss: 0.6191 - val_accuracy: 0.8020
Epoch 446/1000
50/50 [==============================] - 89s 2s/step - loss: 0.3344 - accuracy:
0.8666 - val_loss: 0.4797 - val_accuracy: 0.8327
Epoch 447/1000
50/50 [==============================] - 83s 2s/step - loss: 0.3465 - accuracy:
0.8630 - val_loss: 0.5072 - val_accuracy: 0.8273
Epoch 448/1000
50/50 [==============================] - 82s 2s/step - loss: 0.3233 - accuracy:
0.8768 - val_loss: 0.6865 - val_accuracy: 0.7947
Epoch 449/1000
50/50 [==============================] - 72s 1s/step - loss: 0.3355 - accuracy:
0.8664 - val_loss: 0.5018 - val_accuracy: 0.8273
Epoch 450/1000
50/50 [==============================] - 70s 1s/step - loss: 0.3430 - accuracy:
0.8593 - val_loss: 0.4650 - val_accuracy: 0.8320
Epoch 451/1000
50/50 [==============================] - 70s 1s/step - loss: 0.3273 - accuracy:
0.8662 - val_loss: 0.5434 - val_accuracy: 0.8127
Epoch 452/1000
50/50 [==============================] - 71s 1s/step - loss: 0.3518 - accuracy:
0.8644 - val_loss: 0.5066 - val_accuracy: 0.8120
Epoch 453/1000
50/50 [==============================] - 70s 1s/step - loss: 0.3185 - accuracy:
0.8768 - val_loss: 0.4015 - val_accuracy: 0.8493
Epoch 454/1000
50/50 [==============================] - 72s 1s/step - loss: 0.3230 - accuracy:
0.8788 - val_loss: 0.4302 - val_accuracy: 0.8380
```

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Epoch 455/1000
50/50 [==============================] - 71s 1s/step - loss: 0.3186 - accuracy:
0.8704 - val_loss: 0.4398 - val_accuracy: 0.8487
Epoch 456/1000
50/50 [==============================] - 128s 3s/step - loss: 0.3192 - accuracy:
0.8732 - val_loss: 0.4599 - val_accuracy: 0.8193
Epoch 457/1000
50/50 [==============================] - 80s 2s/step - loss: 0.3200 - accuracy:
0.8800 - val_loss: 0.4537 - val_accuracy: 0.8327
Epoch 458/1000
50/50 [==============================] - 75s 2s/step - loss: 0.3360 - accuracy:
0.8660 - val_loss: 0.5183 - val_accuracy: 0.8180
Epoch 459/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3329 - accuracy:
0.8696 - val_loss: 0.5379 - val_accuracy: 0.8273
Epoch 460/1000
50/50 [==============================] - 83s 2s/step - loss: 0.3219 - accuracy:
0.8820 - val_loss: 0.5821 - val_accuracy: 0.8100
Epoch 461/1000
50/50 [==============================] - 86s 2s/step - loss: 0.3445 - accuracy:
0.8776 - val_loss: 0.3985 - val_accuracy: 0.8547
Epoch 462/1000
50/50 [==============================] - 78s 2s/step - loss: 0.3188 - accuracy:
0.8784 - val_loss: 0.5354 - val_accuracy: 0.8273
Epoch 463/1000
50/50 [==============================] - 98s 2s/step - loss: 0.3654 - accuracy:
0.8620 - val_loss: 0.4671 - val_accuracy: 0.8413
Epoch 464/1000
50/50 [==============================] - 76s 2s/step - loss: 0.3289 - accuracy:
0.8712 - val_loss: 0.5194 - val_accuracy: 0.8280
Epoch 465/1000
50/50 [==============================] - 84s 2s/step - loss: 0.3152 - accuracy:
0.8756 - val_loss: 0.4755 - val_accuracy: 0.8307
Epoch 466/1000
50/50 [==============================] - 79s 2s/step - loss: 0.3146 - accuracy:
0.8764 - val_loss: 0.5552 - val_accuracy: 0.8220
Epoch 467/1000
50/50 [==============================] - 83s 2s/step - loss: 0.3267 - accuracy:
0.8808 - val_loss: 0.4601 - val_accuracy: 0.8427
Epoch 468/1000
50/50 [==============================] - 74s 1s/step - loss: 0.3135 - accuracy:
0.8792 - val_loss: 0.4651 - val_accuracy: 0.8480
Epoch 469/1000
50/50 [==============================] - 78s 2s/step - loss: 0.3329 - accuracy:
0.8604 - val_loss: 0.4614 - val_accuracy: 0.8393
Epoch 470/1000
50/50 [==============================] - 100s 2s/step - loss: 0.3233 - accuracy:
0.8712 - val_loss: 0.4725 - val_accuracy: 0.8373
```

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Epoch 471/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3539 - accuracy:
0.8608 - val_loss: 0.6089 - val_accuracy: 0.8040
Epoch 472/1000
50/50 [==============================] - 103s 2s/step - loss: 0.3196 - accuracy:
0.8676 - val_loss: 0.6061 - val_accuracy: 0.7920
Epoch 473/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3377 - accuracy:
0.8752 - val_loss: 0.5735 - val_accuracy: 0.8200
Epoch 474/1000
50/50 [==============================] - 90s 2s/step - loss: 0.2902 - accuracy:
0.8784 - val_loss: 0.6833 - val_accuracy: 0.8027
Epoch 475/1000
50/50 [==============================] - 92s 2s/step - loss: 0.3168 - accuracy:
0.8832 - val_loss: 0.7072 - val_accuracy: 0.7907
Epoch 476/1000
50/50 [==============================] - 99s 2s/step - loss: 0.3280 - accuracy:
0.8736 - val_loss: 0.5205 - val_accuracy: 0.8300
Epoch 477/1000
50/50 [==============================] - 106s 2s/step - loss: 0.3143 - accuracy:
0.8756 - val_loss: 0.4498 - val_accuracy: 0.8333
Epoch 478/1000
50/50 [==============================] - 93s 2s/step - loss: 0.3111 - accuracy:
0.8808 - val_loss: 0.5499 - val_accuracy: 0.8133
Epoch 479/1000
50/50 [==============================] - 96s 2s/step - loss: 0.3175 - accuracy:
0.8740 - val_loss: 0.3992 - val_accuracy: 0.8580
Epoch 480/1000
50/50 [==============================] - 97s 2s/step - loss: 0.3133 - accuracy:
0.8740 - val_loss: 0.4892 - val_accuracy: 0.8453
Epoch 481/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3174 - accuracy:
0.8796 - val_loss: 0.5454 - val_accuracy: 0.8187
Epoch 482/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3171 - accuracy:
0.8792 - val_loss: 0.5184 - val_accuracy: 0.8273
Epoch 483/1000
50/50 [==============================] - 115s 2s/step - loss: 0.3202 - accuracy:
0.8764 - val_loss: 0.5213 - val_accuracy: 0.8313
Epoch 484/1000
50/50 [==============================] - 93s 2s/step - loss: 0.3374 - accuracy:
0.8707 - val_loss: 0.5291 - val_accuracy: 0.8320
Epoch 485/1000
50/50 [==============================] - 90s 2s/step - loss: 0.3188 - accuracy:
0.8712 - val_loss: 0.5200 - val_accuracy: 0.8280
Epoch 486/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3324 - accuracy:
0.8723 - val_loss: 0.4705 - val_accuracy: 0.8313
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Epoch 487/1000
50/50 [==============================] - 84s 2s/step - loss: 0.3025 - accuracy:
0.8772 - val_loss: 0.4892 - val_accuracy: 0.8260
Epoch 488/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3291 - accuracy:
0.8687 - val_loss: 0.4637 - val_accuracy: 0.8367
Epoch 489/1000
50/50 [==============================] - 119s 2s/step - loss: 0.3318 - accuracy:
0.8720 - val_loss: 0.5028 - val_accuracy: 0.8287
Epoch 490/1000
50/50 [==============================] - 98s 2s/step - loss: 0.3242 - accuracy:
0.8808 - val_loss: 0.5516 - val_accuracy: 0.8167
Epoch 491/1000
50/50 [==============================] - 96s 2s/step - loss: 0.3469 - accuracy:
0.8580 - val_loss: 0.4912 - val_accuracy: 0.8307
Epoch 492/1000
50/50 [==============================] - 97s 2s/step - loss: 0.3135 - accuracy:
0.8747 - val_loss: 0.5522 - val_accuracy: 0.8020
Epoch 493/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3189 - accuracy:
0.8695 - val_loss: 0.7290 - val_accuracy: 0.7967
Epoch 494/1000
50/50 [==============================] - 77s 2s/step - loss: 0.3205 - accuracy:
0.8784 - val_loss: 0.5318 - val_accuracy: 0.8233
Epoch 495/1000
50/50 [==============================] - 104s 2s/step - loss: 0.3568 - accuracy:
0.8712 - val_loss: 0.5558 - val_accuracy: 0.8133
Epoch 496/1000
50/50 [==============================] - 93s 2s/step - loss: 0.3098 - accuracy:
0.8768 - val_loss: 0.5040 - val_accuracy: 0.8413
Epoch 497/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3268 - accuracy:
0.8724 - val_loss: 0.5181 - val_accuracy: 0.8253
Epoch 498/1000
50/50 [==============================] - 87s 2s/step - loss: 0.2950 - accuracy:
0.8865 - val_loss: 0.6193 - val_accuracy: 0.8113
Epoch 499/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3565 - accuracy:
0.8640 - val_loss: 0.4662 - val_accuracy: 0.8353
Epoch 500/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3203 - accuracy:
0.8656 - val_loss: 0.5068 - val_accuracy: 0.8173
Epoch 501/1000
50/50 [==============================] - 83s 2s/step - loss: 0.3203 - accuracy:
0.8756 - val_loss: 0.5471 - val_accuracy: 0.8160
Epoch 502/1000
50/50 [==============================] - 103s 2s/step - loss: 0.3388 - accuracy:
0.8704 - val_loss: 0.4499 - val_accuracy: 0.8407
```

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Epoch 503/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3180 - accuracy:
0.8748 - val_loss: 0.5393 - val_accuracy: 0.8173
Epoch 504/1000
50/50 [==============================] - 89s 2s/step - loss: 0.3223 - accuracy:
0.8728 - val_loss: 0.4674 - val_accuracy: 0.8333
Epoch 505/1000
50/50 [==============================] - 89s 2s/step - loss: 0.3016 - accuracy:
0.8844 - val_loss: 0.5328 - val_accuracy: 0.8287
Epoch 506/1000
50/50 [==============================] - 99s 2s/step - loss: 0.3088 - accuracy:
0.8772 - val_loss: 0.5204 - val_accuracy: 0.8253
Epoch 507/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3466 - accuracy:
0.8664 - val_loss: 0.5154 - val_accuracy: 0.8160
Epoch 508/1000
50/50 [==============================] - 117s 2s/step - loss: 0.2999 - accuracy:
0.8876 - val_loss: 0.5629 - val_accuracy: 0.8200
Epoch 509/1000
50/50 [==============================] - 96s 2s/step - loss: 0.3155 - accuracy:
0.8748 - val_loss: 0.4827 - val_accuracy: 0.8333
Epoch 510/1000
50/50 [==============================] - 99s 2s/step - loss: 0.3066 - accuracy:
0.8711 - val_loss: 0.4567 - val_accuracy: 0.8267
Epoch 511/1000
50/50 [==============================] - 89s 2s/step - loss: 0.3141 - accuracy:
0.8736 - val_loss: 0.5237 - val_accuracy: 0.8313
Epoch 512/1000
50/50 [==============================] - 93s 2s/step - loss: 0.3066 - accuracy:
0.8764 - val_loss: 0.5655 - val_accuracy: 0.8287
Epoch 513/1000
50/50 [==============================] - 98s 2s/step - loss: 0.3294 - accuracy:
0.8680 - val_loss: 0.4993 - val_accuracy: 0.8367
Epoch 514/1000
50/50 [==============================] - 99s 2s/step - loss: 0.2970 - accuracy:
0.8852 - val_loss: 0.4864 - val_accuracy: 0.8487
Epoch 515/1000
50/50 [==============================] - 106s 2s/step - loss: 0.3127 - accuracy:
0.8776 - val_loss: 0.5090 - val_accuracy: 0.8247
Epoch 516/1000
50/50 [==============================] - 75s 1s/step - loss: 0.2787 - accuracy:
0.8952 - val_loss: 0.5245 - val_accuracy: 0.8467
Epoch 517/1000
50/50 [==============================] - 77s 2s/step - loss: 0.3098 - accuracy:
0.8772 - val_loss: 0.4473 - val_accuracy: 0.8420
Epoch 518/1000
50/50 [==============================] - 76s 2s/step - loss: 0.3071 - accuracy:
0.8860 - val_loss: 0.5313 - val_accuracy: 0.8153
```

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Epoch 519/1000
50/50 [==============================] - 82s 2s/step - loss: 0.3411 - accuracy:
0.8596 - val_loss: 0.5238 - val_accuracy: 0.8380
Epoch 520/1000
50/50 [==============================] - 74s 1s/step - loss: 0.2958 - accuracy:
0.8792 - val_loss: 0.4863 - val_accuracy: 0.8427
Epoch 521/1000
50/50 [==============================] - 75s 2s/step - loss: 0.3088 - accuracy:
0.8868 - val_loss: 0.4937 - val_accuracy: 0.8187
Epoch 522/1000
50/50 [==============================] - 90s 2s/step - loss: 0.3039 - accuracy:
0.8864 - val_loss: 0.5140 - val_accuracy: 0.8260
Epoch 523/1000
50/50 [==============================] - 75s 2s/step - loss: 0.3191 - accuracy:
0.8780 - val_loss: 0.5570 - val_accuracy: 0.8167
Epoch 524/1000
50/50 [==============================] - 72s 1s/step - loss: 0.3257 - accuracy:
0.8752 - val_loss: 0.4454 - val_accuracy: 0.8427
Epoch 525/1000
50/50 [==============================] - 73s 1s/step - loss: 0.3021 - accuracy:
0.8848 - val_loss: 0.5024 - val_accuracy: 0.8193
Epoch 526/1000
50/50 [==============================] - 92s 2s/step - loss: 0.3262 - accuracy:
0.8732 - val_loss: 0.4935 - val_accuracy: 0.8373
Epoch 527/1000
50/50 [==============================] - 94s 2s/step - loss: 0.2949 - accuracy:
0.8824 - val_loss: 0.4681 - val_accuracy: 0.8447
Epoch 528/1000
50/50 [==============================] - 92s 2s/step - loss: 0.2909 - accuracy:
0.8828 - val_loss: 0.4722 - val_accuracy: 0.8387
Epoch 529/1000
50/50 [==============================] - 107s 2s/step - loss: 0.2919 - accuracy:
0.8872 - val_loss: 0.6101 - val_accuracy: 0.7987
Epoch 530/1000
50/50 [==============================] - 112s 2s/step - loss: 0.3961 - accuracy:
0.8536 - val_loss: 0.4524 - val_accuracy: 0.8427
Epoch 531/1000
50/50 [==============================] - 93s 2s/step - loss: 0.3350 - accuracy:
0.8656 - val_loss: 0.5559 - val_accuracy: 0.8193
Epoch 532/1000
50/50 [==============================] - 92s 2s/step - loss: 0.2878 - accuracy:
0.8912 - val_loss: 0.5639 - val_accuracy: 0.8033
Epoch 533/1000
50/50 [==============================] - 88s 2s/step - loss: 0.2961 - accuracy:
0.8868 - val_loss: 0.5807 - val_accuracy: 0.8080
Epoch 534/1000
50/50 [==============================] - 86s 2s/step - loss: 0.2998 - accuracy:
0.8940 - val_loss: 0.4578 - val_accuracy: 0.8513
```

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Epoch 535/1000
50/50 [==============================] - 100s 2s/step - loss: 0.3261 - accuracy:
0.8711 - val_loss: 0.4156 - val_accuracy: 0.8507
Epoch 536/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3086 - accuracy:
0.8792 - val_loss: 0.4635 - val_accuracy: 0.8440
Epoch 537/1000
50/50 [==============================] - 84s 2s/step - loss: 0.3228 - accuracy:
0.8720 - val_loss: 0.5032 - val_accuracy: 0.8227
Epoch 538/1000
50/50 [==============================] - 79s 2s/step - loss: 0.3140 - accuracy:
0.8691 - val_loss: 0.4921 - val_accuracy: 0.8413
Epoch 539/1000
50/50 [==============================] - 91s 2s/step - loss: 0.2914 - accuracy:
0.8800 - val_loss: 0.5229 - val_accuracy: 0.8393
Epoch 540/1000
50/50 [==============================] - 88s 2s/step - loss: 0.3122 - accuracy:
0.8768 - val_loss: 0.4341 - val_accuracy: 0.8353
Epoch 541/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3022 - accuracy:
0.8816 - val_loss: 0.4748 - val_accuracy: 0.8260
Epoch 542/1000
50/50 [==============================] - 108s 2s/step - loss: 0.3016 - accuracy:
0.8796 - val_loss: 0.4725 - val_accuracy: 0.8407
Epoch 543/1000
50/50 [==============================] - 76s 2s/step - loss: 0.3233 - accuracy:
0.8768 - val_loss: 0.4887 - val_accuracy: 0.8347
Epoch 544/1000
50/50 [==============================] - 89s 2s/step - loss: 0.3257 - accuracy:
0.8744 - val_loss: 0.5090 - val_accuracy: 0.8393
Epoch 545/1000
50/50 [==============================] - 93s 2s/step - loss: 0.3094 - accuracy:
0.8736 - val_loss: 0.5494 - val_accuracy: 0.8320
Epoch 546/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3025 - accuracy:
0.8840 - val_loss: 0.4420 - val_accuracy: 0.8400
Epoch 547/1000
50/50 [==============================] - 90s 2s/step - loss: 0.3155 - accuracy:
0.8764 - val_loss: 0.4935 - val_accuracy: 0.8360
Epoch 548/1000
50/50 [==============================] - 104s 2s/step - loss: 0.2900 - accuracy:
0.8848 - val_loss: 0.5306 - val_accuracy: 0.8307
Epoch 549/1000
50/50 [==============================] - 102s 2s/step - loss: 0.3061 - accuracy:
0.8820 - val_loss: 0.4513 - val_accuracy: 0.8340
Epoch 550/1000
50/50 [==============================] - 92s 2s/step - loss: 0.2636 - accuracy:
0.8944 - val_loss: 0.4440 - val_accuracy: 0.8487
```

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Epoch 551/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3142 - accuracy:
0.8748 - val_loss: 0.4735 - val_accuracy: 0.8467
Epoch 552/1000
50/50 [==============================] - 98s 2s/step - loss: 0.2944 - accuracy:
0.8828 - val_loss: 0.4504 - val_accuracy: 0.8513
Epoch 553/1000
50/50 [==============================] - 99s 2s/step - loss: 0.2942 - accuracy:
0.8892 - val_loss: 0.6719 - val_accuracy: 0.8080
Epoch 554/1000
50/50 [==============================] - 101s 2s/step - loss: 0.3158 - accuracy:
0.8752 - val_loss: 0.5754 - val_accuracy: 0.8220
Epoch 555/1000
50/50 [==============================] - 113s 2s/step - loss: 0.3113 - accuracy:
0.8728 - val_loss: 0.4471 - val_accuracy: 0.8413
Epoch 556/1000
50/50 [==============================] - 98s 2s/step - loss: 0.3215 - accuracy:
0.8768 - val_loss: 0.4814 - val_accuracy: 0.8487
Epoch 557/1000
50/50 [==============================] - 78s 2s/step - loss: 0.2902 - accuracy:
0.8828 - val_loss: 0.5626 - val_accuracy: 0.8207
Epoch 558/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3315 - accuracy:
0.8644 - val_loss: 0.4818 - val_accuracy: 0.8460
Epoch 559/1000
50/50 [==============================] - 88s 2s/step - loss: 0.2988 - accuracy:
0.8864 - val_loss: 0.5448 - val_accuracy: 0.8247
Epoch 560/1000
50/50 [==============================] - 111s 2s/step - loss: 0.3222 - accuracy:
0.8780 - val_loss: 0.5132 - val_accuracy: 0.8287
Epoch 561/1000
50/50 [==============================] - 111s 2s/step - loss: 0.2917 - accuracy:
0.8904 - val_loss: 0.5334 - val_accuracy: 0.8107
Epoch 562/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3403 - accuracy:
0.8756 - val_loss: 0.5226 - val_accuracy: 0.8367
Epoch 563/1000
50/50 [==============================] - 99s 2s/step - loss: 0.3193 - accuracy:
0.8772 - val_loss: 0.6482 - val_accuracy: 0.8013
Epoch 564/1000
50/50 [==============================] - 92s 2s/step - loss: 0.2979 - accuracy:
0.8780 - val_loss: 0.4694 - val_accuracy: 0.8387
Epoch 565/1000
50/50 [==============================] - 97s 2s/step - loss: 0.2942 - accuracy:
0.8852 - val_loss: 0.5351 - val_accuracy: 0.8287
Epoch 566/1000
50/50 [==============================] - 106s 2s/step - loss: 0.2986 - accuracy:
0.8812 - val_loss: 0.6303 - val_accuracy: 0.8067
```

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Epoch 567/1000
50/50 [==============================] - 114s 2s/step - loss: 0.2946 - accuracy:
0.8904 - val_loss: 0.4556 - val_accuracy: 0.8380
Epoch 568/1000
50/50 [==============================] - 93s 2s/step - loss: 0.2938 - accuracy:
0.8864 - val_loss: 0.5816 - val_accuracy: 0.8113
Epoch 569/1000
50/50 [==============================] - 97s 2s/step - loss: 0.2918 - accuracy:
0.8820 - val_loss: 0.5359 - val_accuracy: 0.8273
Epoch 570/1000
50/50 [==============================] - 99s 2s/step - loss: 0.2920 - accuracy:
0.8828 - val_loss: 0.5780 - val_accuracy: 0.8193
Epoch 571/1000
50/50 [==============================] - 100s 2s/step - loss: 0.2876 - accuracy:
0.8840 - val_loss: 0.5109 - val_accuracy: 0.8340
Epoch 572/1000
50/50 [==============================] - 97s 2s/step - loss: 0.2973 - accuracy:
0.8860 - val_loss: 0.5730 - val_accuracy: 0.8193
Epoch 573/1000
50/50 [==============================] - 100s 2s/step - loss: 0.2959 - accuracy:
0.8796 - val_loss: 0.5769 - val_accuracy: 0.8200
Epoch 574/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3123 - accuracy:
0.8804 - val_loss: 0.5139 - val_accuracy: 0.8427
Epoch 575/1000
50/50 [==============================] - 90s 2s/step - loss: 0.3072 - accuracy:
0.8792 - val_loss: 0.4657 - val_accuracy: 0.8467
Epoch 576/1000
50/50 [==============================] - 89s 2s/step - loss: 0.2978 - accuracy:
0.8812 - val_loss: 0.4735 - val_accuracy: 0.8487
Epoch 577/1000
50/50 [==============================] - 91s 2s/step - loss: 0.2870 - accuracy:
0.8865 - val_loss: 0.5218 - val_accuracy: 0.8413
Epoch 578/1000
50/50 [==============================] - 86s 2s/step - loss: 0.2979 - accuracy:
0.8837 - val_loss: 0.5193 - val_accuracy: 0.8380
Epoch 579/1000
50/50 [==============================] - 87s 2s/step - loss: 0.2912 - accuracy:
0.8836 - val_loss: 0.6769 - val_accuracy: 0.8040
Epoch 580/1000
50/50 [==============================] - 103s 2s/step - loss: 0.3106 - accuracy:
0.8844 - val_loss: 0.5221 - val_accuracy: 0.8287
Epoch 581/1000
50/50 [==============================] - 96s 2s/step - loss: 0.2927 - accuracy:
0.8828 - val_loss: 0.5437 - val_accuracy: 0.8160
Epoch 582/1000
50/50 [==============================] - 97s 2s/step - loss: 0.2943 - accuracy:
0.8860 - val_loss: 0.4398 - val_accuracy: 0.8347
```

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Epoch 583/1000
50/50 [==============================] - 93s 2s/step - loss: 0.2934 - accuracy:
0.8868 - val_loss: 0.4972 - val_accuracy: 0.8240
Epoch 584/1000
50/50 [==============================] - 98s 2s/step - loss: 0.2904 - accuracy:
0.8906 - val_loss: 0.5239 - val_accuracy: 0.8220
Epoch 585/1000
50/50 [==============================] - 111s 2s/step - loss: 0.3144 - accuracy:
0.8720 - val_loss: 0.5693 - val_accuracy: 0.8193
Epoch 586/1000
50/50 [==============================] - 103s 2s/step - loss: 0.2820 - accuracy:
0.8884 - val_loss: 0.5798 - val_accuracy: 0.8227
Epoch 587/1000
50/50 [==============================] - 100s 2s/step - loss: 0.2829 - accuracy:
0.8946 - val_loss: 0.4719 - val_accuracy: 0.8453
Epoch 588/1000
50/50 [==============================] - 102s 2s/step - loss: 0.2910 - accuracy:
0.8900 - val_loss: 0.5093 - val_accuracy: 0.8433
Epoch 589/1000
50/50 [==============================] - 98s 2s/step - loss: 0.3003 - accuracy:
0.8840 - val_loss: 0.4635 - val_accuracy: 0.8380
Epoch 590/1000
50/50 [==============================] - 93s 2s/step - loss: 0.2957 - accuracy:
0.8836 - val_loss: 0.5523 - val_accuracy: 0.8247
Epoch 591/1000
50/50 [==============================] - 92s 2s/step - loss: 0.2886 - accuracy:
0.8872 - val_loss: 0.4847 - val_accuracy: 0.8340
Epoch 592/1000
50/50 [==============================] - 103s 2s/step - loss: 0.2971 - accuracy:
0.8860 - val_loss: 0.4495 - val_accuracy: 0.8420
Epoch 593/1000
50/50 [==============================] - 92s 2s/step - loss: 0.3093 - accuracy:
0.8824 - val_loss: 0.5929 - val_accuracy: 0.8367
Epoch 594/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3298 - accuracy:
0.8792 - val_loss: 0.5427 - val_accuracy: 0.8147
Epoch 595/1000
50/50 [==============================] - 98s 2s/step - loss: 0.2984 - accuracy:
0.8946 - val_loss: 0.5355 - val_accuracy: 0.8193
Epoch 596/1000
50/50 [==============================] - 90s 2s/step - loss: 0.3436 - accuracy:
0.8636 - val_loss: 0.4743 - val_accuracy: 0.8260
Epoch 597/1000
50/50 [==============================] - 93s 2s/step - loss: 0.3202 - accuracy:
0.8732 - val_loss: 0.5348 - val_accuracy: 0.8260
Epoch 598/1000
50/50 [==============================] - 104s 2s/step - loss: 0.3105 - accuracy:
0.8756 - val_loss: 0.5506 - val_accuracy: 0.8167
```

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Epoch 599/1000
50/50 [==============================] - 87s 2s/step - loss: 0.3088 - accuracy:
0.8760 - val_loss: 0.5893 - val_accuracy: 0.8247
Epoch 600/1000
50/50 [==============================] - 94s 2s/step - loss: 0.2925 - accuracy:
0.8848 - val_loss: 0.4816 - val_accuracy: 0.8340
Epoch 601/1000
50/50 [==============================] - 90s 2s/step - loss: 0.2887 - accuracy:
0.8868 - val_loss: 0.4777 - val_accuracy: 0.8293
Epoch 602/1000
50/50 [==============================] - 85s 2s/step - loss: 0.3045 - accuracy:
0.8788 - val_loss: 0.4885 - val_accuracy: 0.8313
Epoch 603/1000
50/50 [==============================] - 99s 2s/step - loss: 0.3049 - accuracy:
0.8792 - val_loss: 0.5386 - val_accuracy: 0.8240
Epoch 604/1000
50/50 [==============================] - 104s 2s/step - loss: 0.2553 - accuracy:
0.8995 - val_loss: 0.5032 - val_accuracy: 0.8307
Epoch 605/1000
50/50 [==============================] - 96s 2s/step - loss: 0.3066 - accuracy:
0.8780 - val_loss: 0.4791 - val_accuracy: 0.8500
Epoch 606/1000
50/50 [==============================] - 89s 2s/step - loss: 0.3054 - accuracy:
0.8856 - val_loss: 0.5408 - val_accuracy: 0.8347
Epoch 607/1000
50/50 [==============================] - 97s 2s/step - loss: 0.2913 - accuracy:
0.8904 - val_loss: 0.5016 - val_accuracy: 0.8467
Epoch 608/1000
50/50 [==============================] - 92s 2s/step - loss: 0.3037 - accuracy:
0.8808 - val_loss: 0.4265 - val_accuracy: 0.8473
Epoch 609/1000
50/50 [==============================] - 94s 2s/step - loss: 0.2992 - accuracy:
0.8872 - val_loss: 0.4713 - val_accuracy: 0.8393
Epoch 610/1000
50/50 [==============================] - 95s 2s/step - loss: 0.2754 - accuracy:
0.8988 - val_loss: 0.4639 - val_accuracy: 0.8487
Epoch 611/1000
50/50 [==============================] - 89s 2s/step - loss: 0.2981 - accuracy:
0.8792 - val_loss: 0.4973 - val_accuracy: 0.8360
Epoch 612/1000
50/50 [==============================] - 93s 2s/step - loss: 0.2937 - accuracy:
0.8860 - val_loss: 0.5824 - val_accuracy: 0.8213
Epoch 613/1000
50/50 [==============================] - 98s 2s/step - loss: 0.2922 - accuracy:
0.8896 - val_loss: 0.5175 - val_accuracy: 0.8327
Epoch 614/1000
50/50 [==============================] - 98s 2s/step - loss: 0.2907 - accuracy:
0.8820 - val_loss: 0.4193 - val_accuracy: 0.8560
```

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Epoch 615/1000
50/50 [==============================] - 100s 2s/step - loss: 0.2661 - accuracy:
0.8940 - val_loss: 0.4788 - val_accuracy: 0.8407
Epoch 616/1000
50/50 [==============================] - 92s 2s/step - loss: 0.2837 - accuracy:
0.8910 - val_loss: 0.6315 - val_accuracy: 0.8087
Epoch 617/1000
50/50 [==============================] - 114s 2s/step - loss: 0.2769 - accuracy:
0.8983 - val_loss: 0.5118 - val_accuracy: 0.8220
Epoch 618/1000
50/50 [==============================] - 94s 2s/step - loss: 0.2753 - accuracy:
0.8924 - val_loss: 0.7557 - val_accuracy: 0.8027
Epoch 619/1000
50/50 [==============================] - 97s 2s/step - loss: 0.3226 - accuracy:
0.8622 - val_loss: 0.4925 - val_accuracy: 0.8407
Epoch 620/1000
50/50 [==============================] - 88s 2s/step - loss: 0.2934 - accuracy:
0.8796 - val_loss: 0.5230 - val_accuracy: 0.8247
Epoch 621/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3062 - accuracy:
0.8788 - val_loss: 0.4823 - val_accuracy: 0.8407
Epoch 622/1000
50/50 [==============================] - 91s 2s/step - loss: 0.3160 - accuracy:
0.8812 - val_loss: 0.5463 - val_accuracy: 0.8127
Epoch 623/1000
50/50 [==============================] - 109s 2s/step - loss: 0.2978 - accuracy:
0.8864 - val_loss: 0.5064 - val_accuracy: 0.8240
Epoch 624/1000
50/50 [==============================] - 94s 2s/step - loss: 0.2727 - accuracy:
0.8893 - val_loss: 0.5421 - val_accuracy: 0.8260
Epoch 625/1000
50/50 [==============================] - 105s 2s/step - loss: 0.3007 - accuracy:
0.8772 - val_loss: 0.4997 - val_accuracy: 0.8300
Epoch 626/1000
50/50 [==============================] - 105s 2s/step - loss: 0.2734 - accuracy:
0.8952 - val_loss: 0.5699 - val_accuracy: 0.8320
Epoch 627/1000
50/50 [==============================] - 96s 2s/step - loss: 0.2765 - accuracy:
0.8876 - val_loss: 0.5334 - val_accuracy: 0.8200
Epoch 628/1000
50/50 [==============================] - 95s 2s/step - loss: 0.2868 - accuracy:
0.8972 - val_loss: 0.7033 - val_accuracy: 0.7967
Epoch 629/1000
50/50 [==============================] - 114s 2s/step - loss: 0.3136 - accuracy:
0.8796 - val_loss: 0.4740 - val_accuracy: 0.8407
Epoch 630/1000
50/50 [==============================] - 92s 2s/step - loss: 0.3047 - accuracy:
0.8724 - val_loss: 0.5740 - val_accuracy: 0.8193
```

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Epoch 631/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3048 - accuracy:
0.8812 - val_loss: 0.5441 - val_accuracy: 0.8220
Epoch 632/1000
50/50 [==============================] - 92s 2s/step - loss: 0.2802 - accuracy:
0.8908 - val_loss: 0.4826 - val_accuracy: 0.8447
Epoch 633/1000
50/50 [==============================] - 96s 2s/step - loss: 0.2718 - accuracy:
0.8880 - val_loss: 0.5846 - val_accuracy: 0.8293
Epoch 634/1000
50/50 [==============================] - 116s 2s/step - loss: 0.2826 - accuracy:
0.8872 - val_loss: 0.4609 - val_accuracy: 0.8500
Epoch 635/1000
50/50 [==============================] - 147s 3s/step - loss: 0.3042 - accuracy:
0.8852 - val_loss: 0.4799 - val_accuracy: 0.8293
Epoch 636/1000
50/50 [==============================] - 94s 2s/step - loss: 0.3258 - accuracy:
0.8748 - val_loss: 0.4704 - val_accuracy: 0.8473
Epoch 637/1000
50/50 [==============================] - 93s 2s/step - loss: 0.2923 - accuracy:
0.8853 - val_loss: 0.5348 - val_accuracy: 0.8193
Epoch 638/1000
50/50 [==============================] - 93s 2s/step - loss: 0.2631 - accuracy:
0.9008 - val_loss: 0.4673 - val_accuracy: 0.8407
Epoch 639/1000
50/50 [==============================] - 96s 2s/step - loss: 0.3188 - accuracy:
0.8808 - val_loss: 0.4502 - val_accuracy: 0.8353
Epoch 640/1000
50/50 [==============================] - 100s 2s/step - loss: 0.2766 - accuracy:
0.8948 - val_loss: 0.5285 - val_accuracy: 0.8407
Epoch 641/1000
50/50 [==============================] - 120s 2s/step - loss: 0.3476 - accuracy:
0.8724 - val_loss: 0.5370 - val_accuracy: 0.8200
Epoch 642/1000
50/50 [==============================] - 102s 2s/step - loss: 0.3109 - accuracy:
0.8833 - val_loss: 0.4353 - val_accuracy: 0.8560
Epoch 643/1000
50/50 [==============================] - 98s 2s/step - loss: 0.2805 - accuracy:
0.8924 - val_loss: 0.5491 - val_accuracy: 0.8380
Epoch 644/1000
50/50 [==============================] - 96s 2s/step - loss: 0.2917 - accuracy:
0.8908 - val_loss: 0.4891 - val_accuracy: 0.8600
Epoch 645/1000
50/50 [==============================] - 91s 2s/step - loss: 0.2881 - accuracy:
0.8910 - val_loss: 0.5235 - val_accuracy: 0.8393
Epoch 646/1000
50/50 [==============================] - 96s 2s/step - loss: 0.2541 - accuracy:
0.8976 - val_loss: 0.4688 - val_accuracy: 0.8473
```

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Epoch 647/1000
50/50 [==============================] - 110s 2s/step - loss: 0.3085 - accuracy:
0.8856 - val_loss: 0.5054 - val_accuracy: 0.8440
Epoch 648/1000
50/50 [==============================] - 99s 2s/step - loss: 0.2807 - accuracy:
0.8857 - val_loss: 0.4706 - val_accuracy: 0.8460
Epoch 649/1000
50/50 [==============================] - 118s 2s/step - loss: 0.2792 - accuracy:
0.8872 - val_loss: 0.4751 - val_accuracy: 0.8473
Epoch 650/1000
50/50 [==============================] - 93s 2s/step - loss: 0.2812 - accuracy:
0.8876 - val_loss: 0.5143 - val_accuracy: 0.8340
Epoch 651/1000
50/50 [==============================] - 99s 2s/step - loss: 0.3015 - accuracy:
0.8804 - val_loss: 0.4422 - val_accuracy: 0.8453
Epoch 652/1000
50/50 [==============================] - 92s 2s/step - loss: 0.2875 - accuracy:
0.8884 - val_loss: 0.4572 - val_accuracy: 0.8353
Epoch 653/1000
50/50 [==============================] - 104s 2s/step - loss: 0.2750 - accuracy:
0.8920 - val_loss: 0.6246 - val_accuracy: 0.8167
Epoch 654/1000
50/50 [==============================] - 91s 2s/step - loss: 0.2861 - accuracy:
0.8904 - val_loss: 0.5101 - val_accuracy: 0.8407
Epoch 655/1000
50/50 [==============================] - 91s 2s/step - loss: 0.2903 - accuracy:
0.8936 - val_loss: 0.5134 - val_accuracy: 0.8300
Epoch 656/1000
50/50 [==============================] - 94s 2s/step - loss: 0.2924 - accuracy:
0.8772 - val_loss: 0.5678 - val_accuracy: 0.8353
Epoch 657/1000
50/50 [==============================] - 100s 2s/step - loss: 0.2599 - accuracy:
0.8940 - val_loss: 0.6579 - val_accuracy: 0.8140
Epoch 658/1000
50/50 [==============================] - 101s 2s/step - loss: 0.3070 - accuracy:
0.8752 - val_loss: 0.5101 - val_accuracy: 0.8273
Epoch 659/1000
50/50 [==============================] - 122s 2s/step - loss: 0.2767 - accuracy:
0.8892 - val_loss: 0.4888 - val_accuracy: 0.8253
Epoch 660/1000
50/50 [==============================] - 98s 2s/step - loss: 0.2732 - accuracy:
0.8916 - val_loss: 0.4650 - val_accuracy: 0.8520
Epoch 661/1000
50/50 [==============================] - 98s 2s/step - loss: 0.2715 - accuracy:
0.8910 - val_loss: 0.4617 - val_accuracy: 0.8280
Epoch 662/1000
50/50 [==============================] - 93s 2s/step - loss: 0.2863 - accuracy:
0.8914 - val_loss: 0.5158 - val_accuracy: 0.8480
```

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Epoch 663/1000
50/50 [==============================] - 91s 2s/step - loss: 0.2900 - accuracy:
0.8893 - val_loss: 0.4692 - val_accuracy: 0.8407
Epoch 664/1000
50/50 [==============================] - 93s 2s/step - loss: 0.2870 - accuracy:
0.8884 - val_loss: 0.4555 - val_accuracy: 0.8540
Epoch 665/1000
50/50 [==============================] - 112s 2s/step - loss: 0.2763 - accuracy:
0.8932 - val_loss: 0.5932 - val_accuracy: 0.8213
Epoch 666/1000
50/50 [==============================] - 95s 2s/step - loss: 0.3025 - accuracy:
0.8788 - val_loss: 0.4672 - val_accuracy: 0.8533
Epoch 667/1000
50/50 [==============================] - 90s 2s/step - loss: 0.2856 - accuracy:
0.8888 - val_loss: 0.4627 - val_accuracy: 0.8493
Epoch 668/1000
50/50 [==============================] - 92s 2s/step - loss: 0.2785 - accuracy:
0.8936 - val_loss: 0.6595 - val_accuracy: 0.8073
Epoch 669/1000
50/50 [==============================] - 91s 2s/step - loss: 0.2947 - accuracy:
0.8948 - val_loss: 0.5399 - val_accuracy: 0.8453
Epoch 670/1000
50/50 [==============================] - 96s 2s/step - loss: 0.2748 - accuracy:
0.8980 - val_loss: 0.4779 - val_accuracy: 0.8500
Epoch 671/1000
50/50 [==============================] - 107s 2s/step - loss: 0.2733 - accuracy:
0.8991 - val_loss: 0.5121 - val_accuracy: 0.8433
Epoch 672/1000
50/50 [==============================] - 89s 2s/step - loss: 0.2806 - accuracy:
0.8936 - val_loss: 0.5329 - val_accuracy: 0.8367
Epoch 673/1000
50/50 [==============================] - 81s 2s/step - loss: 0.2740 - accuracy:
0.8950 - val_loss: 0.5146 - val_accuracy: 0.8407
Epoch 674/1000
50/50 [==============================] - 96s 2s/step - loss: 0.2659 - accuracy:
0.9036 - val_loss: 0.6427 - val_accuracy: 0.8293
Epoch 675/1000
50/50 [==============================] - 96s 2s/step - loss: 0.2713 - accuracy:
0.8948 - val_loss: 0.5013 - val_accuracy: 0.8427
Epoch 676/1000
50/50 [==============================] - 87s 2s/step - loss: 0.2922 - accuracy:
0.8892 - val_loss: 0.6132 - val_accuracy: 0.8180
Epoch 677/1000
50/50 [==============================] - 89s 2s/step - loss: 0.2955 - accuracy:
0.8796 - val_loss: 0.5520 - val_accuracy: 0.8300
Epoch 678/1000
50/50 [==============================] - 101s 2s/step - loss: 0.2909 - accuracy:
0.8861 - val_loss: 0.5785 - val_accuracy: 0.8320
```

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Epoch 679/1000
50/50 [==============================] - 81s 2s/step - loss: 0.3043 - accuracy:
0.8832 - val_loss: 0.4662 - val_accuracy: 0.8520
Epoch 680/1000
50/50 [==============================] - 76s 2s/step - loss: 0.3128 - accuracy:
0.8808 - val_loss: 0.4399 - val_accuracy: 0.8520
Epoch 681/1000
50/50 [==============================] - 57s 1s/step - loss: 0.2790 - accuracy:
0.8885 - val_loss: 0.5268 - val_accuracy: 0.8333
Epoch 682/1000
50/50 [==============================] - 49s 980ms/step - loss: 0.2912 -
accuracy: 0.8888 - val_loss: 0.4934 - val_accuracy: 0.8493
Epoch 683/1000
50/50 [==============================] - 48s 954ms/step - loss: 0.2907 -
accuracy: 0.8872 - val_loss: 0.5821 - val_accuracy: 0.8280
Epoch 684/1000
50/50 [==============================] - 49s 979ms/step - loss: 0.2858 -
accuracy: 0.8881 - val_loss: 0.6694 - val_accuracy: 0.7973
Epoch 685/1000
50/50 [==============================] - 46s 921ms/step - loss: 0.2799 -
accuracy: 0.8908 - val_loss: 0.5347 - val_accuracy: 0.8333
Epoch 686/1000
50/50 [==============================] - 48s 962ms/step - loss: 0.2953 -
accuracy: 0.8868 - val_loss: 0.6373 - val_accuracy: 0.8120
Epoch 687/1000
50/50 [==============================] - 101s 2s/step - loss: 0.3074 - accuracy:
0.8820 - val_loss: 0.4314 - val_accuracy: 0.8473
Epoch 688/1000
50/50 [==============================] - 134s 3s/step - loss: 0.2592 - accuracy:
0.8979 - val_loss: 0.4589 - val_accuracy: 0.8547
Epoch 689/1000
50/50 [==============================] - 134s 3s/step - loss: 0.2687 - accuracy:
0.8972 - val_loss: 0.5060 - val_accuracy: 0.8427
Epoch 690/1000
50/50 [==============================] - 141s 3s/step - loss: 0.2790 - accuracy:
0.8968 - val_loss: 0.5257 - val_accuracy: 0.8407
Epoch 691/1000
50/50 [==============================] - 165s 3s/step - loss: 0.2852 - accuracy:
0.8932 - val_loss: 0.5104 - val_accuracy: 0.8393
Epoch 692/1000
50/50 [==============================] - 156s 3s/step - loss: 0.2611 - accuracy:
0.8991 - val_loss: 0.5356 - val_accuracy: 0.8227
Epoch 693/1000
50/50 [==============================] - 166s 3s/step - loss: 0.2784 - accuracy:
0.8979 - val_loss: 0.4706 - val_accuracy: 0.8480
Epoch 694/1000
50/50 [==============================] - 136s 3s/step - loss: 0.2700 - accuracy:
0.8944 - val_loss: 0.4700 - val_accuracy: 0.8327
```

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Epoch 695/1000
50/50 [==============================] - 187s 4s/step - loss: 0.2708 - accuracy:
0.8912 - val_loss: 0.4362 - val_accuracy: 0.8473
Epoch 696/1000
50/50 [==============================] - 90s 2s/step - loss: 0.2843 - accuracy:
0.8868 - val_loss: 0.5714 - val_accuracy: 0.8260
Epoch 697/1000
50/50 [==============================] - 48s 959ms/step - loss: 0.2610 -
accuracy: 0.8956 - val_loss: 0.4210 - val_accuracy: 0.8580
Epoch 698/1000
50/50 [==============================] - 52s 1s/step - loss: 0.2837 - accuracy:
0.8904 - val_loss: 0.5545 - val_accuracy: 0.8353
Epoch 699/1000
50/50 [==============================] - 49s 975ms/step - loss: 0.3152 -
accuracy: 0.8796 - val_loss: 0.4535 - val_accuracy: 0.8493
Epoch 700/1000
50/50 [==============================] - 48s 961ms/step - loss: 0.2788 -
accuracy: 0.8930 - val_loss: 0.5906 - val_accuracy: 0.8193
Epoch 701/1000
50/50 [==============================] - 48s 962ms/step - loss: 0.2920 -
accuracy: 0.8872 - val_loss: 0.4192 - val_accuracy: 0.8640
Epoch 702/1000
50/50 [==============================] - 50s 992ms/step - loss: 0.2865 -
accuracy: 0.8920 - val_loss: 0.4754 - val_accuracy: 0.8493
Epoch 703/1000
50/50 [==============================] - 49s 974ms/step - loss: 0.2989 -
accuracy: 0.8796 - val_loss: 0.5076 - val_accuracy: 0.8440
Epoch 704/1000
50/50 [==============================] - 51s 1s/step - loss: 0.2717 - accuracy:
0.8908 - val_loss: 0.5559 - val_accuracy: 0.8327
Epoch 705/1000
50/50 [==============================] - 50s 992ms/step - loss: 0.2458 -
accuracy: 0.9044 - val_loss: 0.6085 - val_accuracy: 0.8367
Epoch 706/1000
50/50 [==============================] - 53s 1s/step - loss: 0.2905 - accuracy:
0.8796 - val_loss: 0.6010 - val_accuracy: 0.8180
Epoch 707/1000
50/50 [==============================] - 49s 976ms/step - loss: 0.2871 -
accuracy: 0.8892 - val_loss: 0.4615 - val_accuracy: 0.8413
Epoch 708/1000
50/50 [==============================] - 49s 979ms/step - loss: 0.2486 -
accuracy: 0.8988 - val_loss: 0.4857 - val_accuracy: 0.8507
Epoch 709/1000
50/50 [==============================] - 48s 961ms/step - loss: 0.2881 -
accuracy: 0.8877 - val_loss: 0.6197 - val_accuracy: 0.8120
Epoch 710/1000
50/50 [==============================] - 48s 964ms/step - loss: 0.2694 -
accuracy: 0.8904 - val_loss: 0.4996 - val_accuracy: 0.8320
```

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Epoch 711/1000
50/50 [==============================] - 49s 974ms/step - loss: 0.2974 -
accuracy: 0.8872 - val_loss: 0.7270 - val_accuracy: 0.8013
Epoch 712/1000
50/50 [==============================] - 49s 983ms/step - loss: 0.2788 -
accuracy: 0.8888 - val_loss: 0.5511 - val_accuracy: 0.8360
Epoch 713/1000
50/50 [==============================] - 48s 962ms/step - loss: 0.2980 -
accuracy: 0.8836 - val_loss: 0.4956 - val_accuracy: 0.8500
Epoch 714/1000
50/50 [==============================] - 50s 990ms/step - loss: 0.2443 -
accuracy: 0.9116 - val_loss: 0.5686 - val_accuracy: 0.8227
Epoch 715/1000
50/50 [==============================] - 50s 985ms/step - loss: 0.2811 -
accuracy: 0.8884 - val_loss: 0.5729 - val_accuracy: 0.8287
Epoch 716/1000
50/50 [==============================] - 49s 982ms/step - loss: 0.2626 -
accuracy: 0.8992 - val_loss: 0.5181 - val_accuracy: 0.8480
Epoch 717/1000
50/50 [==============================] - 49s 968ms/step - loss: 0.2709 -
accuracy: 0.8946 - val_loss: 0.4266 - val_accuracy: 0.8660
Epoch 718/1000
50/50 [==============================] - 57s 1s/step - loss: 0.2940 - accuracy:
0.8836 - val_loss: 0.5708 - val_accuracy: 0.8447
Epoch 719/1000
50/50 [==============================] - 50s 1s/step - loss: 0.2832 - accuracy:
0.8960 - val_loss: 0.5129 - val_accuracy: 0.8360
Epoch 720/1000
50/50 [==============================] - 50s 978ms/step - loss: 0.2603 -
accuracy: 0.8964 - val_loss: 0.5284 - val_accuracy: 0.8187
Epoch 721/1000
50/50 [==============================] - 48s 966ms/step - loss: 0.2904 -
accuracy: 0.8880 - val_loss: 0.5166 - val_accuracy: 0.8487
Epoch 722/1000
50/50 [==============================] - 49s 973ms/step - loss: 0.2910 -
accuracy: 0.8848 - val_loss: 0.5637 - val_accuracy: 0.8073
Epoch 723/1000
50/50 [==============================] - 50s 1s/step - loss: 0.2698 - accuracy:
0.8984 - val_loss: 0.4033 - val_accuracy: 0.8613
Epoch 724/1000
50/50 [==============================] - 50s 1s/step - loss: 0.2894 - accuracy:
0.8880 - val_loss: 0.5110 - val_accuracy: 0.8180
Epoch 725/1000
50/50 [==============================] - 47s 946ms/step - loss: 0.2658 -
accuracy: 0.8888 - val_loss: 0.6537 - val_accuracy: 0.7993
Epoch 726/1000
50/50 [==============================] - 50s 999ms/step - loss: 0.2913 -
accuracy: 0.8824 - val_loss: 0.4585 - val_accuracy: 0.8607
```

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Epoch 727/1000
50/50 [==============================] - 49s 972ms/step - loss: 0.2781 -
accuracy: 0.8872 - val_loss: 0.4380 - val_accuracy: 0.8400
Epoch 728/1000
50/50 [==============================] - 51s 1s/step - loss: 0.2559 - accuracy:
0.9024 - val_loss: 0.4981 - val_accuracy: 0.8367
Epoch 729/1000
50/50 [==============================] - 50s 996ms/step - loss: 0.2684 -
accuracy: 0.9012 - val_loss: 0.4707 - val_accuracy: 0.8433
Epoch 730/1000
50/50 [==============================] - 59s 1s/step - loss: 0.2997 - accuracy:
0.8876 - val_loss: 0.4175 - val_accuracy: 0.8440
Epoch 731/1000
50/50 [==============================] - 49s 973ms/step - loss: 0.2918 -
accuracy: 0.8824 - val_loss: 0.4617 - val_accuracy: 0.8340
Epoch 732/1000
50/50 [==============================] - 49s 972ms/step - loss: 0.2682 -
accuracy: 0.8948 - val_loss: 0.4519 - val_accuracy: 0.8487
Epoch 733/1000
50/50 [==============================] - 50s 987ms/step - loss: 0.2763 -
accuracy: 0.8872 - val_loss: 0.5047 - val_accuracy: 0.8453
Epoch 734/1000
50/50 [==============================] - 50s 990ms/step - loss: 0.2676 -
accuracy: 0.8996 - val_loss: 0.5327 - val_accuracy: 0.8340
Epoch 735/1000
50/50 [==============================] - 51s 1s/step - loss: 0.2901 - accuracy:
0.8908 - val_loss: 0.4543 - val_accuracy: 0.8507
Epoch 736/1000
50/50 [==============================] - 49s 980ms/step - loss: 0.2869 -
accuracy: 0.8840 - val_loss: 0.5262 - val_accuracy: 0.8367
Epoch 737/1000
50/50 [==============================] - 48s 962ms/step - loss: 0.2816 -
accuracy: 0.8920 - val_loss: 0.5641 - val_accuracy: 0.8127
Epoch 738/1000
50/50 [==============================] - 47s 938ms/step - loss: 0.2603 -
accuracy: 0.8952 - val_loss: 0.4799 - val_accuracy: 0.8453
Epoch 739/1000
50/50 [==============================] - 49s 970ms/step - loss: 0.2859 -
accuracy: 0.8837 - val_loss: 0.4293 - val_accuracy: 0.8567
Epoch 740/1000
50/50 [==============================] - 49s 976ms/step - loss: 0.2632 -
accuracy: 0.8884 - val_loss: 0.5619 - val_accuracy: 0.8407
Epoch 741/1000
50/50 [==============================] - 49s 973ms/step - loss: 0.2907 -
accuracy: 0.8828 - val_loss: 0.4794 - val_accuracy: 0.8367
Epoch 742/1000
50/50 [==============================] - 50s 985ms/step - loss: 0.2734 -
accuracy: 0.8904 - val_loss: 0.4530 - val_accuracy: 0.8607
```

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Epoch 743/1000
50/50 [==============================] - 46s 920ms/step - loss: 0.2864 -
accuracy: 0.8954 - val_loss: 0.5278 - val_accuracy: 0.8280
Epoch 744/1000
50/50 [==============================] - 48s 960ms/step - loss: 0.2837 -
accuracy: 0.8920 - val_loss: 0.5738 - val_accuracy: 0.8327
Epoch 745/1000
50/50 [==============================] - 45s 906ms/step - loss: 0.2779 -
accuracy: 0.8928 - val_loss: 0.5294 - val_accuracy: 0.8327
Epoch 746/1000
50/50 [==============================] - 49s 986ms/step - loss: 0.2817 -
accuracy: 0.8922 - val_loss: 0.5042 - val_accuracy: 0.8420
Epoch 747/1000
50/50 [==============================] - 46s 921ms/step - loss: 0.2898 -
accuracy: 0.8881 - val_loss: 0.4890 - val_accuracy: 0.8353
Epoch 748/1000
50/50 [==============================] - 47s 941ms/step - loss: 0.2688 -
accuracy: 0.8956 - val_loss: 0.5333 - val_accuracy: 0.8280
Epoch 749/1000
50/50 [==============================] - 49s 974ms/step - loss: 0.2660 -
accuracy: 0.9000 - val_loss: 0.4438 - val_accuracy: 0.8567
Epoch 750/1000
50/50 [==============================] - 46s 922ms/step - loss: 0.2746 -
accuracy: 0.8924 - val_loss: 0.4892 - val_accuracy: 0.8467
Epoch 751/1000
50/50 [==============================] - 48s 948ms/step - loss: 0.2730 -
accuracy: 0.8920 - val_loss: 0.6612 - val_accuracy: 0.8193
Epoch 752/1000
50/50 [==============================] - 45s 905ms/step - loss: 0.2805 -
accuracy: 0.8940 - val_loss: 0.7190 - val_accuracy: 0.7873
Epoch 753/1000
50/50 [==============================] - 48s 969ms/step - loss: 0.2675 -
accuracy: 0.8950 - val_loss: 0.5051 - val_accuracy: 0.8373
Epoch 754/1000
50/50 [==============================] - 48s 967ms/step - loss: 0.2570 -
accuracy: 0.8984 - val_loss: 0.4857 - val_accuracy: 0.8527
Epoch 755/1000
50/50 [==============================] - 48s 946ms/step - loss: 0.2536 -
accuracy: 0.9039 - val_loss: 0.4686 - val_accuracy: 0.8460
Epoch 756/1000
50/50 [==============================] - 45s 900ms/step - loss: 0.2686 -
accuracy: 0.8948 - val_loss: 0.4506 - val_accuracy: 0.8520
Epoch 757/1000
50/50 [==============================] - 46s 918ms/step - loss: 0.2741 -
accuracy: 0.8881 - val_loss: 0.5385 - val_accuracy: 0.8247
Epoch 758/1000
50/50 [==============================] - 49s 985ms/step - loss: 0.2706 -
accuracy: 0.8976 - val_loss: 0.5545 - val_accuracy: 0.8340
```

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Epoch 759/1000
50/50 [==============================] - 46s 926ms/step - loss: 0.2779 -
accuracy: 0.8910 - val_loss: 0.5067 - val_accuracy: 0.8427
Epoch 760/1000
50/50 [==============================] - 49s 975ms/step - loss: 0.2811 -
accuracy: 0.8896 - val_loss: 0.4941 - val_accuracy: 0.8447
Epoch 761/1000
50/50 [==============================] - 48s 956ms/step - loss: 0.2721 -
accuracy: 0.8952 - val_loss: 0.4234 - val_accuracy: 0.8587
Epoch 762/1000
50/50 [==============================] - 47s 945ms/step - loss: 0.2461 -
accuracy: 0.9003 - val_loss: 0.5789 - val_accuracy: 0.8347
Epoch 763/1000
50/50 [==============================] - 49s 971ms/step - loss: 0.2551 -
accuracy: 0.9028 - val_loss: 0.5723 - val_accuracy: 0.8347
Epoch 764/1000
50/50 [==============================] - 46s 922ms/step - loss: 0.2643 -
accuracy: 0.9008 - val_loss: 0.4824 - val_accuracy: 0.8473
Epoch 765/1000
50/50 [==============================] - 58s 1s/step - loss: 0.2561 - accuracy:
0.9064 - val_loss: 0.5216 - val_accuracy: 0.8427
Epoch 766/1000
50/50 [==============================] - 47s 937ms/step - loss: 0.2572 -
accuracy: 0.8950 - val_loss: 0.5251 - val_accuracy: 0.8360
Epoch 767/1000
50/50 [==============================] - 49s 980ms/step - loss: 0.2712 -
accuracy: 0.8980 - val_loss: 0.5395 - val_accuracy: 0.8333
Epoch 768/1000
50/50 [==============================] - 48s 953ms/step - loss: 0.2545 -
accuracy: 0.9004 - val_loss: 0.6059 - val_accuracy: 0.8227
Epoch 769/1000
50/50 [==============================] - 46s 920ms/step - loss: 0.2629 -
accuracy: 0.8932 - val_loss: 0.5250 - val_accuracy: 0.8367
Epoch 770/1000
50/50 [==============================] - 49s 986ms/step - loss: 0.2684 -
accuracy: 0.9036 - val_loss: 0.6175 - val_accuracy: 0.8147
Epoch 771/1000
50/50 [==============================] - 46s 914ms/step - loss: 0.2699 -
accuracy: 0.8926 - val_loss: 0.4256 - val_accuracy: 0.8640
Epoch 772/1000
50/50 [==============================] - 47s 939ms/step - loss: 0.2491 -
accuracy: 0.8970 - val_loss: 0.4951 - val_accuracy: 0.8347
Epoch 773/1000
50/50 [==============================] - 47s 939ms/step - loss: 0.2675 -
accuracy: 0.8928 - val_loss: 0.4850 - val_accuracy: 0.8320
Epoch 774/1000
50/50 [==============================] - 46s 925ms/step - loss: 0.2805 -
accuracy: 0.8873 - val_loss: 0.5524 - val_accuracy: 0.8207
```

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Epoch 775/1000
50/50 [==============================] - 47s 950ms/step - loss: 0.3040 -
accuracy: 0.8784 - val_loss: 0.4996 - val_accuracy: 0.8440
Epoch 776/1000
50/50 [==============================] - 47s 935ms/step - loss: 0.2840 -
accuracy: 0.8936 - val_loss: 0.4623 - val_accuracy: 0.8560
Epoch 777/1000
50/50 [==============================] - 45s 905ms/step - loss: 0.2669 -
accuracy: 0.8962 - val_loss: 0.5127 - val_accuracy: 0.8420
Epoch 778/1000
50/50 [==============================] - 46s 926ms/step - loss: 0.2584 -
accuracy: 0.8999 - val_loss: 0.4699 - val_accuracy: 0.8580
Epoch 779/1000
50/50 [==============================] - 47s 944ms/step - loss: 0.2543 -
accuracy: 0.9004 - val_loss: 0.4688 - val_accuracy: 0.8507
Epoch 780/1000
50/50 [==============================] - 48s 945ms/step - loss: 0.2902 -
accuracy: 0.8928 - val_loss: 0.4921 - val_accuracy: 0.8360
Epoch 781/1000
50/50 [==============================] - 48s 958ms/step - loss: 0.2567 -
accuracy: 0.8964 - val_loss: 0.5657 - val_accuracy: 0.8220
Epoch 782/1000
50/50 [==============================] - 49s 978ms/step - loss: 0.2764 -
accuracy: 0.8918 - val_loss: 0.5672 - val_accuracy: 0.8173
Epoch 783/1000
50/50 [==============================] - 48s 959ms/step - loss: 0.2643 -
accuracy: 0.8924 - val_loss: 0.4198 - val_accuracy: 0.8513
Epoch 784/1000
50/50 [==============================] - 47s 944ms/step - loss: 0.2527 -
accuracy: 0.9023 - val_loss: 0.5893 - val_accuracy: 0.8367
Epoch 785/1000
50/50 [==============================] - 47s 931ms/step - loss: 0.2667 -
accuracy: 0.8980 - val_loss: 0.5324 - val_accuracy: 0.8387
Epoch 786/1000
50/50 [==============================] - 47s 934ms/step - loss: 0.2366 -
accuracy: 0.9100 - val_loss: 0.5100 - val_accuracy: 0.8460
Epoch 787/1000
50/50 [==============================] - 49s 968ms/step - loss: 0.2754 -
accuracy: 0.8948 - val_loss: 0.5171 - val_accuracy: 0.8393
Epoch 788/1000
50/50 [==============================] - 48s 955ms/step - loss: 0.2807 -
accuracy: 0.8884 - val_loss: 0.6081 - val_accuracy: 0.8220
Epoch 789/1000
50/50 [==============================] - 46s 912ms/step - loss: 0.2746 -
accuracy: 0.8930 - val_loss: 0.4764 - val_accuracy: 0.8520
Epoch 790/1000
50/50 [==============================] - 47s 946ms/step - loss: 0.3011 -
accuracy: 0.8868 - val_loss: 0.5072 - val_accuracy: 0.8407
```

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Epoch 791/1000
50/50 [==============================] - 47s 942ms/step - loss: 0.2644 -
accuracy: 0.8976 - val_loss: 0.5437 - val_accuracy: 0.8347
Epoch 792/1000
50/50 [==============================] - 48s 964ms/step - loss: 0.2599 -
accuracy: 0.9088 - val_loss: 0.5213 - val_accuracy: 0.8313
Epoch 793/1000
50/50 [==============================] - 47s 946ms/step - loss: 0.2850 -
accuracy: 0.8897 - val_loss: 0.5130 - val_accuracy: 0.8340
Epoch 794/1000
50/50 [==============================] - 47s 940ms/step - loss: 0.2543 -
accuracy: 0.8972 - val_loss: 0.5252 - val_accuracy: 0.8307
Epoch 795/1000
50/50 [==============================] - 46s 910ms/step - loss: 0.2633 -
accuracy: 0.9020 - val_loss: 0.4817 - val_accuracy: 0.8567
Epoch 796/1000
50/50 [==============================] - 47s 945ms/step - loss: 0.2954 -
accuracy: 0.8816 - val_loss: 0.5838 - val_accuracy: 0.8293
Epoch 797/1000
50/50 [==============================] - 46s 924ms/step - loss: 0.2609 -
accuracy: 0.8910 - val_loss: 0.4429 - val_accuracy: 0.8620
Epoch 798/1000
50/50 [==============================] - 47s 932ms/step - loss: 0.2573 -
accuracy: 0.9040 - val_loss: 0.5763 - val_accuracy: 0.8187
Epoch 799/1000
50/50 [==============================] - 47s 944ms/step - loss: 0.2646 -
accuracy: 0.8960 - val_loss: 0.5448 - val_accuracy: 0.8320
Epoch 800/1000
50/50 [==============================] - 46s 924ms/step - loss: 0.2640 -
accuracy: 0.9019 - val_loss: 0.6452 - val_accuracy: 0.8113
Epoch 801/1000
50/50 [==============================] - 46s 924ms/step - loss: 0.2592 -
accuracy: 0.9032 - val_loss: 0.4293 - val_accuracy: 0.8433
Epoch 802/1000
50/50 [==============================] - 47s 936ms/step - loss: 0.2624 -
accuracy: 0.9036 - val_loss: 0.5138 - val_accuracy: 0.8400
Epoch 803/1000
50/50 [==============================] - 47s 943ms/step - loss: 0.2525 -
accuracy: 0.8999 - val_loss: 0.5112 - val_accuracy: 0.8220
Epoch 804/1000
50/50 [==============================] - 46s 924ms/step - loss: 0.2725 -
accuracy: 0.8979 - val_loss: 0.4437 - val_accuracy: 0.8520
Epoch 805/1000
50/50 [==============================] - 50s 1s/step - loss: 0.2720 - accuracy:
0.8920 - val_loss: 0.4751 - val_accuracy: 0.8480
Epoch 806/1000
50/50 [==============================] - 48s 954ms/step - loss: 0.2612 -
accuracy: 0.9000 - val_loss: 0.5840 - val_accuracy: 0.8187
```

```
Epoch 807/1000
50/50 [==============================] - 47s 934ms/step - loss: 0.2762 -
accuracy: 0.8906 - val_loss: 0.5631 - val_accuracy: 0.8247
Epoch 808/1000
50/50 [==============================] - 47s 944ms/step - loss: 0.2923 -
accuracy: 0.8837 - val_loss: 0.5344 - val_accuracy: 0.8300
Epoch 809/1000
50/50 [==============================] - 47s 938ms/step - loss: 0.2910 -
accuracy: 0.8896 - val_loss: 0.5617 - val_accuracy: 0.8133
Epoch 810/1000
50/50 [==============================] - 48s 973ms/step - loss: 0.2805 -
accuracy: 0.8861 - val_loss: 0.5878 - val_accuracy: 0.8127
Epoch 811/1000
50/50 [==============================] - 46s 917ms/step - loss: 0.2766 -
accuracy: 0.8944 - val_loss: 0.5330 - val_accuracy: 0.8420
Epoch 812/1000
50/50 [==============================] - 46s 917ms/step - loss: 0.2610 -
accuracy: 0.8944 - val_loss: 0.4732 - val_accuracy: 0.8420
Epoch 813/1000
50/50 [==============================] - 48s 954ms/step - loss: 0.2521 -
accuracy: 0.9032 - val_loss: 0.6405 - val_accuracy: 0.8307
Epoch 814/1000
50/50 [==============================] - 46s 918ms/step - loss: 0.2364 -
accuracy: 0.9076 - val_loss: 0.4801 - val_accuracy: 0.8593
Epoch 815/1000
50/50 [==============================] - 47s 929ms/step - loss: 0.2729 -
accuracy: 0.9004 - val_loss: 0.5997 - val_accuracy: 0.8253
Epoch 816/1000
50/50 [==============================] - 48s 956ms/step - loss: 0.2487 -
accuracy: 0.9036 - val_loss: 0.5184 - val_accuracy: 0.8353
Epoch 817/1000
50/50 [==============================] - 46s 927ms/step - loss: 0.2641 -
accuracy: 0.9096 - val_loss: 0.4953 - val_accuracy: 0.8520
Epoch 818/1000
50/50 [==============================] - 47s 948ms/step - loss: 0.2659 -
accuracy: 0.9032 - val_loss: 0.6459 - val_accuracy: 0.8207
Epoch 819/1000
50/50 [==============================] - 45s 895ms/step - loss: 0.2847 -
accuracy: 0.8958 - val_loss: 0.5251 - val_accuracy: 0.8340
Epoch 820/1000
50/50 [==============================] - 46s 930ms/step - loss: 0.2620 -
accuracy: 0.9072 - val_loss: 0.5384 - val_accuracy: 0.8333
Epoch 821/1000
50/50 [==============================] - 48s 960ms/step - loss: 0.2525 -
accuracy: 0.8984 - val_loss: 0.4676 - val_accuracy: 0.8540
Epoch 822/1000
50/50 [==============================] - 47s 932ms/step - loss: 0.2856 -
accuracy: 0.8884 - val_loss: 0.5527 - val_accuracy: 0.8173
```

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Epoch 823/1000
50/50 [==============================] - 48s 953ms/step - loss: 0.2722 -
accuracy: 0.8948 - val_loss: 0.5560 - val_accuracy: 0.8300
Epoch 824/1000
50/50 [==============================] - 45s 903ms/step - loss: 0.2370 -
accuracy: 0.9116 - val_loss: 0.4639 - val_accuracy: 0.8500
Epoch 825/1000
50/50 [==============================] - 46s 918ms/step - loss: 0.2470 -
accuracy: 0.9000 - val_loss: 0.5294 - val_accuracy: 0.8387
Epoch 826/1000
50/50 [==============================] - 47s 937ms/step - loss: 0.2470 -
accuracy: 0.8991 - val_loss: 0.6371 - val_accuracy: 0.8247
Epoch 827/1000
50/50 [==============================] - 46s 916ms/step - loss: 0.2533 -
accuracy: 0.9016 - val_loss: 0.5449 - val_accuracy: 0.8327
Epoch 828/1000
50/50 [==============================] - 47s 948ms/step - loss: 0.2512 -
accuracy: 0.9012 - val_loss: 0.6493 - val_accuracy: 0.8087
Epoch 829/1000
50/50 [==============================] - 48s 958ms/step - loss: 0.2735 -
accuracy: 0.8920 - val_loss: 0.4448 - val_accuracy: 0.8533
Epoch 830/1000
50/50 [==============================] - 47s 929ms/step - loss: 0.2734 -
accuracy: 0.8938 - val_loss: 0.4899 - val_accuracy: 0.8393
Epoch 831/1000
50/50 [==============================] - 47s 939ms/step - loss: 0.2725 -
accuracy: 0.8956 - val_loss: 0.5383 - val_accuracy: 0.8360
Epoch 832/1000
50/50 [==============================] - 47s 939ms/step - loss: 0.2814 -
accuracy: 0.8876 - val_loss: 0.4366 - val_accuracy: 0.8380
Epoch 833/1000
50/50 [==============================] - 47s 946ms/step - loss: 0.2744 -
accuracy: 0.8956 - val_loss: 0.4208 - val_accuracy: 0.8627
Epoch 834/1000
50/50 [==============================] - 46s 929ms/step - loss: 0.2682 -
accuracy: 0.8956 - val_loss: 0.5290 - val_accuracy: 0.8273
Epoch 835/1000
50/50 [==============================] - 45s 891ms/step - loss: 0.2458 -
accuracy: 0.9016 - val_loss: 0.5097 - val_accuracy: 0.8420
Epoch 836/1000
50/50 [==============================] - 46s 907ms/step - loss: 0.2572 -
accuracy: 0.8974 - val_loss: 0.6183 - val_accuracy: 0.8327
Epoch 837/1000
50/50 [==============================] - 46s 923ms/step - loss: 0.2321 -
accuracy: 0.9019 - val_loss: 0.5818 - val_accuracy: 0.8340
Epoch 838/1000
50/50 [==============================] - 47s 949ms/step - loss: 0.2610 -
accuracy: 0.9008 - val_loss: 0.5513 - val_accuracy: 0.8327
```

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Epoch 839/1000
50/50 [==============================] - 46s 922ms/step - loss: 0.2448 -
accuracy: 0.9016 - val_loss: 0.5145 - val_accuracy: 0.8473
Epoch 840/1000
50/50 [==============================] - 48s 969ms/step - loss: 0.2580 -
accuracy: 0.8992 - val_loss: 0.5037 - val_accuracy: 0.8493
Epoch 841/1000
50/50 [==============================] - 48s 949ms/step - loss: 0.2339 -
accuracy: 0.9116 - val_loss: 0.5320 - val_accuracy: 0.8427
Epoch 842/1000
50/50 [==============================] - 122s 2s/step - loss: 0.2596 - accuracy:
0.9036 - val_loss: 0.5063 - val_accuracy: 0.8487
Epoch 843/1000
50/50 [==============================] - 165s 3s/step - loss: 0.2621 - accuracy:
0.8948 - val_loss: 0.5317 - val_accuracy: 0.8300
Epoch 844/1000
50/50 [==============================] - 63s 1s/step - loss: 0.2516 - accuracy:
0.9060 - val_loss: 0.5252 - val_accuracy: 0.8327
Epoch 845/1000
50/50 [==============================] - 49s 982ms/step - loss: 0.2651 -
accuracy: 0.8932 - val_loss: 0.5849 - val_accuracy: 0.8440
Epoch 846/1000
50/50 [==============================] - 48s 967ms/step - loss: 0.2775 -
accuracy: 0.8928 - val_loss: 0.5585 - val_accuracy: 0.8113
Epoch 847/1000
50/50 [==============================] - 47s 944ms/step - loss: 0.2480 -
accuracy: 0.8983 - val_loss: 0.5949 - val_accuracy: 0.8233
Epoch 848/1000
50/50 [==============================] - 49s 982ms/step - loss: 0.2801 -
accuracy: 0.8938 - val_loss: 0.5455 - val_accuracy: 0.8293
Epoch 849/1000
50/50 [==============================] - 49s 971ms/step - loss: 0.2636 -
accuracy: 0.8912 - val_loss: 0.4993 - val_accuracy: 0.8387
Epoch 850/1000
50/50 [==============================] - 51s 1s/step - loss: 0.2445 - accuracy:
0.9040 - val_loss: 0.4510 - val_accuracy: 0.8587
Epoch 851/1000
50/50 [==============================] - 53s 1s/step - loss: 0.2456 - accuracy:
0.9068 - val_loss: 0.5647 - val_accuracy: 0.8273
Epoch 852/1000
50/50 [==============================] - 50s 979ms/step - loss: 0.2874 -
accuracy: 0.8900 - val_loss: 0.4343 - val_accuracy: 0.8573
Epoch 853/1000
50/50 [==============================] - 50s 993ms/step - loss: 0.2773 -
accuracy: 0.8880 - val_loss: 0.4505 - val_accuracy: 0.8540
Epoch 854/1000
50/50 [==============================] - 48s 957ms/step - loss: 0.2449 -
accuracy: 0.9020 - val_loss: 0.5601 - val_accuracy: 0.8387
```

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Epoch 855/1000
50/50 [==============================] - 49s 974ms/step - loss: 0.2380 -
accuracy: 0.9076 - val_loss: 0.4488 - val_accuracy: 0.8560
Epoch 856/1000
50/50 [==============================] - 52s 1s/step - loss: 0.2420 - accuracy:
0.9015 - val_loss: 0.5617 - val_accuracy: 0.8360
Epoch 857/1000
50/50 [==============================] - 50s 993ms/step - loss: 0.2458 -
accuracy: 0.8996 - val_loss: 0.5121 - val_accuracy: 0.8413
Epoch 858/1000
50/50 [==============================] - 50s 993ms/step - loss: 0.2487 -
accuracy: 0.8948 - val_loss: 0.5733 - val_accuracy: 0.8253
Epoch 859/1000
50/50 [==============================] - 49s 974ms/step - loss: 0.2385 -
accuracy: 0.9132 - val_loss: 0.6085 - val_accuracy: 0.8300
Epoch 860/1000
50/50 [==============================] - 49s 977ms/step - loss: 0.2537 -
accuracy: 0.9004 - val_loss: 0.8604 - val_accuracy: 0.7787
Epoch 861/1000
50/50 [==============================] - 47s 929ms/step - loss: 0.2774 -
accuracy: 0.8970 - val_loss: 0.6720 - val_accuracy: 0.8213
Epoch 862/1000
50/50 [==============================] - 49s 976ms/step - loss: 0.2532 -
accuracy: 0.9028 - val_loss: 0.5418 - val_accuracy: 0.8407
Epoch 863/1000
50/50 [==============================] - 50s 999ms/step - loss: 0.2744 -
accuracy: 0.8926 - val_loss: 0.4595 - val_accuracy: 0.8633
Epoch 864/1000
50/50 [==============================] - 53s 1s/step - loss: 0.2749 - accuracy:
0.8906 - val_loss: 0.6435 - val_accuracy: 0.8060
Epoch 865/1000
50/50 [==============================] - 50s 1s/step - loss: 0.2610 - accuracy:
0.8968 - val_loss: 0.7026 - val_accuracy: 0.8073
Epoch 866/1000
50/50 [==============================] - 49s 984ms/step - loss: 0.2490 -
accuracy: 0.9007 - val_loss: 0.5618 - val_accuracy: 0.8347
Epoch 867/1000
50/50 [==============================] - 50s 986ms/step - loss: 0.2468 -
accuracy: 0.9012 - val_loss: 0.6085 - val_accuracy: 0.8227
Epoch 868/1000
50/50 [==============================] - 48s 947ms/step - loss: 0.2759 -
accuracy: 0.8920 - val_loss: 0.4488 - val_accuracy: 0.8527
Epoch 869/1000
50/50 [==============================] - 49s 990ms/step - loss: 0.2622 -
accuracy: 0.9016 - val_loss: 0.5782 - val_accuracy: 0.8280
Epoch 870/1000
50/50 [==============================] - 48s 960ms/step - loss: 0.2640 -
accuracy: 0.8946 - val_loss: 0.4692 - val_accuracy: 0.8507
```

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Epoch 871/1000
50/50 [==============================] - 49s 987ms/step - loss: 0.2551 -
accuracy: 0.8996 - val_loss: 0.5138 - val_accuracy: 0.8467
Epoch 872/1000
50/50 [==============================] - 47s 933ms/step - loss: 0.2251 -
accuracy: 0.9104 - val_loss: 0.5554 - val_accuracy: 0.8460
Epoch 873/1000
50/50 [==============================] - 48s 962ms/step - loss: 0.2550 -
accuracy: 0.9031 - val_loss: 0.5634 - val_accuracy: 0.8247
Epoch 874/1000
50/50 [==============================] - 50s 1s/step - loss: 0.2296 - accuracy:
0.9100 - val_loss: 0.5097 - val_accuracy: 0.8593
Epoch 875/1000
50/50 [==============================] - 50s 990ms/step - loss: 0.2411 -
accuracy: 0.9032 - val_loss: 0.6111 - val_accuracy: 0.8187
Epoch 876/1000
50/50 [==============================] - 60s 1s/step - loss: 0.2640 - accuracy:
0.8948 - val_loss: 0.5696 - val_accuracy: 0.8347
Epoch 877/1000
50/50 [==============================] - 49s 985ms/step - loss: 0.2612 -
accuracy: 0.8956 - val_loss: 0.5717 - val_accuracy: 0.8220
Epoch 878/1000
50/50 [==============================] - 48s 968ms/step - loss: 0.2758 -
accuracy: 0.8876 - val_loss: 0.6554 - val_accuracy: 0.8147
Epoch 879/1000
50/50 [==============================] - 49s 969ms/step - loss: 0.2579 -
accuracy: 0.9032 - val_loss: 0.5916 - val_accuracy: 0.8313
Epoch 880/1000
50/50 [==============================] - 50s 996ms/step - loss: 0.2630 -
accuracy: 0.8976 - val_loss: 0.4851 - val_accuracy: 0.8440
Epoch 881/1000
50/50 [==============================] - 48s 949ms/step - loss: 0.2814 -
accuracy: 0.8808 - val_loss: 0.4748 - val_accuracy: 0.8407
Epoch 882/1000
50/50 [==============================] - 49s 980ms/step - loss: 0.2564 -
accuracy: 0.9052 - val_loss: 0.5203 - val_accuracy: 0.8360
Epoch 883/1000
50/50 [==============================] - 49s 979ms/step - loss: 0.2606 -
accuracy: 0.8992 - val_loss: 0.5777 - val_accuracy: 0.8213
Epoch 884/1000
50/50 [==============================] - 48s 951ms/step - loss: 0.2503 -
accuracy: 0.9032 - val_loss: 0.5616 - val_accuracy: 0.8280
Epoch 885/1000
50/50 [==============================] - 50s 1s/step - loss: 0.2605 - accuracy:
0.9008 - val_loss: 0.5076 - val_accuracy: 0.8413
Epoch 886/1000
50/50 [==============================] - 48s 956ms/step - loss: 0.2406 -
accuracy: 0.9076 - val_loss: 0.6408 - val_accuracy: 0.8313
```

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Epoch 887/1000
50/50 [==============================] - 49s 977ms/step - loss: 0.2711 -
accuracy: 0.9004 - val_loss: 0.6163 - val_accuracy: 0.8293
Epoch 888/1000
50/50 [==============================] - 58s 1s/step - loss: 0.3063 - accuracy:
0.8861 - val_loss: 0.6114 - val_accuracy: 0.8140
Epoch 889/1000
50/50 [==============================] - 48s 969ms/step - loss: 0.2799 -
accuracy: 0.8908 - val_loss: 0.5104 - val_accuracy: 0.8440
Epoch 890/1000
50/50 [==============================] - 49s 971ms/step - loss: 0.2405 -
accuracy: 0.9084 - val_loss: 0.5104 - val_accuracy: 0.8413
Epoch 891/1000
50/50 [==============================] - 48s 961ms/step - loss: 0.2511 -
accuracy: 0.9052 - val_loss: 0.5350 - val_accuracy: 0.8467
Epoch 892/1000
50/50 [==============================] - 50s 997ms/step - loss: 0.2617 -
accuracy: 0.8966 - val_loss: 0.4703 - val_accuracy: 0.8520
Epoch 893/1000
50/50 [==============================] - 48s 964ms/step - loss: 0.2499 -
accuracy: 0.9028 - val_loss: 0.5945 - val_accuracy: 0.8287
Epoch 894/1000
50/50 [==============================] - 49s 970ms/step - loss: 0.2293 -
accuracy: 0.9120 - val_loss: 0.5136 - val_accuracy: 0.8507
Epoch 895/1000
50/50 [==============================] - 49s 978ms/step - loss: 0.2488 -
accuracy: 0.9056 - val_loss: 0.5149 - val_accuracy: 0.8393
Epoch 896/1000
50/50 [==============================] - 50s 992ms/step - loss: 0.2289 -
accuracy: 0.9136 - val_loss: 0.5125 - val_accuracy: 0.8573
Epoch 897/1000
50/50 [==============================] - 48s 962ms/step - loss: 0.2767 -
accuracy: 0.8926 - val_loss: 0.5137 - val_accuracy: 0.8453
Epoch 898/1000
50/50 [==============================] - 51s 1s/step - loss: 0.2485 - accuracy:
0.9072 - val_loss: 0.5890 - val_accuracy: 0.8213
Epoch 899/1000
50/50 [==============================] - 48s 964ms/step - loss: 0.2377 -
accuracy: 0.9084 - val_loss: 0.5726 - val_accuracy: 0.8460
Epoch 900/1000
50/50 [==============================] - 54s 1s/step - loss: 0.2742 - accuracy:
0.8916 - val_loss: 0.4728 - val_accuracy: 0.8433
Epoch 901/1000
50/50 [==============================] - 49s 984ms/step - loss: 0.2279 -
accuracy: 0.9136 - val_loss: 0.5750 - val_accuracy: 0.8420
Epoch 902/1000
50/50 [==============================] - 49s 985ms/step - loss: 0.2580 -
accuracy: 0.8976 - val_loss: 0.4994 - val_accuracy: 0.8493
```

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Epoch 903/1000
50/50 [==============================] - 48s 948ms/step - loss: 0.2394 -
accuracy: 0.9048 - val_loss: 0.4841 - val_accuracy: 0.8540
Epoch 904/1000
50/50 [==============================] - 47s 947ms/step - loss: 0.2444 -
accuracy: 0.9035 - val_loss: 0.6334 - val_accuracy: 0.8193
Epoch 905/1000
50/50 [==============================] - 51s 1s/step - loss: 0.2528 - accuracy:
0.9043 - val_loss: 0.5207 - val_accuracy: 0.8440
Epoch 906/1000
50/50 [==============================] - 50s 984ms/step - loss: 0.2457 -
accuracy: 0.9011 - val_loss: 0.5381 - val_accuracy: 0.8393
Epoch 907/1000
50/50 [==============================] - 50s 995ms/step - loss: 0.2526 -
accuracy: 0.8987 - val_loss: 0.5176 - val_accuracy: 0.8427
Epoch 908/1000
50/50 [==============================] - 47s 947ms/step - loss: 0.2785 -
accuracy: 0.8864 - val_loss: 0.5333 - val_accuracy: 0.8167
Epoch 909/1000
50/50 [==============================] - 49s 986ms/step - loss: 0.2636 -
accuracy: 0.9039 - val_loss: 0.6544 - val_accuracy: 0.8393
Epoch 910/1000
50/50 [==============================] - 47s 946ms/step - loss: 0.2747 -
accuracy: 0.8970 - val_loss: 0.4791 - val_accuracy: 0.8587
Epoch 911/1000
50/50 [==============================] - 46s 918ms/step - loss: 0.2429 -
accuracy: 0.9148 - val_loss: 0.6037 - val_accuracy: 0.8340
Epoch 912/1000
50/50 [==============================] - 51s 1s/step - loss: 0.2534 - accuracy:
0.9051 - val_loss: 0.5323 - val_accuracy: 0.8380
Epoch 913/1000
50/50 [==============================] - 46s 917ms/step - loss: 0.2327 -
accuracy: 0.9096 - val_loss: 0.5499 - val_accuracy: 0.8333
Epoch 914/1000
50/50 [==============================] - 46s 927ms/step - loss: 0.2561 -
accuracy: 0.9008 - val_loss: 0.5306 - val_accuracy: 0.8520
Epoch 915/1000
50/50 [==============================] - 49s 990ms/step - loss: 0.2320 -
accuracy: 0.9080 - val_loss: 0.4855 - val_accuracy: 0.8353
Epoch 916/1000
50/50 [==============================] - 47s 936ms/step - loss: 0.2414 -
accuracy: 0.9104 - val_loss: 0.5238 - val_accuracy: 0.8580
Epoch 917/1000
50/50 [==============================] - 48s 964ms/step - loss: 0.2326 -
accuracy: 0.9120 - val_loss: 0.5036 - val_accuracy: 0.8447
Epoch 918/1000
50/50 [==============================] - 48s 965ms/step - loss: 0.2316 -
accuracy: 0.9100 - val_loss: 0.4776 - val_accuracy: 0.8573
```

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Epoch 919/1000
50/50 [==============================] - 48s 949ms/step - loss: 0.2487 -
accuracy: 0.9015 - val_loss: 0.6010 - val_accuracy: 0.8140
Epoch 920/1000
50/50 [==============================] - 49s 979ms/step - loss: 0.2490 -
accuracy: 0.9024 - val_loss: 0.4608 - val_accuracy: 0.8433
Epoch 921/1000
50/50 [==============================] - 46s 912ms/step - loss: 0.2241 -
accuracy: 0.9128 - val_loss: 0.6509 - val_accuracy: 0.8293
Epoch 922/1000
50/50 [==============================] - 47s 937ms/step - loss: 0.2312 -
accuracy: 0.9128 - val_loss: 0.5309 - val_accuracy: 0.8480
Epoch 923/1000
50/50 [==============================] - 48s 951ms/step - loss: 0.2521 -
accuracy: 0.9032 - val_loss: 0.5353 - val_accuracy: 0.8433
Epoch 924/1000
50/50 [==============================] - 47s 947ms/step - loss: 0.2784 -
accuracy: 0.8916 - val_loss: 0.5267 - val_accuracy: 0.8360
Epoch 925/1000
50/50 [==============================] - 49s 974ms/step - loss: 0.2354 -
accuracy: 0.9056 - val_loss: 0.4564 - val_accuracy: 0.8507
Epoch 926/1000
50/50 [==============================] - 46s 910ms/step - loss: 0.2626 -
accuracy: 0.9008 - val_loss: 0.4999 - val_accuracy: 0.8480
Epoch 927/1000
50/50 [==============================] - 47s 942ms/step - loss: 0.2532 -
accuracy: 0.8968 - val_loss: 0.5589 - val_accuracy: 0.8327
Epoch 928/1000
50/50 [==============================] - 46s 925ms/step - loss: 0.2597 -
accuracy: 0.8968 - val_loss: 0.6682 - val_accuracy: 0.7960
Epoch 929/1000
50/50 [==============================] - 48s 950ms/step - loss: 0.2498 -
accuracy: 0.9048 - val_loss: 0.5606 - val_accuracy: 0.8373
Epoch 930/1000
50/50 [==============================] - 46s 924ms/step - loss: 0.2532 -
accuracy: 0.9024 - val_loss: 0.5054 - val_accuracy: 0.8587
Epoch 931/1000
50/50 [==============================] - 48s 954ms/step - loss: 0.2489 -
accuracy: 0.9032 - val_loss: 0.5043 - val_accuracy: 0.8533
Epoch 932/1000
50/50 [==============================] - 47s 940ms/step - loss: 0.2567 -
accuracy: 0.9052 - val_loss: 0.4798 - val_accuracy: 0.8433
Epoch 933/1000
50/50 [==============================] - 47s 944ms/step - loss: 0.2446 -
accuracy: 0.8964 - val_loss: 0.6176 - val_accuracy: 0.8253
Epoch 934/1000
50/50 [==============================] - 48s 967ms/step - loss: 0.2128 -
accuracy: 0.9184 - val_loss: 0.5455 - val_accuracy: 0.8387
```

```
Epoch 935/1000
50/50 [==============================] - 45s 901ms/step - loss: 0.2492 -
accuracy: 0.9012 - val_loss: 0.5392 - val_accuracy: 0.8393
Epoch 936/1000
50/50 [==============================] - 46s 927ms/step - loss: 0.2490 -
accuracy: 0.8999 - val_loss: 0.5789 - val_accuracy: 0.8313
Epoch 937/1000
50/50 [==============================] - 49s 975ms/step - loss: 0.2546 -
accuracy: 0.8983 - val_loss: 0.4811 - val_accuracy: 0.8573
Epoch 938/1000
50/50 [==============================] - 48s 966ms/step - loss: 0.2379 -
accuracy: 0.9112 - val_loss: 0.5555 - val_accuracy: 0.8560
Epoch 939/1000
50/50 [==============================] - 47s 945ms/step - loss: 0.2358 -
accuracy: 0.9076 - val_loss: 0.5280 - val_accuracy: 0.8560
Epoch 940/1000
50/50 [==============================] - 46s 917ms/step - loss: 0.2515 -
accuracy: 0.8996 - val_loss: 0.5898 - val_accuracy: 0.8447
Epoch 941/1000
50/50 [==============================] - 46s 922ms/step - loss: 0.2477 -
accuracy: 0.9051 - val_loss: 0.5789 - val_accuracy: 0.8420
Epoch 942/1000
50/50 [==============================] - 46s 909ms/step - loss: 0.2401 -
accuracy: 0.9012 - val_loss: 0.6083 - val_accuracy: 0.8240
Epoch 943/1000
50/50 [==============================] - 47s 935ms/step - loss: 0.2888 -
accuracy: 0.8884 - val_loss: 0.6042 - val_accuracy: 0.8213
Epoch 944/1000
50/50 [==============================] - 47s 936ms/step - loss: 0.2926 -
accuracy: 0.8820 - val_loss: 0.4369 - val_accuracy: 0.8480
Epoch 945/1000
50/50 [==============================] - 47s 931ms/step - loss: 0.2668 -
accuracy: 0.8885 - val_loss: 0.5290 - val_accuracy: 0.8280
Epoch 946/1000
50/50 [==============================] - 48s 956ms/step - loss: 0.2674 -
accuracy: 0.8960 - val_loss: 0.5444 - val_accuracy: 0.8380
Epoch 947/1000
50/50 [==============================] - 48s 950ms/step - loss: 0.2307 -
accuracy: 0.9108 - val_loss: 0.5869 - val_accuracy: 0.8340
Epoch 948/1000
50/50 [==============================] - 46s 925ms/step - loss: 0.2636 -
accuracy: 0.9012 - val_loss: 0.4914 - val_accuracy: 0.8400
Epoch 949/1000
50/50 [==============================] - 49s 976ms/step - loss: 0.2519 -
accuracy: 0.8976 - val_loss: 0.6312 - val_accuracy: 0.8327
Epoch 950/1000
50/50 [==============================] - 51s 1s/step - loss: 0.2548 - accuracy:
0.8992 - val_loss: 0.5004 - val_accuracy: 0.8440
```

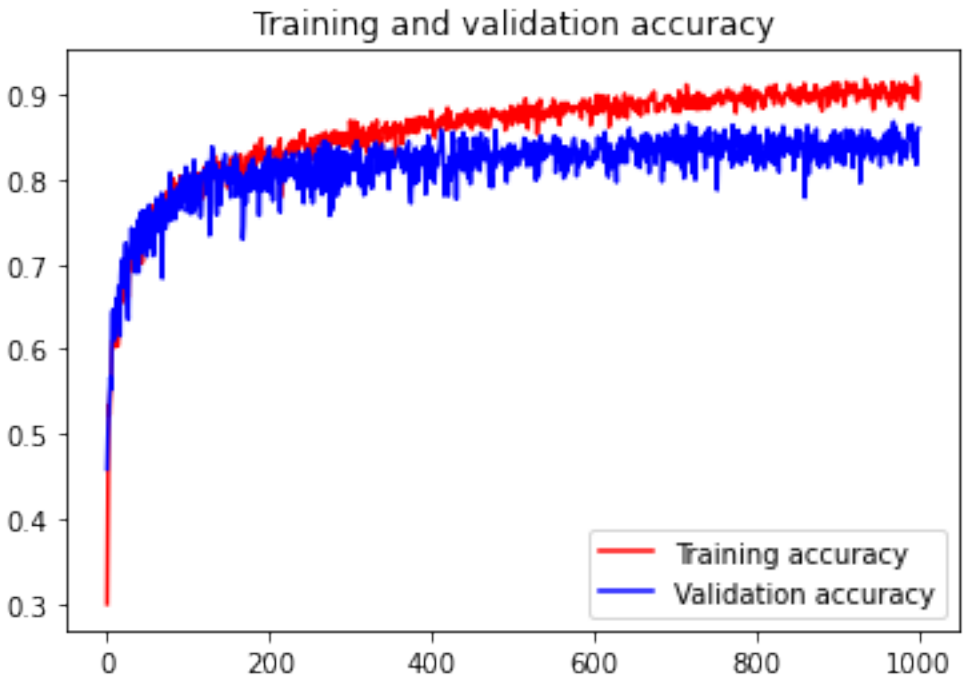
```
Epoch 951/1000
50/50 [==============================] - 47s 938ms/step - loss: 0.2392 -
accuracy: 0.9084 - val_loss: 0.5685 - val_accuracy: 0.8327
Epoch 952/1000
50/50 [==============================] - 47s 947ms/step - loss: 0.2315 -
accuracy: 0.9092 - val_loss: 0.6308 - val_accuracy: 0.8360
Epoch 953/1000
50/50 [==============================] - 46s 910ms/step - loss: 0.2611 -
accuracy: 0.8950 - val_loss: 0.7942 - val_accuracy: 0.8153
Epoch 954/1000
50/50 [==============================] - 48s 951ms/step - loss: 0.2542 -
accuracy: 0.8976 - val_loss: 0.5376 - val_accuracy: 0.8387
Epoch 955/1000
50/50 [==============================] - 48s 952ms/step - loss: 0.2184 -
accuracy: 0.9141 - val_loss: 0.5303 - val_accuracy: 0.8460
Epoch 956/1000
50/50 [==============================] - 47s 932ms/step - loss: 0.2481 -
accuracy: 0.9084 - val_loss: 0.4998 - val_accuracy: 0.8480
Epoch 957/1000
50/50 [==============================] - 48s 958ms/step - loss: 0.2306 -
accuracy: 0.9084 - val_loss: 0.5700 - val_accuracy: 0.8307
Epoch 958/1000
50/50 [==============================] - 46s 926ms/step - loss: 0.2709 -
accuracy: 0.9040 - val_loss: 0.4890 - val_accuracy: 0.8533
Epoch 959/1000
50/50 [==============================] - 48s 954ms/step - loss: 0.2331 -
accuracy: 0.9092 - val_loss: 0.5234 - val_accuracy: 0.8453
Epoch 960/1000
50/50 [==============================] - 47s 934ms/step - loss: 0.2531 -
accuracy: 0.9039 - val_loss: 0.4779 - val_accuracy: 0.8513
Epoch 961/1000
50/50 [==============================] - 48s 961ms/step - loss: 0.2494 -
accuracy: 0.8956 - val_loss: 0.5690 - val_accuracy: 0.8287
Epoch 962/1000
50/50 [==============================] - 48s 951ms/step - loss: 0.2454 -
accuracy: 0.8996 - val_loss: 0.5585 - val_accuracy: 0.8400
Epoch 963/1000
50/50 [==============================] - 48s 961ms/step - loss: 0.2714 -
accuracy: 0.8896 - val_loss: 0.5100 - val_accuracy: 0.8580
Epoch 964/1000
50/50 [==============================] - 46s 918ms/step - loss: 0.2798 -
accuracy: 0.8873 - val_loss: 0.4698 - val_accuracy: 0.8300
Epoch 965/1000
50/50 [==============================] - 49s 987ms/step - loss: 0.2494 -
accuracy: 0.9020 - val_loss: 0.5787 - val_accuracy: 0.8347
Epoch 966/1000
50/50 [==============================] - 47s 933ms/step - loss: 0.2590 -
accuracy: 0.8988 - val_loss: 0.5561 - val_accuracy: 0.8200
```

```
Epoch 967/1000
50/50 [==============================] - 49s 982ms/step - loss: 0.2660 -
accuracy: 0.8988 - val_loss: 0.5106 - val_accuracy: 0.8353
Epoch 968/1000
50/50 [==============================] - 47s 941ms/step - loss: 0.2197 -
accuracy: 0.9148 - val_loss: 0.4926 - val_accuracy: 0.8540
Epoch 969/1000
50/50 [==============================] - 48s 960ms/step - loss: 0.2653 -
accuracy: 0.9020 - val_loss: 0.4289 - val_accuracy: 0.8680
Epoch 970/1000
50/50 [==============================] - 48s 971ms/step - loss: 0.2477 -
accuracy: 0.9064 - val_loss: 0.5324 - val_accuracy: 0.8320
Epoch 971/1000
50/50 [==============================] - 47s 929ms/step - loss: 0.2356 -
accuracy: 0.9072 - val_loss: 0.4098 - val_accuracy: 0.8627
Epoch 972/1000
50/50 [==============================] - 46s 916ms/step - loss: 0.2703 -
accuracy: 0.8924 - val_loss: 0.5892 - val_accuracy: 0.8387
Epoch 973/1000
50/50 [==============================] - 48s 957ms/step - loss: 0.2484 -
accuracy: 0.9040 - val_loss: 0.5108 - val_accuracy: 0.8433
Epoch 974/1000
50/50 [==============================] - 46s 923ms/step - loss: 0.2469 -
accuracy: 0.8988 - val_loss: 0.5219 - val_accuracy: 0.8380
Epoch 975/1000
50/50 [==============================] - 49s 985ms/step - loss: 0.2372 -
accuracy: 0.9060 - val_loss: 0.4663 - val_accuracy: 0.8513
Epoch 976/1000
50/50 [==============================] - 46s 927ms/step - loss: 0.2356 -
accuracy: 0.9132 - val_loss: 0.5048 - val_accuracy: 0.8547
Epoch 977/1000
50/50 [==============================] - 48s 957ms/step - loss: 0.2490 -
accuracy: 0.9052 - val_loss: 0.5222 - val_accuracy: 0.8380
Epoch 978/1000
50/50 [==============================] - 47s 936ms/step - loss: 0.2417 -
accuracy: 0.9092 - val_loss: 0.5950 - val_accuracy: 0.8180
Epoch 979/1000
50/50 [==============================] - 48s 963ms/step - loss: 0.2683 -
accuracy: 0.8833 - val_loss: 0.5284 - val_accuracy: 0.8327
Epoch 980/1000
50/50 [==============================] - 48s 951ms/step - loss: 0.2275 -
accuracy: 0.9080 - val_loss: 0.5708 - val_accuracy: 0.8387
Epoch 981/1000
50/50 [==============================] - 49s 977ms/step - loss: 0.2361 -
accuracy: 0.9056 - val_loss: 0.5345 - val_accuracy: 0.8467
Epoch 982/1000
50/50 [==============================] - 46s 918ms/step - loss: 0.2653 -
accuracy: 0.8950 - val_loss: 0.4609 - val_accuracy: 0.8413
```

```
Epoch 983/1000
50/50 [==============================] - 48s 951ms/step - loss: 0.2301 -
accuracy: 0.9133 - val_loss: 0.5353 - val_accuracy: 0.8413
Epoch 984/1000
50/50 [==============================] - 47s 948ms/step - loss: 0.2386 -
accuracy: 0.9036 - val_loss: 0.5445 - val_accuracy: 0.8360
Epoch 985/1000
50/50 [==============================] - 47s 936ms/step - loss: 0.2270 -
accuracy: 0.9088 - val_loss: 0.6401 - val_accuracy: 0.8247
Epoch 986/1000
50/50 [==============================] - 48s 958ms/step - loss: 0.2572 -
accuracy: 0.9020 - val_loss: 0.6192 - val_accuracy: 0.8340
Epoch 987/1000
50/50 [==============================] - 184s 4s/step - loss: 0.2484 - accuracy:
0.9068 - val_loss: 0.5779 - val_accuracy: 0.8340
Epoch 988/1000
50/50 [==============================] - 146s 3s/step - loss: 0.2574 - accuracy:
0.9043 - val_loss: 0.5138 - val_accuracy: 0.8640
Epoch 989/1000
50/50 [==============================] - 141s 3s/step - loss: 0.2545 - accuracy:
0.9040 - val_loss: 0.5282 - val_accuracy: 0.8507
Epoch 990/1000
50/50 [==============================] - 209s 4s/step - loss: 0.2573 - accuracy:
0.9032 - val_loss: 0.4714 - val_accuracy: 0.8467
Epoch 991/1000
50/50 [==============================] - 135s 3s/step - loss: 0.2395 - accuracy:
0.9080 - val_loss: 0.4654 - val_accuracy: 0.8587
Epoch 992/1000
50/50 [==============================] - 150s 3s/step - loss: 0.2388 - accuracy:
0.9040 - val_loss: 0.4417 - val_accuracy: 0.8647
Epoch 993/1000
50/50 [==============================] - 130s 3s/step - loss: 0.2627 - accuracy:
0.8968 - val_loss: 0.4740 - val_accuracy: 0.8533
Epoch 994/1000
50/50 [==============================] - 153s 3s/step - loss: 0.2501 - accuracy:
0.8984 - val_loss: 0.6034 - val_accuracy: 0.8260
Epoch 995/1000
50/50 [==============================] - 129s 3s/step - loss: 0.2535 - accuracy:
0.9007 - val_loss: 0.5007 - val_accuracy: 0.8527
Epoch 996/1000
50/50 [==============================] - 127s 3s/step - loss: 0.2026 - accuracy:
0.9210 - val_loss: 0.5814 - val_accuracy: 0.8413
Epoch 997/1000
50/50 [==============================] - 125s 2s/step - loss: 0.2022 - accuracy:
0.9218 - val_loss: 0.6705 - val_accuracy: 0.8173
Epoch 998/1000
50/50 [==============================] - 135s 3s/step - loss: 0.2834 - accuracy:
0.8936 - val_loss: 0.4365 - val_accuracy: 0.8527
```

```
Epoch 999/1000
50/50 [==============================] - 155s 3s/step - loss: 0.2695 - accuracy:
0.8948 - val_loss: 0.4447 - val_accuracy: 0.8580
Epoch 1000/1000
50/50 [==============================] - 134s 3s/step - loss: 0.2316 - accuracy:
0.9132 - val_loss: 0.5148 - val_accuracy: 0.8600
```

[2]:
```python
# Mostrar grafico
import matplotlib.pyplot as plt
acc = history.history['accuracy']
val_acc = history.history['val_accuracy']
loss = history.history['loss']
val_loss = history.history['val_loss']

epochs = range(len(acc))

plt.plot(epochs, acc, 'r', label='Training accuracy')
plt.plot(epochs, val_acc, 'b', label='Validation accuracy')
plt.title('Training and validation accuracy')
plt.legend(loc=0)
plt.figure()


plt.show()
```

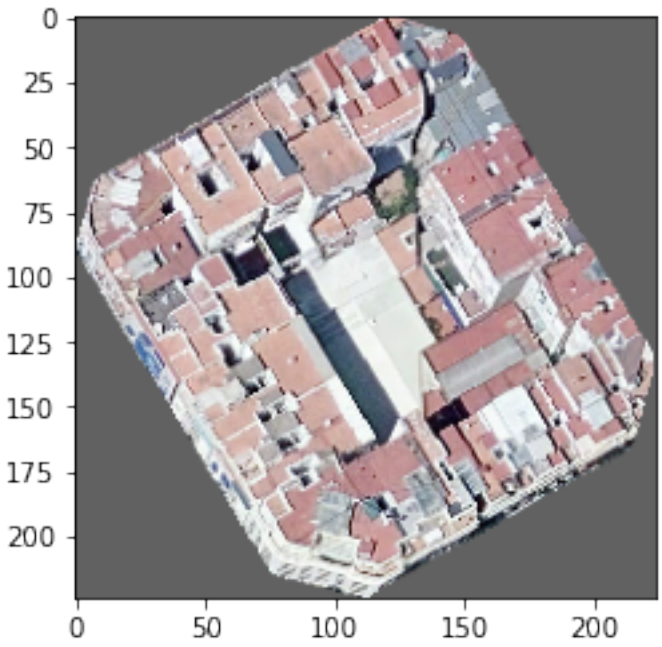


```
<Figure size 432x288 with 0 Axes>
```

[3]:
```
import numpy as np
from keras.preprocessing import image
from IPython.display import Image

builtup_names = ["0_espacioabierto", "1_industrial", "2_atomistic","4_formal"]
base_dir = "E:\TFM_MUESTRAS\Test_003\muestras_maestras"
to_test = [
  base_dir+"\\Valencia-61192cda1504_0.tif",
  base_dir+"\\Valencia-61192eff5fa_0.tif",
  base_dir+"\\Valencia-611928751acc_2.tif",
  base_dir+"\\Valencia-611929607f7_2.tif",
  base_dir+"\\Valencia-61192a125b3_1.tif",
  base_dir+"\\Valencia-61192a13139c_1.tif",
  base_dir+"\\Valencia-61192dd51504_4.tif",
  base_dir+"\\Valencia-61192e3b1cd3_4.tif"
]
#to_test = ["E:\\Atlas_Datos\\test_data\\trainingAll\\tempSample-60a5d3a41b89_4.
 ↪tif"]
#to_test = ["E:\\Atlas_Datos\\test_data\\trainingAll\\tempSample-60a5d3b51189_0.
 ↪tif"]
for fn in to_test:

  # predicting images
  path = fn
  img = image.load_img(path, target_size=(image_size, image_size))
  x = image.img_to_array(img)
  x = np.expand_dims(x, axis=0)

  images = np.vstack([x])
  classes = model.predict(images, batch_size=10)
  print(fn)
  print(classes)
  print(type(classes))
  classes_list = classes.tolist()[0]
  print (classes_list)
  max_index = classes_list.index(max(classes_list))
  print("Clase: ", max_index, " --- ", builtup_names[max_index])
  #print(img)

  from matplotlib.pyplot import imshow
  imshow(np.asarray(img))
```

```
E:\TFM_MUESTRAS\Test_003\muestras_maestras\Valencia-61192cda1504_0.tif
[[0. 0. 0. 1.]]
<class 'numpy.ndarray'>
[0.0, 0.0, 0.0, 1.0]
```

```
Clase:  3  ---  4_formal
E:\TFM_MUESTRAS\Test_003\muestras_maestras\Valencia-61192eff5fa_0.tif
[[0. 0. 0. 1.]]
<class 'numpy.ndarray'>
[0.0, 0.0, 0.0, 1.0]
Clase:  3  ---  4_formal
E:\TFM_MUESTRAS\Test_003\muestras_maestras\Valencia-611928751acc_2.tif
[[0. 0. 0. 1.]]
<class 'numpy.ndarray'>
[0.0, 0.0, 0.0, 1.0]
Clase:  3  ---  4_formal
E:\TFM_MUESTRAS\Test_003\muestras_maestras\Valencia-611929607f7_2.tif
[[0. 0. 0. 1.]]
<class 'numpy.ndarray'>
[0.0, 0.0, 0.0, 1.0]
Clase:  3  ---  4_formal
E:\TFM_MUESTRAS\Test_003\muestras_maestras\Valencia-61192a125b3_1.tif
[[0. 1. 0. 0.]]
<class 'numpy.ndarray'>
[0.0, 1.0, 0.0, 0.0]
Clase:  1  ---  1_industrial
E:\TFM_MUESTRAS\Test_003\muestras_maestras\Valencia-61192a13139c_1.tif
[[0. 1. 0. 0.]]
<class 'numpy.ndarray'>
[0.0, 1.0, 0.0, 0.0]
Clase:  1  ---  1_industrial
E:\TFM_MUESTRAS\Test_003\muestras_maestras\Valencia-61192dd51504_4.tif
[[0. 0. 0. 1.]]
<class 'numpy.ndarray'>
[0.0, 0.0, 0.0, 1.0]
Clase:  3  ---  4_formal
E:\TFM_MUESTRAS\Test_003\muestras_maestras\Valencia-61192e3b1cd3_4.tif
[[0. 0. 0. 1.]]
<class 'numpy.ndarray'>
[0.0, 0.0, 0.0, 1.0]
Clase:  3  ---  4_formal
```



[4]:
```
#https://subscription.packtpub.com/book/big_data_and_business_intelligence/
 ↪9781838555078/6/ch06lvl1sec34/confusion-matrix
from sklearn.metrics import classification_report, confusion_matrix
import numpy as np
my_validation_datagen = ImageDataGenerator(rescale = 1./255)
my_validation_generator = my_validation_datagen.flow_from_directory(
        NEW_VALIDATION_FOLDER,
        target_size=(image_size, image_size),
        class_mode='categorical',
  batch_size=batch_size,
  shuffle=False
)

Y_pred = model.predict(my_validation_generator)
y_pred = np.argmax(Y_pred, axis=1)

print('Confusion Matrix')
print(confusion_matrix(my_validation_generator.classes, y_pred))
print('Classification Report')
# list(train_generator.class_indices.keys())
target_names = []
for key in builtup_names:
    target_names.append(key)
```

```
print(classification_report(my_validation_generator.classes, y_pred,␣
 ↪target_names=target_names))
```

```
Found 2486 images belonging to 4 classes.
```

```
C:\Users\oskmo\.conda\envs\masterall\lib\site-packages\PIL\Image.py:2855:
DecompressionBombWarning: Image size (171081905 pixels) exceeds limit of
89478485 pixels, could be decompression bomb DOS attack.
  warnings.warn(
```

```
Confusion Matrix
[[617  43  18   7]
 [  7 318  19  17]
 [  8  20 588  83]
 [ 18  27  93 603]]
Classification Report
                  precision    recall  f1-score   support

0_espacioabierto       0.95      0.90      0.92       685
    1_industrial       0.78      0.88      0.83       361
     2_atomistic       0.82      0.84      0.83       699
        4_formal       0.85      0.81      0.83       741

        accuracy                           0.86      2486
       macro avg       0.85      0.86      0.85      2486
    weighted avg       0.86      0.86      0.86      2486
```