```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
!unzip '/content/drive/MyDrive/Flowers-Dataset.zip'
```

```
  inflating: flowers/tulip/8668973377_c69527db42_m.jpg
  inflating: flowers/tulip/8668974855_8389ecbdca_m.jpg
  inflating: flowers/tulip/8669794378_97dda6036f_n.jpg
  inflating: flowers/tulip/8673412732_f8fd690ee4_n.jpg
  inflating: flowers/tulip/8673416166_620fc18e2f_n.jpg
  inflating: flowers/tulip/8673416556_639f5c88f1_n.jpg
  inflating: flowers/tulip/8677713853_1312f65e71.jpg
  inflating: flowers/tulip/8681825637_837a63513a_n.jpg
  inflating: flowers/tulip/8686013485_3c4dfbfd1f_n.jpg
  inflating: flowers/tulip/8686332852_c6dcb2e86b.jpg
  inflating: flowers/tulip/8687675254_c93f50d8b0_m.jpg
  inflating: flowers/tulip/8688502760_1c8d6de921_m.jpg
  inflating: flowers/tulip/8689672277_b289909f97_n.jpg
  inflating: flowers/tulip/8690789564_394eb04982_n.jpg
  inflating: flowers/tulip/8690791226_b1f015259f_n.jpg
  inflating: flowers/tulip/8695367666_0809529eaf_n.jpg
  inflating: flowers/tulip/8695372372_302135aeb2.jpg
  inflating: flowers/tulip/8697784345_e75913d220.jpg
  inflating: flowers/tulip/8702982836_75222725d7.jpg
  inflating: flowers/tulip/8706523526_a0f161b72b.jpg
  inflating: flowers/tulip/8708209606_d3aede4801.jpg
  inflating: flowers/tulip/8708856019_f3be2353a4_n.jpg
  inflating: flowers/tulip/8710148289_6fc196a0f8_n.jpg
  inflating: flowers/tulip/8711277462_b43df5454b_m.jpg
  inflating: flowers/tulip/8712230357_1298b8513b.jpg
  inflating: flowers/tulip/8712243901_54d686319e_m.jpg
  inflating: flowers/tulip/8712244311_da8e90bf8e_n.jpg
  inflating: flowers/tulip/8712260079_c0ff42e0e2_n.jpg
  inflating: flowers/tulip/8712263493_3db76c5f82.jpg
  inflating: flowers/tulip/8712266605_3787e346cd_n.jpg
  inflating: flowers/tulip/8712267391_c756f18ee7_n.jpg
  inflating: flowers/tulip/8712267813_f7a9be2ec5.jpg
  inflating: flowers/tulip/8712268519_f4c2c39a06_n.jpg
  inflating: flowers/tulip/8712269349_2b933da2b8_n.jpg
  inflating: flowers/tulip/8712270243_8512cf4fbd.jpg
  inflating: flowers/tulip/8712270665_57b5bda0a2_n.jpg
  inflating: flowers/tulip/8712282563_3819afb7bc.jpg
  inflating: flowers/tulip/8713357842_9964a93473_n.jpg
  inflating: flowers/tulip/8713387500_6a9138b41b_n.jpg
  inflating: flowers/tulip/8713388322_e5ae26263b_n.jpg
  inflating: flowers/tulip/8713389178_66bceb71a8_n.jpg
  inflating: flowers/tulip/8713390684_041148dd3e_n.jpg
  inflating: flowers/tulip/8713391394_4b679ea1e3_n.jpg
  inflating: flowers/tulip/8713392604_90631fb809_n.jpg
  inflating: flowers/tulip/8713394070_b24561b0a9.jpg
  inflating: flowers/tulip/8713396140_5af8136136.jpg
```

```
inflating: flowers/tulip/8713397358_0505cc0176_n.jpg
inflating: flowers/tulip/8713397694_bcbcbba2c2_n.jpg
inflating: flowers/tulip/8713398114_bc96f1b624_n.jpg
inflating: flowers/tulip/8713398614_88202e452e_n.jpg
inflating: flowers/tulip/8713398906_28e59a225a_n.jpg
inflating: flowers/tulip/8713407768_f880df361f.jpg
inflating: flowers/tulip/8717900362_2aa508e9e5.jpg
inflating: flowers/tulip/8722514702_7ecc68691c.jpg
inflating: flowers/tulip/8723767533_9145dec4bd_n.jpg
inflating: flowers/tulip/8729501081_b993185542_m.jpg
inflating: flowers/tulip/8733586143_3139db6e9e_n.jpg
inflating: flowers/tulip/8748266132_5298a91dcf_n.jpg
```

```
import numpy as np
import tensorflow as tf
from tensorflow.keras import layers
from tensorflow.keras.models import Sequential
from tensorflow.keras.preprocessing.image import ImageDataGenerator
import matplotlib.pyplot as plt
batch_size = 32
img_height = 180
img_width = 180
data_dir = "/content/flowers"
```

```
train_datagen = ImageDataGenerator(rescale = 1./255, horizontal_flip = True, vertical_flip =
```

```
x_train = train_datagen.flow_from_directory('/content/flowers',
                                            target_size=(64,64),
                                            class_mode='categorical',
                                            batch_size=100)
```

```
Found 4317 images belonging to 5 classes.
```

```
data_augmentation = Sequential(
  [
    layers.RandomFlip("vertical",input_shape=(img_height, img_width, 3)),
    layers.RandomRotation(0.1),
    layers.RandomZoom(0.1),
  ]
)
```

```
from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense
model = Sequential()
```

```
#Image Augumentation accuracy
data_augmentation = Sequential(
  [
    layers.RandomFlip("horizontal",input_shape=(img_height, img_width, 3)),
    layers.RandomRotation(0.1),
```

```
    layers.RandomZoom(0.1),
  ]
)


training_ds = tf.keras.utils.image_dataset_from_directory(
  data_dir,
  validation_split=0.2,
  subset="training",
  seed=57,
  image_size=(img_height, img_width),
  batch_size=batch_size)
```

```
Found 4317 files belonging to 5 classes.
Using 3454 files for training.
```

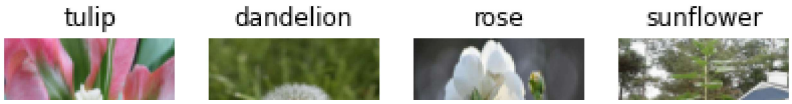
```
validation_ds = tf.keras.utils.image_dataset_from_directory(
  data_dir,
  validation_split=0.2,
  subset="validation",
seed=107,
  image_size=(img_height, img_width),
  batch_size=batch_size)
```

```
Found 4317 files belonging to 5 classes.
Using 863 files for validation.
```

```
training_ds.class_names
```

```
['daisy', 'dandelion', 'rose', 'sunflower', 'tulip']
```

```
plt.figure(figsize=(7, 7))
for data, labels in training_ds.take(1):
  for i in range(6):
    ax = plt.subplot(3, 4, i + 1)
    plt.imshow(data[i].numpy().astype("uint8"))
    plt.title(training_ds.class_names[labels[i]])
    plt.axis("off")
```




```
model.add(Convolution2D(32, (3,3), activation = "relu", input_shape = (64,64,3) ))
```

```
model.add(MaxPooling2D(pool_size = (2,2)))
```


```
model.add(Flatten())
```

```
model.add(Dense(300, activation = "relu"))
model.add(Dense(150, activation = "relu"))


model.add(Dense(5, activation = "softmax"))


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


model.fit(x_train, epochs = 15, steps_per_epoch = len(x_train))
```

```
Epoch 1/15
44/44 [==============================] - 30s 627ms/step - loss: 1.6264 - accuracy: 0.375
Epoch 2/15
44/44 [==============================] - 27s 615ms/step - loss: 1.1473 - accuracy: 0.529
Epoch 3/15
44/44 [==============================] - 27s 605ms/step - loss: 1.0621 - accuracy: 0.568
Epoch 4/15
44/44 [==============================] - 27s 598ms/step - loss: 1.0014 - accuracy: 0.603
Epoch 5/15
44/44 [==============================] - 27s 605ms/step - loss: 0.9545 - accuracy: 0.626
Epoch 6/15
44/44 [==============================] - 27s 599ms/step - loss: 0.8956 - accuracy: 0.656
Epoch 7/15
44/44 [==============================] - 27s 601ms/step - loss: 0.8710 - accuracy: 0.662
Epoch 8/15
44/44 [==============================] - 27s 602ms/step - loss: 0.8354 - accuracy: 0.686
Epoch 9/15
44/44 [==============================] - 27s 602ms/step - loss: 0.8215 - accuracy: 0.682
Epoch 10/15
44/44 [==============================] - 27s 601ms/step - loss: 0.7984 - accuracy: 0.696
Epoch 11/15
44/44 [==============================] - 27s 598ms/step - loss: 0.7667 - accuracy: 0.701
Epoch 12/15
44/44 [==============================] - 27s 598ms/step - loss: 0.7665 - accuracy: 0.698
Epoch 13/15
44/44 [==============================] - 27s 597ms/step - loss: 0.7211 - accuracy: 0.724
Epoch 14/15
44/44 [==============================] - 26s 596ms/step - loss: 0.7185 - accuracy: 0.721
Epoch 15/15
44/44 [==============================] - 27s 599ms/step - loss: 0.6840 - accuracy: 0.738
<keras.callbacks.History at 0x7fba6a7bacd0>
```

```
model.save("flowers.h5")
```

```
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
```

```
model = load_model("/content/flowers.h5")
```

```
tulip_img = image.load_img('/content/flowers/tulip/11441893003_ab83672800.jpg',target_size=(6
x = image.img_to_array(tulip_img)
x = np.expand_dims(x,axis=0)
predicted_class=model.predict(x)
```

```
labels = ['daisy','dandelion','roses','sunflowers','tulips']
labels[np.argmax(predicted_class)]
```

```
'tulips'
```

```
tulip_img
```

Colab paid products - Cancel contracts here

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