```
import tensorflow as tf
from tensorflow.keras import layers, models
from tensorflow.keras.callbacks import ReduceLROnPlateau
import matplotlib.pyplot as plt
import tensorflow_datasets as tfds

dataset, info = tfds.load('tf_flowers', split='train', with_info=True)
```

```
Downloading and preparing dataset 218.21 MiB (download: 218.21 MiB, generated: 221.83 MiB, total: 440.05
DI Completed...: 100%                                    5/5 [00:04<00:00,  1.13 file/s]
Dataset tf_flowers downloaded and prepared to /root/tensorflow_datasets/tf_flowers/3.0.1. Subsequent call
```

```
def preprocess(example):
    image = example['image']
    label = example['label']
    image = tf.image.resize(image, (150, 150))
    image = tf.cast(image, tf.float32) / 255.0
    return image, label


dataset = dataset.map(preprocess)


train_size = info.splits['train'].num_examples
train_dataset = dataset.take(train_size * 80 // 100)
test_dataset = dataset.skip(train_size * 80 // 100)


train_dataset = train_dataset.shuffle(1000).batch(32)
test_dataset = test_dataset.batch(32)

for image, label in train_dataset.take(1):
    plt.figure()
    plt.imshow(image[0])
    plt.title('Sample Image')
    plt.axis('off')
    plt.show()
    break
```


```
model = models.Sequential([
    layers.Conv2D(32, (3, 3), activation='relu', input_shape=(150, 150, 3)),
    layers.MaxPooling2D((2, 2)),
    layers.Conv2D(64, (3, 3), activation='relu'),
    layers.MaxPooling2D((2, 2)),
    layers.Conv2D(128, (3, 3), activation='relu'),
    layers.MaxPooling2D((2, 2)),
```

```
    layers.Conv2D(128, (3, 3), activation='relu'),
    layers.MaxPooling2D((2, 2)),
    layers.Flatten(),
    layers.Dense(512, activation='relu'),
    layers.Dense(5, activation='softmax')
])
```

```
/usr/local/lib/python3.10/dist-packages/keras/src/layers/convolutional/base_conv.py:107: UserWarning: Do
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

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



reduce_lr = ReduceLROnPlateau(monitor='val_loss', factor=0.2, patience=5, min_lr=0.001)

history = model.fit(train_dataset, epochs=5, validation_data=test_dataset,
                    callbacks=[reduce_lr])
```

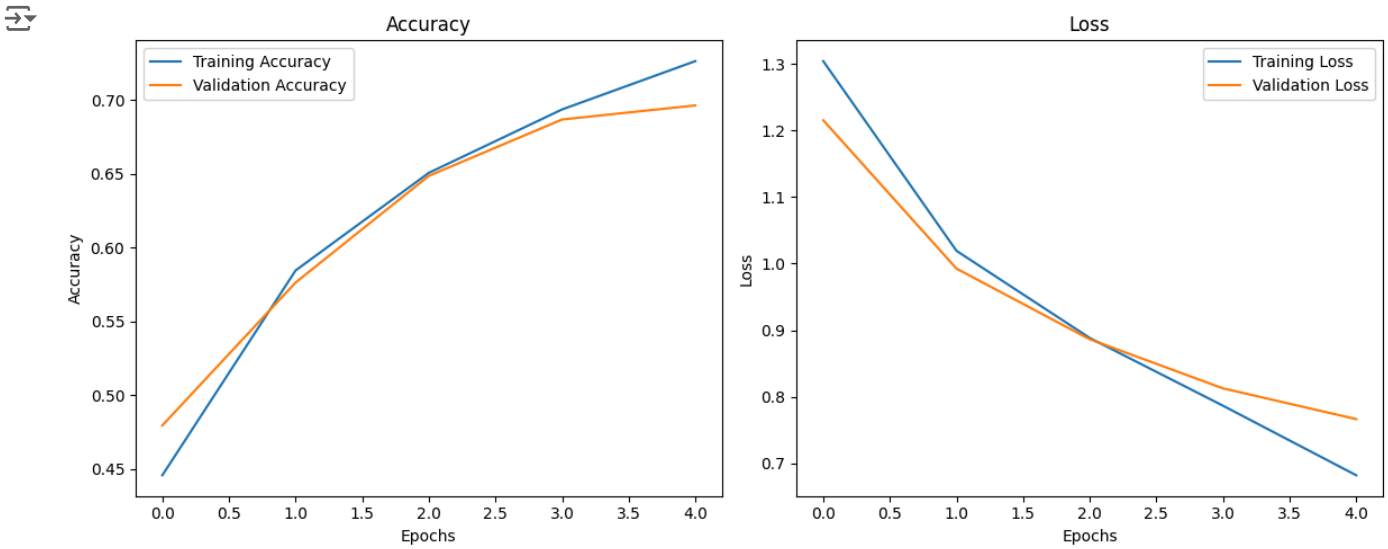
```
Epoch 1/5
92/92 ━━━━━━━━━━━━━━━━━━━━ 185s 2s/step - accuracy: 0.3728 - loss: 1.4281 - val_accuracy: 0.4796 - val_lo
Epoch 2/5
92/92 ━━━━━━━━━━━━━━━━━━━━ 185s 2s/step - accuracy: 0.5572 - loss: 1.0681 - val_accuracy: 0.5763 - val_lo
Epoch 3/5
92/92 ━━━━━━━━━━━━━━━━━━━━ 203s 2s/step - accuracy: 0.6394 - loss: 0.8924 - val_accuracy: 0.6485 - val_lo
Epoch 4/5
92/92 ━━━━━━━━━━━━━━━━━━━━ 193s 2s/step - accuracy: 0.6783 - loss: 0.8299 - val_accuracy: 0.6866 - val_lo
Epoch 5/5
92/92 ━━━━━━━━━━━━━━━━━━━━ 207s 2s/step - accuracy: 0.7144 - loss: 0.6984 - val_accuracy: 0.6962 - val_lo
```

```
plt.figure(figsize=(12, 5))


# Accuracy
plt.subplot(1, 2, 1)
plt.plot(history.history['accuracy'], label='Training Accuracy')
plt.plot(history.history['val_accuracy'], label='Validation Accuracy')
plt.title('Accuracy')
plt.xlabel('Epochs')
plt.ylabel('Accuracy')
plt.legend()


# Loss
plt.subplot(1, 2, 2)
plt.plot(history.history['loss'], label='Training Loss')
plt.plot(history.history['val_loss'], label='Validation Loss')
plt.title('Loss')
plt.xlabel('Epochs')
plt.ylabel('Loss')
plt.legend()


plt.tight_layout()
plt.show()
```


Accuracy
Training Accuracy
Validation Accuracy
Accuracy
Epochs
0.45
0.50
0.55
0.60
0.65
0.70
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Loss
Training Loss
Validation Loss
Loss
Epochs
0.7
0.8
0.9
1.0
1.1
1.2
1.3