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import tensorflow as tf
from tensorflow.keras.preprocessing.image import ImageDataGenerator
import os
import matplotlib.pyplot as plt
import numpy as np
from tensorflow.keras.preprocessing import
image_dataset_from_directory
from tensorflow.keras.layers import Dense, Flatten, Conv2D,
MaxPooling2D, Dropout, GlobalAveragePooling2D,
Input, BatchNormalization
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from tensorflow.keras.applications import MobileNetV2
from tensorflow.keras.models import Sequential
from tensorflow.keras.optimizers import Adam
from tensorflow.keras.utils import to_categorical
from tensorflow.keras.models import load_model
import warnings
warnings.filterwarnings('ignore')
from tensorflow.keras.preprocessing.image import img_to_array, load_img
from tensorflow.keras.preprocessing import image
from tensorflow.keras.regularizers import l2
from tensorflow.keras.callbacks import EarlyStopping
```

```
!mkdir -p ~/.kaggle
!cp kaggle.json ~/.kaggle/
!chmod 600 /root/.kaggle/kaggle.json
```

```
!kaggle datasets download -d samuelcortinhas/cats-and-dogs-image-
classification
```

Dataset URL: <https://www.kaggle.com/datasets/samuelcortinhas/cats-and-dogs-image-classification>

License(s): CC0-1.0

Downloading cats-and-dogs-image-classification.zip to /content

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100% 64.4M/64.4M [00:00<00:00, 118MB/s]

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!unzip cats-and-dogs-image-classification.zip
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Archive: cats-and-dogs-image-classification.zip

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```

train='/content/train'
test='/content/test'

train_datagen = ImageDataGenerator(
    rescale=1./255,
    horizontal_flip=True,
    rotation_range=30,
    zoom_range=0.2,
    validation_split=0.2)

test_datagen = ImageDataGenerator(
    rescale=1./255,
    horizontal_flip=True,
    rotation_range=30,
    zoom_range=0.2,)

train_gen = train_datagen.flow_from_directory(
    train,
    class_mode='categorical',
    batch_size = 32,
    target_size = (224,224),
    shuffle = True,
    seed = 42,
    subset = "training")

Found 447 images belonging to 2 classes.

val_gen = train_datagen.flow_from_directory(
    train,
    class_mode = "categorical",
    batch_size = 32,
    target_size = (224,224),
    shuffle = False,
    seed = 42,
    subset = "validation")

Found 110 images belonging to 2 classes.

test_set = test_datagen.flow_from_directory(
    test,
    class_mode = "categorical",
    batch_size = 32,
    target_size = (224,224),
    shuffle = False,
    seed = 42)

Found 140 images belonging to 2 classes.

base1 = MobileNetV2(weights='imagenet', include_top=False,
input_shape=(224, 224, 3))

```


Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/mobilenet_v2/mobilenet_v2_weights_tf_dim_ordering_tf_kernels_1.0_224_no_top.h5
9406464/9406464 ————— 0s 0us/step

```
m1 = Sequential()
m1.add(Input(shape=(224, 224, 3)))
m1.add(basel) # Add MobileNetV2 as the base
m1.add(GlobalAveragePooling2D())
m1.add(Dense(1024, activation='relu'))
m1.add(Dropout(0.5))
m1.add(Dense(512, activation='relu'))
m1.add(Dropout(0.5))
m1.add(Dense(2, activation='softmax')) # 2 output units for binary
classification

'''for layer in m1.layers[-20:]:
    layer.trainable = False
'''

basel.trainable = False

m1.compile(optimizer=Adam(learning_rate=0.0001),
           loss='categorical_crossentropy',
           metrics=['accuracy'])
```

m1.summary()

Model: "sequential"

Layer (type) Param #	Output Shape
mobilenetv2_1.00_224 (Functional) 2,257,984	(None, 7, 7, 1280)
global_average_pooling2d 0 (GlobalAveragePooling2D)	(None, 1280)
dense (Dense) 1,311,744	(None, 1024)
dropout (Dropout) 0	(None, 1024)

dense_1 (Dense)		(None, 512)
524,800		
dropout_1 (Dropout)		(None, 512)
0		
dense_2 (Dense)		(None, 2)
1,026		

Total params: 4,095,554 (15.62 MB)

Trainable params: 1,837,570 (7.01 MB)

Non-trainable params: 2,257,984 (8.61 MB)

history = m1.fit(train_gen, validation_data=val_gen, epochs=10)

Epoch 1/10

14/14 ————— 38s 2s/step - accuracy: 0.5733 - loss: 0.8644 - val_accuracy: 0.9091 - val_loss: 0.2575

Epoch 2/10

14/14 ————— 10s 483ms/step - accuracy: 0.8600 - loss: 0.3318 - val_accuracy: 0.8909 - val_loss: 0.2018

Epoch 3/10

14/14 ————— 9s 421ms/step - accuracy: 0.9024 - loss: 0.2305 - val_accuracy: 0.9000 - val_loss: 0.1833

Epoch 4/10

14/14 ————— 8s 327ms/step - accuracy: 0.9272 - loss: 0.1891 - val_accuracy: 0.9091 - val_loss: 0.1992

Epoch 5/10

14/14 ————— 11s 329ms/step - accuracy: 0.9066 - loss: 0.2175 - val_accuracy: 0.9364 - val_loss: 0.1299

Epoch 6/10

14/14 ————— 12s 425ms/step - accuracy: 0.9192 - loss: 0.2087 - val_accuracy: 0.9182 - val_loss: 0.1546

Epoch 7/10

14/14 ————— 9s 420ms/step - accuracy: 0.9478 - loss: 0.1485 - val_accuracy: 0.9364 - val_loss: 0.1348

Epoch 8/10

14/14 ————— 9s 427ms/step - accuracy: 0.9704 - loss: 0.0994 - val_accuracy: 0.9364 - val_loss: 0.1522

Epoch 9/10

14/14 ————— 9s 335ms/step - accuracy: 0.9539 - loss: 0.1058 - val_accuracy: 0.9091 - val_loss: 0.1939

```

Epoch 10/10
14/14 ————— 9s 352ms/step - accuracy: 0.9426 - loss:
0.1415 - val_accuracy: 0.9364 - val_loss: 0.1579

m1.evaluate(test_set)

5/5 ————— 6s 1s/step - accuracy: 0.9352 - loss: 0.1466
[0.13037477433681488, 0.9357143044471741]

# Function to load and preprocess the image
def load_and_prep_image(img_path, img_size=(224, 224)):
    img = load_img(img_path, target_size=img_size) # Load and resize
    img = img_to_array(img) # Convert to array
    img = np.expand_dims(img, axis=0) # Add batch dimension
    img = img / 255.0 # Normalize the image
    return img

# Function to plot the image and prediction
def plot_image_with_prediction(img_path, model):
    img = load_and_prep_image(img_path) # Preprocess the image
    pred = model.predict(img) # Predict the class
    class_names = ['Cat', 'Dog'] # Adjust class names as per your
dataset

    predicted_class = np.argmax(pred, axis=1)[0] # Get the predicted
class (0 or 1)
    predicted_label = class_names[predicted_class] # Get the
corresponding label

    # Display the image and prediction
    img_to_display = load_img(img_path, target_size=(224, 224)) #
Load the image for display
    plt.imshow(img_to_display)
    plt.title(f"Predicted Label: {predicted_label}")
    plt.axis("off")
    plt.show()

# Example of using the function
# Provide the path to an image in your test dataset
test_img_path = "/content/test/cats/cat_119.jpg"
plot_image_with_prediction(test_img_path, m1)

1/1 ————— 0s 50ms/step

```

Predicted Label: Cat



```
m1.save('cat_and_dog.h5')
```

WARNING:absl:You are saving your model as an HDF5 file via
`model.save()` or `keras.saving.save_model(model)`. This file format
is considered legacy. We recommend using instead the native Keras
format, e.g. `model.save('my_model.keras')` or
`keras.saving.save_model(model, 'my_model.keras')`.

```
model=Sequential()
```

```
model.add(Conv2D(64,(3,3),activation='relu',input_shape=(224,224,3)))  
model.add(MaxPooling2D((2,2)))
```

```
model.add(Conv2D(128,(3,3),activation='relu'))  
model.add(MaxPooling2D((2,2)))
```

```
model.add(Conv2D(128,(3,3),activation='relu'))  
model.add(MaxPooling2D((2,2)))
```

```
model.add(Conv2D(512,(3,3),activation='relu'))  
model.add(MaxPooling2D((2,2)))
```

```
model.add(Flatten())  
model.add(Dense(1024,activation='relu'))  
model.add(Dense(2,activation='softmax'))
```

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

```
model.summary()
```

```
Model: "sequential_7"
```

Layer (type) Param #	Output Shape
conv2d_24 (Conv2D) 1,792	(None, 222, 222, 64)
max_pooling2d_24 (MaxPooling2D) 0	(None, 111, 111, 64)
conv2d_25 (Conv2D) 73,856	(None, 109, 109, 128)
max_pooling2d_25 (MaxPooling2D) 0	(None, 54, 54, 128)
conv2d_26 (Conv2D) 147,584	(None, 52, 52, 128)
max_pooling2d_26 (MaxPooling2D) 0	(None, 26, 26, 128)
conv2d_27 (Conv2D) 590,336	(None, 24, 24, 512)
max_pooling2d_27 (MaxPooling2D) 0	(None, 12, 12, 512)
flatten_6 (Flatten) 0	(None, 73728)

dense_15 (Dense)	(None, 1024)
75,498,496	
dense_16 (Dense)	(None, 2)
2,050	

Total params: 76,314,114 (291.12 MB)

Trainable params: 76,314,114 (291.12 MB)

Non-trainable params: 0 (0.00 B)

```
history = model.fit(
    train_gen,
    epochs=100,
    validation_data=val_gen,
)
```

Epoch 1/100

14/14 ————— 16s 726ms/step - accuracy: 0.4999 - loss: 2.0910 - val_accuracy: 0.5000 - val_loss: 0.7230

Epoch 2/100

14/14 ————— 9s 448ms/step - accuracy: 0.4894 - loss: 0.6932 - val_accuracy: 0.5091 - val_loss: 0.6930

Epoch 3/100

14/14 ————— 9s 384ms/step - accuracy: 0.5185 - loss: 0.6932 - val_accuracy: 0.5545 - val_loss: 0.6927

Epoch 4/100

14/14 ————— 10s 394ms/step - accuracy: 0.5127 - loss: 0.6929 - val_accuracy: 0.5182 - val_loss: 0.6910

Epoch 5/100

14/14 ————— 11s 414ms/step - accuracy: 0.5170 - loss: 0.6920 - val_accuracy: 0.5545 - val_loss: 0.6865

Epoch 6/100

14/14 ————— 11s 523ms/step - accuracy: 0.5386 - loss: 0.6898 - val_accuracy: 0.5727 - val_loss: 0.6780

Epoch 7/100

14/14 ————— 10s 528ms/step - accuracy: 0.5272 - loss: 0.6881 - val_accuracy: 0.5273 - val_loss: 0.6826

Epoch 8/100

14/14 ————— 19s 392ms/step - accuracy: 0.5478 - loss: 0.6900 - val_accuracy: 0.5727 - val_loss: 0.6616

Epoch 9/100

14/14 ————— 12s 466ms/step - accuracy: 0.6065 - loss: 0.6598 - val_accuracy: 0.6455 - val_loss: 0.6520

Epoch 10/100

14/14 ————— 19s 445ms/step - accuracy: 0.6831 - loss:

0.6258 - val_accuracy: 0.6545 - val_loss: 0.6500
Epoch 11/100
14/14 _____ 9s 390ms/step - accuracy: 0.6933 - loss:
0.6131 - val_accuracy: 0.6364 - val_loss: 0.6496
Epoch 12/100
14/14 _____ 10s 390ms/step - accuracy: 0.6753 - loss:
0.6199 - val_accuracy: 0.6364 - val_loss: 0.5876
Epoch 13/100
14/14 _____ 10s 430ms/step - accuracy: 0.6806 - loss:
0.5943 - val_accuracy: 0.6455 - val_loss: 0.6254
Epoch 14/100
14/14 _____ 10s 512ms/step - accuracy: 0.6674 - loss:
0.6211 - val_accuracy: 0.6273 - val_loss: 0.6365
Epoch 15/100
14/14 _____ 10s 463ms/step - accuracy: 0.6895 - loss:
0.5844 - val_accuracy: 0.6636 - val_loss: 0.6402
Epoch 16/100
14/14 _____ 9s 394ms/step - accuracy: 0.7021 - loss:
0.5824 - val_accuracy: 0.6545 - val_loss: 0.5962
Epoch 17/100
14/14 _____ 11s 463ms/step - accuracy: 0.7159 - loss:
0.5866 - val_accuracy: 0.6636 - val_loss: 0.6117
Epoch 18/100
14/14 _____ 20s 506ms/step - accuracy: 0.7538 - loss:
0.5407 - val_accuracy: 0.6545 - val_loss: 0.6034
Epoch 19/100
14/14 _____ 9s 436ms/step - accuracy: 0.7280 - loss:
0.5623 - val_accuracy: 0.6727 - val_loss: 0.6504
Epoch 20/100
14/14 _____ 9s 388ms/step - accuracy: 0.6674 - loss:
0.5923 - val_accuracy: 0.6364 - val_loss: 0.6156
Epoch 21/100
14/14 _____ 11s 377ms/step - accuracy: 0.6990 - loss:
0.5579 - val_accuracy: 0.7000 - val_loss: 0.6289
Epoch 22/100
14/14 _____ 10s 484ms/step - accuracy: 0.7196 - loss:
0.5602 - val_accuracy: 0.6545 - val_loss: 0.5997
Epoch 23/100
14/14 _____ 10s 475ms/step - accuracy: 0.7386 - loss:
0.5266 - val_accuracy: 0.6091 - val_loss: 0.7577
Epoch 24/100
14/14 _____ 9s 387ms/step - accuracy: 0.7053 - loss:
0.5625 - val_accuracy: 0.6545 - val_loss: 0.6314
Epoch 25/100
14/14 _____ 10s 398ms/step - accuracy: 0.7563 - loss:
0.5185 - val_accuracy: 0.6818 - val_loss: 0.5912
Epoch 26/100
14/14 _____ 11s 543ms/step - accuracy: 0.7924 - loss:
0.4639 - val_accuracy: 0.6455 - val_loss: 0.6030

Epoch 27/100
14/14 _____ 19s 446ms/step - accuracy: 0.7457 - loss: 0.4794 - val_accuracy: 0.6455 - val_loss: 0.6514
Epoch 28/100
14/14 _____ 9s 407ms/step - accuracy: 0.7238 - loss: 0.5229 - val_accuracy: 0.6818 - val_loss: 0.6509
Epoch 29/100
14/14 _____ 10s 393ms/step - accuracy: 0.7978 - loss: 0.4360 - val_accuracy: 0.6455 - val_loss: 0.7280
Epoch 30/100
14/14 _____ 10s 458ms/step - accuracy: 0.7777 - loss: 0.5005 - val_accuracy: 0.6636 - val_loss: 0.5979
Epoch 31/100
14/14 _____ 10s 483ms/step - accuracy: 0.7762 - loss: 0.4800 - val_accuracy: 0.7000 - val_loss: 0.6959
Epoch 32/100
14/14 _____ 10s 469ms/step - accuracy: 0.7402 - loss: 0.5133 - val_accuracy: 0.7091 - val_loss: 0.6098
Epoch 33/100
14/14 _____ 9s 383ms/step - accuracy: 0.7960 - loss: 0.4222 - val_accuracy: 0.7091 - val_loss: 0.6435
Epoch 34/100
14/14 _____ 10s 390ms/step - accuracy: 0.7574 - loss: 0.4826 - val_accuracy: 0.7091 - val_loss: 0.5740
Epoch 35/100
14/14 _____ 10s 464ms/step - accuracy: 0.7591 - loss: 0.4401 - val_accuracy: 0.7000 - val_loss: 0.5816
Epoch 36/100
14/14 _____ 10s 476ms/step - accuracy: 0.8164 - loss: 0.3964 - val_accuracy: 0.7182 - val_loss: 0.5944
Epoch 37/100
14/14 _____ 10s 466ms/step - accuracy: 0.8426 - loss: 0.3614 - val_accuracy: 0.7182 - val_loss: 0.6599
Epoch 38/100
14/14 _____ 11s 466ms/step - accuracy: 0.8115 - loss: 0.3867 - val_accuracy: 0.7364 - val_loss: 0.5440
Epoch 39/100
14/14 _____ 20s 451ms/step - accuracy: 0.8069 - loss: 0.3866 - val_accuracy: 0.7091 - val_loss: 0.6049
Epoch 40/100
14/14 _____ 10s 459ms/step - accuracy: 0.8401 - loss: 0.3491 - val_accuracy: 0.7364 - val_loss: 0.5851
Epoch 41/100
14/14 _____ 10s 411ms/step - accuracy: 0.8263 - loss: 0.3652 - val_accuracy: 0.7000 - val_loss: 0.7032
Epoch 42/100
14/14 _____ 11s 470ms/step - accuracy: 0.8088 - loss: 0.3877 - val_accuracy: 0.6909 - val_loss: 0.6360
Epoch 43/100

14/14 _____ 11s 473ms/step - accuracy: 0.8472 - loss: 0.3925 - val_accuracy: 0.6364 - val_loss: 0.6618
Epoch 44/100
14/14 _____ 10s 398ms/step - accuracy: 0.8420 - loss: 0.3571 - val_accuracy: 0.7000 - val_loss: 0.7266
Epoch 45/100
14/14 _____ 10s 465ms/step - accuracy: 0.8163 - loss: 0.4058 - val_accuracy: 0.7000 - val_loss: 0.6249
Epoch 46/100
14/14 _____ 10s 471ms/step - accuracy: 0.8088 - loss: 0.3633 - val_accuracy: 0.6545 - val_loss: 0.6302
Epoch 47/100
14/14 _____ 10s 482ms/step - accuracy: 0.8277 - loss: 0.3274 - val_accuracy: 0.7455 - val_loss: 0.5782
Epoch 48/100
14/14 _____ 11s 464ms/step - accuracy: 0.8167 - loss: 0.3754 - val_accuracy: 0.7182 - val_loss: 0.6916
Epoch 49/100
14/14 _____ 20s 473ms/step - accuracy: 0.8576 - loss: 0.2937 - val_accuracy: 0.7364 - val_loss: 0.5516
Epoch 50/100
14/14 _____ 10s 451ms/step - accuracy: 0.8399 - loss: 0.3145 - val_accuracy: 0.7273 - val_loss: 0.6361
Epoch 51/100
14/14 _____ 11s 464ms/step - accuracy: 0.8430 - loss: 0.3096 - val_accuracy: 0.7364 - val_loss: 0.5407
Epoch 52/100
14/14 _____ 9s 396ms/step - accuracy: 0.8912 - loss: 0.2648 - val_accuracy: 0.6545 - val_loss: 0.7377
Epoch 53/100
14/14 _____ 10s 391ms/step - accuracy: 0.9002 - loss: 0.2276 - val_accuracy: 0.6818 - val_loss: 0.6872
Epoch 54/100
14/14 _____ 10s 487ms/step - accuracy: 0.8987 - loss: 0.2280 - val_accuracy: 0.6091 - val_loss: 0.8626
Epoch 55/100
14/14 _____ 10s 493ms/step - accuracy: 0.8979 - loss: 0.2622 - val_accuracy: 0.6364 - val_loss: 0.6914
Epoch 56/100
14/14 _____ 20s 401ms/step - accuracy: 0.8418 - loss: 0.3104 - val_accuracy: 0.6727 - val_loss: 0.8149
Epoch 57/100
14/14 _____ 10s 432ms/step - accuracy: 0.9033 - loss: 0.2193 - val_accuracy: 0.7091 - val_loss: 0.7994
Epoch 58/100
14/14 _____ 10s 446ms/step - accuracy: 0.8897 - loss: 0.2505 - val_accuracy: 0.7000 - val_loss: 0.9132
Epoch 59/100
14/14 _____ 10s 431ms/step - accuracy: 0.9034 - loss:

0.2579 - val_accuracy: 0.6727 - val_loss: 0.8235
Epoch 60/100
14/14 _____ 10s 389ms/step - accuracy: 0.8699 - loss:
0.3120 - val_accuracy: 0.6727 - val_loss: 0.7928
Epoch 61/100
14/14 _____ 11s 467ms/step - accuracy: 0.8431 - loss:
0.3233 - val_accuracy: 0.7091 - val_loss: 0.6546
Epoch 62/100
14/14 _____ 10s 438ms/step - accuracy: 0.8925 - loss:
0.2472 - val_accuracy: 0.7364 - val_loss: 0.6831
Epoch 63/100
14/14 _____ 9s 443ms/step - accuracy: 0.8923 - loss:
0.2463 - val_accuracy: 0.7091 - val_loss: 0.7355
Epoch 64/100
14/14 _____ 9s 382ms/step - accuracy: 0.8904 - loss:
0.2312 - val_accuracy: 0.6818 - val_loss: 0.8603
Epoch 65/100
14/14 _____ 10s 385ms/step - accuracy: 0.8989 - loss:
0.2131 - val_accuracy: 0.6455 - val_loss: 0.9930
Epoch 66/100
14/14 _____ 10s 429ms/step - accuracy: 0.9168 - loss:
0.2007 - val_accuracy: 0.7182 - val_loss: 0.7831
Epoch 67/100
14/14 _____ 9s 436ms/step - accuracy: 0.9332 - loss:
0.1904 - val_accuracy: 0.7455 - val_loss: 0.8285
Epoch 68/100
14/14 _____ 10s 399ms/step - accuracy: 0.9300 - loss:
0.1647 - val_accuracy: 0.7091 - val_loss: 0.9757
Epoch 69/100
14/14 _____ 9s 388ms/step - accuracy: 0.9560 - loss:
0.1426 - val_accuracy: 0.6727 - val_loss: 1.2775
Epoch 70/100
14/14 _____ 10s 452ms/step - accuracy: 0.8668 - loss:
0.3844 - val_accuracy: 0.6727 - val_loss: 1.1506
Epoch 71/100
14/14 _____ 11s 501ms/step - accuracy: 0.9322 - loss:
0.1896 - val_accuracy: 0.6727 - val_loss: 0.9762
Epoch 72/100
14/14 _____ 10s 468ms/step - accuracy: 0.9326 - loss:
0.1565 - val_accuracy: 0.6545 - val_loss: 1.2432
Epoch 73/100
14/14 _____ 9s 388ms/step - accuracy: 0.9330 - loss:
0.1983 - val_accuracy: 0.6636 - val_loss: 1.0931
Epoch 74/100
14/14 _____ 11s 403ms/step - accuracy: 0.9178 - loss:
0.1673 - val_accuracy: 0.7545 - val_loss: 0.7239
Epoch 75/100
14/14 _____ 11s 549ms/step - accuracy: 0.9380 - loss:
0.1549 - val_accuracy: 0.7455 - val_loss: 0.8322

Epoch 76/100
14/14 _____ 10s 498ms/step - accuracy: 0.9572 - loss: 0.1094 - val_accuracy: 0.7364 - val_loss: 0.7794
Epoch 77/100
14/14 _____ 9s 399ms/step - accuracy: 0.9386 - loss: 0.1522 - val_accuracy: 0.7364 - val_loss: 1.2355
Epoch 78/100
14/14 _____ 11s 473ms/step - accuracy: 0.9571 - loss: 0.1296 - val_accuracy: 0.7182 - val_loss: 1.0408
Epoch 79/100
14/14 _____ 11s 468ms/step - accuracy: 0.9227 - loss: 0.1696 - val_accuracy: 0.6273 - val_loss: 1.0524
Epoch 80/100
14/14 _____ 20s 477ms/step - accuracy: 0.9211 - loss: 0.1734 - val_accuracy: 0.7727 - val_loss: 0.7476
Epoch 81/100
14/14 _____ 9s 455ms/step - accuracy: 0.9594 - loss: 0.1346 - val_accuracy: 0.7273 - val_loss: 1.0627
Epoch 82/100
14/14 _____ 10s 394ms/step - accuracy: 0.9583 - loss: 0.1473 - val_accuracy: 0.7364 - val_loss: 0.8902
Epoch 83/100
14/14 _____ 10s 399ms/step - accuracy: 0.9652 - loss: 0.1096 - val_accuracy: 0.7455 - val_loss: 0.7104
Epoch 84/100
14/14 _____ 10s 456ms/step - accuracy: 0.9647 - loss: 0.1104 - val_accuracy: 0.7273 - val_loss: 1.0158
Epoch 85/100
14/14 _____ 10s 473ms/step - accuracy: 0.9783 - loss: 0.1066 - val_accuracy: 0.7000 - val_loss: 1.0136
Epoch 86/100
14/14 _____ 9s 396ms/step - accuracy: 0.9608 - loss: 0.1001 - val_accuracy: 0.6636 - val_loss: 1.1873
Epoch 87/100
14/14 _____ 10s 392ms/step - accuracy: 0.9484 - loss: 0.1377 - val_accuracy: 0.7273 - val_loss: 1.0400
Epoch 88/100
14/14 _____ 10s 459ms/step - accuracy: 0.9718 - loss: 0.0864 - val_accuracy: 0.7636 - val_loss: 1.0463
Epoch 89/100
14/14 _____ 10s 447ms/step - accuracy: 0.9609 - loss: 0.0923 - val_accuracy: 0.7455 - val_loss: 0.9022
Epoch 90/100
14/14 _____ 10s 417ms/step - accuracy: 0.9684 - loss: 0.0847 - val_accuracy: 0.7455 - val_loss: 1.1936
Epoch 91/100
14/14 _____ 10s 393ms/step - accuracy: 0.9858 - loss: 0.0736 - val_accuracy: 0.7273 - val_loss: 1.2792
Epoch 92/100

```

14/14 _____ 10s 403ms/step - accuracy: 0.9794 - loss:
0.0506 - val_accuracy: 0.7182 - val_loss: 1.4677
Epoch 93/100
14/14 _____ 11s 552ms/step - accuracy: 0.9863 - loss:
0.0469 - val_accuracy: 0.7364 - val_loss: 1.2311
Epoch 94/100
14/14 _____ 10s 467ms/step - accuracy: 0.9595 - loss:
0.0816 - val_accuracy: 0.7182 - val_loss: 0.9116
Epoch 95/100
14/14 _____ 10s 492ms/step - accuracy: 0.9834 - loss:
0.0612 - val_accuracy: 0.6818 - val_loss: 1.0956
Epoch 96/100
14/14 _____ 11s 469ms/step - accuracy: 0.9723 - loss:
0.1259 - val_accuracy: 0.7727 - val_loss: 0.9579
Epoch 97/100
14/14 _____ 10s 383ms/step - accuracy: 0.9613 - loss:
0.1324 - val_accuracy: 0.7636 - val_loss: 1.0059
Epoch 98/100
14/14 _____ 10s 480ms/step - accuracy: 0.9687 - loss:
0.0725 - val_accuracy: 0.7545 - val_loss: 1.1011
Epoch 99/100
14/14 _____ 10s 454ms/step - accuracy: 0.9791 - loss:
0.0544 - val_accuracy: 0.7091 - val_loss: 1.1072
Epoch 100/100
14/14 _____ 9s 397ms/step - accuracy: 0.9871 - loss:
0.0443 - val_accuracy: 0.7545 - val_loss: 1.0947

```

```
model.evaluate(test_set)
```

```

5/5 _____ 2s 473ms/step - accuracy: 0.6938 - loss:
1.8862

```

```
[2.0231473445892334, 0.6857143044471741]
```

```
# Function to load and preprocess the image
```

```

def load_and_prep_image(img_path, img_size=(224, 224)):
    img = load_img(img_path, target_size=img_size) # Load and resize
    img = img_to_array(img) # Convert to array
    img = np.expand_dims(img, axis=0) # Add batch dimension
    img = img / 255.0 # Normalize the image
    return img

```

```
# Function to plot the image and prediction
```

```

def plot_image_with_prediction(img_path, model):
    img = load_and_prep_image(img_path) # Preprocess the image
    pred = model.predict(img) # Predict the class
    class_names = ['Cat', 'Dog'] # Adjust class names as per your dataset

```

```
    predicted_class = np.argmax(pred, axis=1)[0] # Get the predicted
```

```
class (0 or 1)
    predicted_label = class_names[predicted_class] # Get the
corresponding label

    # Display the image and prediction
    img_to_display = load_img(img_path, target_size=(224, 224)) #
Load the image for display
    plt.imshow(img_to_display)
    plt.title(f"Predicted Label: {predicted_label}")
    plt.axis("off")
    plt.show()

# Example of using the function
# Provide the path to an image in your test dataset
test_img_path = "/content/test/dogs/dog_302.jpg"
plot_image_with_prediction(test_img_path, model)

1/1 ————— 0s 17ms/step
```

Predicted Label: Dog

