```
!mkdir -p ~/.kaggle
!cp kaggle.json ~/.kaggle/
```

```
!kaggle datasets download -d salader/dogs-vs-cats
```

```
Warning: Your Kaggle API key is readable by other users on this system! To fix this, you can run 'chmod 600 /root
Downloading dogs-vs-cats.zip to /content
 98% 1.05G/1.06G [00:08<00:00, 210MB/s]
100% 1.06G/1.06G [00:08<00:00, 132MB/s]
```

```
import zipfile
zip_ref = zipfile.ZipFile('/content/dogs-vs-cats.zip', 'r')
zip_ref.extractall('/content')
zip_ref.close()
```

```
import tensorflow
from tensorflow import keras
from keras import Sequential
from keras.layers import Dense,Flatten
from keras.applications.vgg16 import VGG16
```

```
conv_base = VGG16(
    weights = 'imagenet',
    include_top = False,
    input_shape = (150,150,3)
)
```

```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/vgg16/vgg16_weights_tf_dim_ord
58889256/58889256 [==============================] - 1s 0us/step
```

```
conv_base.summary()
```

```
Model: "vgg16"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 input_1 (InputLayer)        [(None, 150, 150, 3)]     0

 block1_conv1 (Conv2D)       (None, 150, 150, 64)      1792

 block1_conv2 (Conv2D)       (None, 150, 150, 64)      36928

 block1_pool (MaxPooling2D)  (None, 75, 75, 64)        0

 block2_conv1 (Conv2D)       (None, 75, 75, 128)       73856

 block2_conv2 (Conv2D)       (None, 75, 75, 128)       147584

 block2_pool (MaxPooling2D)  (None, 37, 37, 128)       0

 block3_conv1 (Conv2D)       (None, 37, 37, 256)       295168

 block3_conv2 (Conv2D)       (None, 37, 37, 256)       590080

 block3_conv3 (Conv2D)       (None, 37, 37, 256)       590080

 block3_pool (MaxPooling2D)  (None, 18, 18, 256)       0

 block4_conv1 (Conv2D)       (None, 18, 18, 512)       1180160

 block4_conv2 (Conv2D)       (None, 18, 18, 512)       2359808

 block4_conv3 (Conv2D)       (None, 18, 18, 512)       2359808

 block4_pool (MaxPooling2D)  (None, 9, 9, 512)         0

 block5_conv1 (Conv2D)       (None, 9, 9, 512)         2359808

 block5_conv2 (Conv2D)       (None, 9, 9, 512)         2359808

 block5_conv3 (Conv2D)       (None, 9, 9, 512)         2359808

 block5_pool (MaxPooling2D)  (None, 4, 4, 512)         0

=================================================================
Total params: 14714688 (56.13 MB)
Trainable params: 14714688 (56.13 MB)
```

```
Non-trainable params: 0 (0.00 Byte)
_________________________________________________________________
```

```
model = Sequential()
```

```
model.add(conv_base)
model.add(Flatten())
model.add(Dense(256, activation = 'relu'))
model.add(Dense(1, activation = 'sigmoid'))
```

```
model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 vgg16 (Functional)          (None, 4, 4, 512)         14714688

 flatten (Flatten)           (None, 8192)              0

 dense (Dense)               (None, 256)               2097408

 dense_1 (Dense)             (None, 1)                 257

=================================================================
Total params: 16812353 (64.13 MB)
Trainable params: 16812353 (64.13 MB)
Non-trainable params: 0 (0.00 Byte)
_________________________________________________________________
```

```
conv_base.trainable = False
```

```
model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 vgg16 (Functional)          (None, 4, 4, 512)         14714688

 flatten (Flatten)           (None, 8192)              0

 dense (Dense)               (None, 256)               2097408

 dense_1 (Dense)             (None, 1)                 257

=================================================================
Total params: 16812353 (64.13 MB)
Trainable params: 2097665 (8.00 MB)
Non-trainable params: 14714688 (56.13 MB)
_________________________________________________________________
```

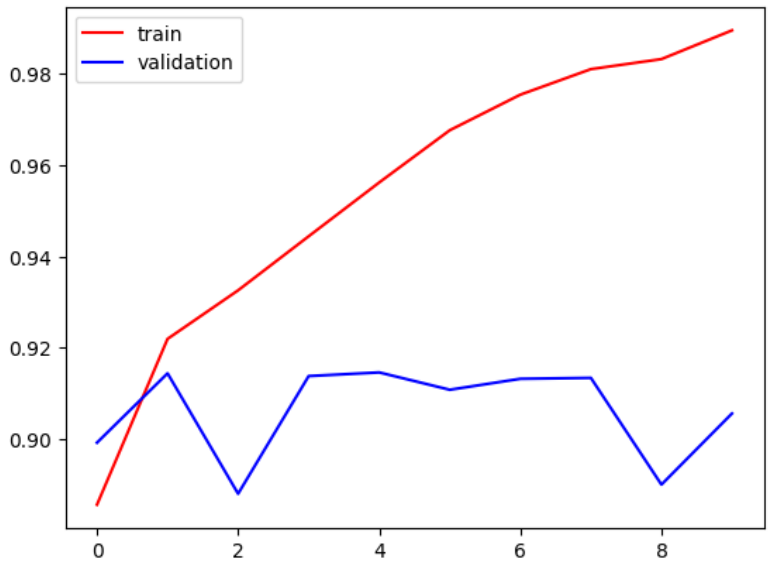
```
#generators
train_ds = keras.utils.image_dataset_from_directory(
    directory = '/content/train',
    labels = 'inferred',
    label_mode = 'int',
    batch_size = 32,
    image_size = (150,150)
)

validation_ds = keras.utils.image_dataset_from_directory(
    directory = '/content/test',
    labels = 'inferred',
    label_mode = 'int',
    batch_size = 32,
    image_size = (150,150)
)
```

```
Found 20000 files belonging to 2 classes.
Found 5000 files belonging to 2 classes.
```

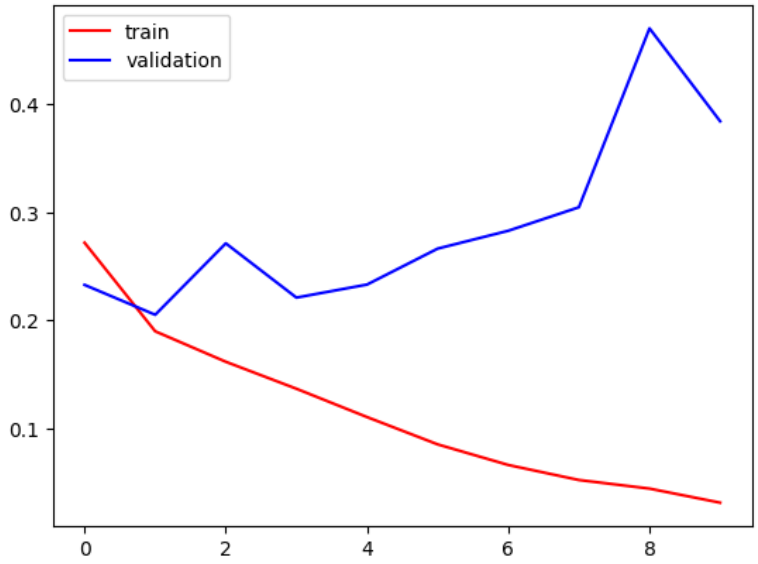
```
def process(image, label):
  image = tensorflow.cast(image/255, tensorflow.float32)
  return image, label

train_ds = train_ds.map(process)
validation_ds = validation_ds.map(process)


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


history = model.fit(train_ds, epochs=10, validation_data = validation_ds)
```

```
==========] - 42s 60ms/step - loss: 0.2719 - accuracy: 0.8856 - val_loss: 0.2329 - val_accuracy: 0.8992
==========] - 28s 44ms/step - loss: 0.1900 - accuracy: 0.9219 - val_loss: 0.2053 - val_accuracy: 0.9144
==========] - 33s 52ms/step - loss: 0.1618 - accuracy: 0.9326 - val_loss: 0.2713 - val_accuracy: 0.8880
==========] - 30s 47ms/step - loss: 0.1369 - accuracy: 0.9445 - val_loss: 0.2211 - val_accuracy: 0.9138
==========] - 30s 47ms/step - loss: 0.1107 - accuracy: 0.9563 - val_loss: 0.2332 - val_accuracy: 0.9146
==========] - 28s 45ms/step - loss: 0.0855 - accuracy: 0.9677 - val_loss: 0.2664 - val_accuracy: 0.9108
==========] - 34s 53ms/step - loss: 0.0665 - accuracy: 0.9755 - val_loss: 0.2829 - val_accuracy: 0.9132
==========] - 34s 54ms/step - loss: 0.0526 - accuracy: 0.9811 - val_loss: 0.3047 - val_accuracy: 0.9134
==========] - 29s 46ms/step - loss: 0.0446 - accuracy: 0.9833 - val_loss: 0.4700 - val_accuracy: 0.8900
==========] - 34s 53ms/step - loss: 0.0316 - accuracy: 0.9896 - val_loss: 0.3842 - val_accuracy: 0.9056
```

```
import matplotlib.pyplot as plt
plt.plot(history.history['accuracy'], color='red', label='train')
plt.plot(history.history['val_accuracy'], color='blue', label='validation')
plt.legend(())
plt.show()
```




```
import matplotlib.pyplot as plt
plt.plot(history.history['loss'], color='red', label='train')
plt.plot(history.history['val_loss'], color='blue', label='validation')
plt.legend()
plt.show()
```

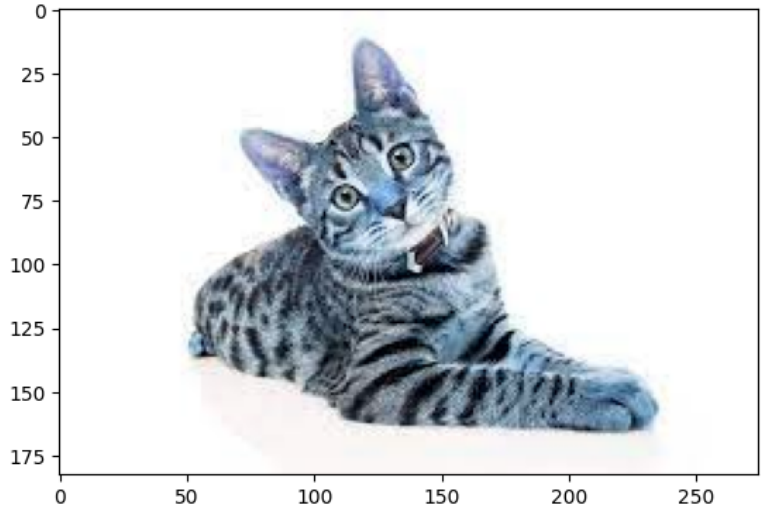



```
import cv2
```

```
test_img = cv2.imread('/content/download (1).jpeg')
```

```
plt.imshow(test_img)
```

```
<matplotlib.image.AxesImage at 0x7fb7f02a4e80>
```




```
test_img.shape
```

```
(183, 275, 3)
```

```
test_img = cv2.resize(test_img,(150,150))
```

```
test_input = test_img.reshape((1,150,150,3))
```

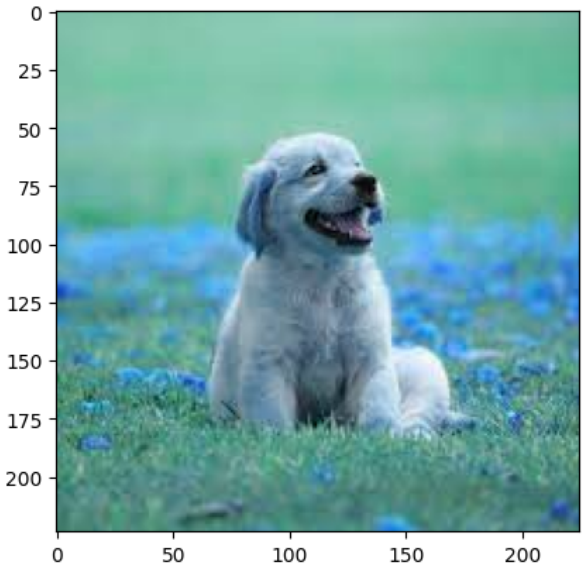
```
model.predict(test_input)
```

```
1/1 [==============================] - 1s 506ms/step
array([[0.]], dtype=float32)
```

```
test_img = cv2.imread('/content/download.jpeg')
```

```
plt.imshow(test_img)
```

```
<matplotlib.image.AxesImage at 0x7fb7fc07a3e0>
```




```
test_img.shape
```

```
(224, 225, 3)
```

```
test_img = cv2.resize(test_img,(150,150))
```

```
test_input = test_img.reshape((1,150,150,3))
```

```
model.predict(test_input)
```

```
1/1 [==============================] - 0s 21ms/step
array([[1.]], dtype=float32)
```

Start coding or generate with AI.