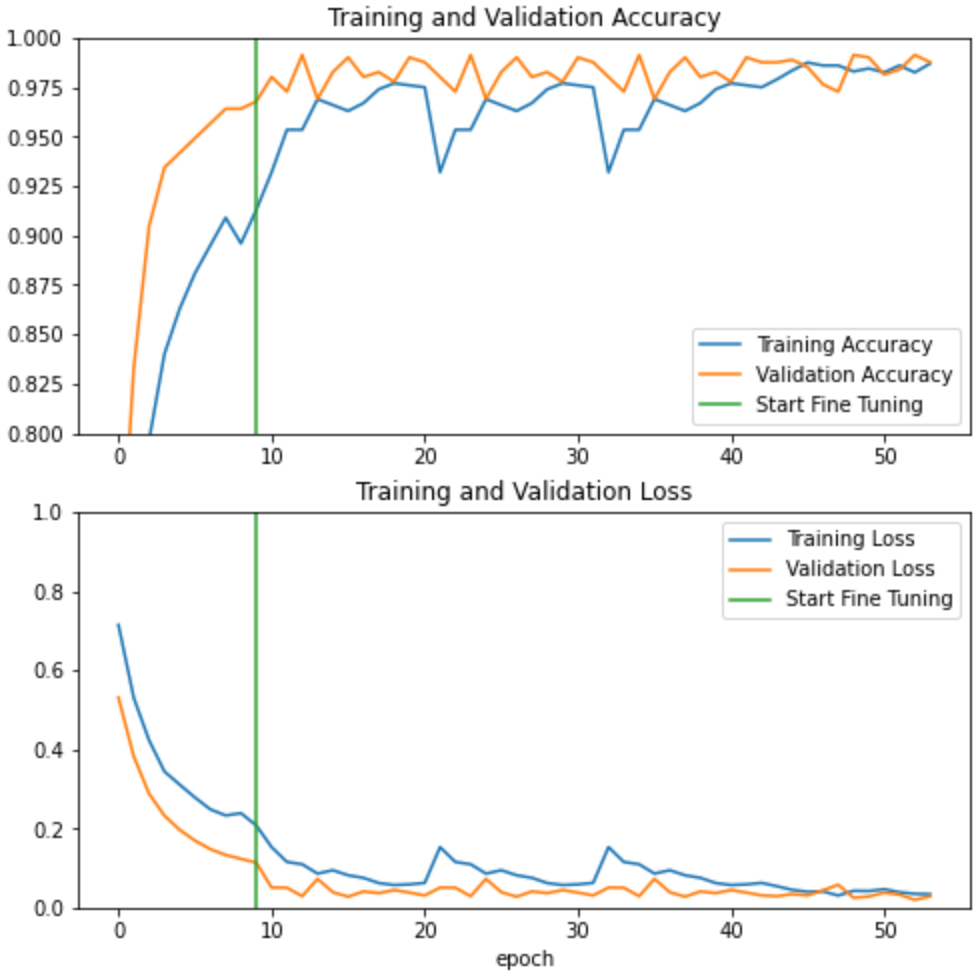
```
import matplotlib.pyplot as plt
import numpy as np
import os
import tensorflow as tf
_URL = 'https://storage.googleapis.com/mledu-datasets/cats_and_dogs_filtered.zip'

path_to_zip = tf.keras.utils.get_file('cats_and_dogs.zip', origin=_URL,
extract=True)
PATH = os.path.join(os.path.dirname(path_to_zip), 'cats_and_dogs_filtered')

train_dir = os.path.join(PATH, 'train')
validation_dir = os.path.join(PATH, 'validation')

BATCH_SIZE = 32
IMG_SIZE = (160, 160)

train_dataset =
tf.keras.utils.image_dataset_from_directory(train_dir,shuffle=True,batch_size=BAT
CH_SIZE,image_size=IMG_SIZE)
validation_dataset = tf.keras.utils.image_dataset_from_directory(validation_dir,
                                                                 shuffle=True,
                                                                 batch_size=BATCH
_SIZE,
                                                                 image_size=IMG_S
IZE)
class_names = train_dataset.class_names

plt.figure(figsize=(10, 10))
for images, labels in train_dataset.take(1):
  for i in range(9):
    ax = plt.subplot(3, 3, i + 1)
    plt.imshow(images[i].numpy().astype("uint8"))
    plt.title(class_names[labels[i]])
    plt.axis("off")
```


```
val_batches = tf.data.experimental.cardinality(validation_dataset)

test_dataset = validation_dataset.take(val_batches // 5)
validation_dataset = validation_dataset.skip(val_batches // 5)
print('Number of validation batches: %d' %
tf.data.experimental.cardinality(validation_dataset))
print('Number of test batches: %d' %
tf.data.experimental.cardinality(test_dataset))
AUTOTUNE = tf.data.AUTOTUNE

train_dataset = train_dataset.prefetch(buffer_size=AUTOTUNE)
validation_dataset = validation_dataset.prefetch(buffer_size=AUTOTUNE)
test_dataset = test_dataset.prefetch(buffer_size=AUTOTUNE)


data_augmentation = tf.keras.Sequential([
```

```
  tf.keras.layers.RandomFlip('horizontal'),
  tf.keras.layers.RandomRotation(0.2),
])


for image, _ in train_dataset.take(1):
  plt.figure(figsize=(10, 10))
  first_image = image[0]
  for i in range(9):
    ax = plt.subplot(3, 3, i + 1)
    augmented_image = data_augmentation(tf.expand_dims(first_image, 0))
    plt.imshow(augmented_image[0] / 255)
    plt.axis('off')
for image, _ in train_dataset.take(1):
  plt.figure(figsize=(10, 10))
  first_image = image[0]
  for i in range(9):
    ax = plt.subplot(3, 3, i + 1)
    augmented_image = data_augmentation(tf.expand_dims(first_image, 0))
    plt.imshow(augmented_image[0] / 255)
    plt.axis('off')
# Create the base model from the pre-trained model
IMG_SHAPE = IMG_SIZE + (3,)
base_model = tf.keras.applications.MobileNetV2(input_shape=IMG_SHAPE,
                                               include_top=False,
                                               weights='imagenet')
image_batch, label_batch = next(iter(train_dataset))
feature_batch = base_model(image_batch)
print(feature_batch.shape)


(32, 5, 5, 1280)

base_model.trainable = False
```

```
Model: "mobilenetv2_1.00_160"
__________________________________________________________________________________________________
 Layer (type)                   Output Shape         Param #     Connected to
==================================================================================================
 input_1 (InputLayer)           [(None, 160, 160, 3  0           []
                                )]

 Conv1 (Conv2D)                 (None, 80, 80, 32)   864
['input_1[0][0]']

 bn_Conv1 (BatchNormalization)  (None, 80, 80, 32)   128         ['Conv1[0][0]']

 Conv1_relu (ReLU)              (None, 80, 80, 32)   0
['bn_Conv1[0][0]']

 expanded_conv_depthwise (Depth  (None, 80, 80, 32)  288
['Conv1_relu[0][0]']
 wiseConv2D)

 expanded_conv_depthwise_BN (Ba  (None, 80, 80, 32)  128
['expanded_conv_depthwise[0][0]']
 tchNormalization)

 expanded_conv_depthwise_relu (  (None, 80, 80, 32)  0
['expanded_conv_depthwise_BN[0][0
 ReLU)                                                          ']

 expanded_conv_project (Conv2D)  (None, 80, 80, 16)  512
['expanded_conv_depthwise_relu[0]
                                                                [0]']


...
Total params: 2,257,984
Trainable params: 0
Non-trainable params: 2,257,984
```

```
inputs = tf.keras.Input(shape=(160, 160, 3))
x = data_augmentation(inputs)
x = preprocess_input(x)
x = base_model(x, training=False)
x = global_average_layer(x)
x = tf.keras.layers.Dropout(0.2)(x)
outputs = prediction_layer(x)
model = tf.keras.Model(inputs, outputs)
```




```
# Retrieve a batch of images from the test set
image_batch, label_batch = test_dataset.as_numpy_iterator().next()
predictions = model.predict_on_batch(image_batch).flatten()

# Apply a sigmoid since our model returns logits
predictions = tf.nn.sigmoid(predictions)
predictions = tf.where(predictions < 0.5, 0, 1)

print('Predictions:\n', predictions.numpy())
print('Labels:\n', label_batch)

plt.figure(figsize=(10, 10))
for i in range(9):
  ax = plt.subplot(3, 3, i + 1)
  plt.imshow(image_batch[i].astype("uint8"))
  plt.title(class_names[predictions[i]])
  plt.axis("off")
```

cats

dogs

dogs

dogs

cats

cats

cats

dogs

dogs