

Assignment Date	29 September 2022
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Maximum Marks	2 Marks

Download the Dataset

```
In [1]: import numpy as np
import tensorflow as tf
from tensorflow.keras import layers
from tensorflow.keras.models import Sequential
import matplotlib.pyplot as plt
import os

In [2]: batch_size = 16
```

Image Augmentation

```
In [3]: data_aug = Sequential(
[
    layers.RandomFlip("horizontal",input_shape=(180, 180, 3)),
    layers.RandomRotation(0.1),
    layers.RandomZoom(0.1),
]
)

In [5]: os.listdir("C:\\Users\\Harini\\Flowers-Dataset")

Out[5]: ['flowers']

In [6]: train_data = tf.keras.utils.image_dataset_from_directory(
"C:\\Users\\Harini\\Flowers-Dataset",
validation_split=0.25,
subset="training",
seed=120,
image_size=(180, 180),
batch_size=batch_size)

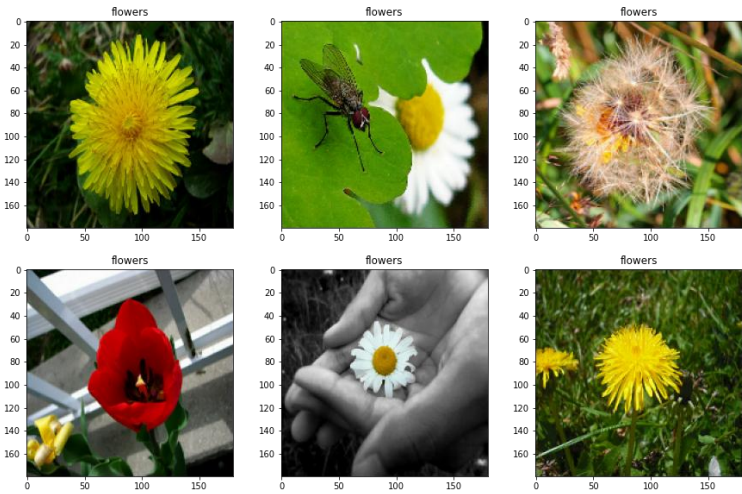
Found 4317 files belonging to 1 classes.
Using 3238 files for training.

In [7]: val_data_set = tf.keras.utils.image_dataset_from_directory(
"C:\\Users\\Harini\\Flowers-Dataset",
validation_split=0.25,
subset="validation",
seed=120,
image_size=(180, 180),
batch_size=batch_size)

Found 4317 files belonging to 1 classes.
Using 1079 files for validation.

In [8]: class_names = train_data.class_names

In [9]: plt.figure(figsize=(15, 15))
for images, labels in train_data.take(1):
    for i in range(6):
        ax = plt.subplot(3, 3, i + 1)
        plt.imshow(images[i].numpy().astype("uint8"))
        plt.title(class_names[labels[i]])
```



```
In [10]: normalization_layer = layers.Rescaling(1./255)

In [11]: dataset_normalized = train_data.map(lambda x, y: (normalization_layer(x), y))
image_batch, labels_batch = next(iter(dataset_normalized))
first_image = image_batch[0]
print(np.min(first_image), np.max(first_image))

0.0 1.0
```

Create Model

Add Layers (Convolution,MaxPooling,Flatten,Dense-(Hidden Layers),Output)

```
In [12]: num_classes = len(class_names)

model = Sequential([
    data_aug,
    layers.Rescaling(1./255, input_shape=(180, 180, 3)),
    layers.Conv2D(16, 3, activation='relu'),
    layers.MaxPooling2D(), layers.Conv2D(32,
3,activation='relu'), layers.Conv2D(32,
3,activation='relu'),
    layers.MaxPooling2D(), layers.Conv2D(64,
3, activation='relu'),
    layers.MaxPooling2D(), layers.Flatten(),
    layers.Dense(128, activation='relu'),
    layers.Dense(num_classes)
])
```

Compile The Model

compiling model with categorical cross entropy and adam optimizer

```
In [13]: model.compile(optimizer='adam',
loss=tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
metrics=['accuracy'])
```

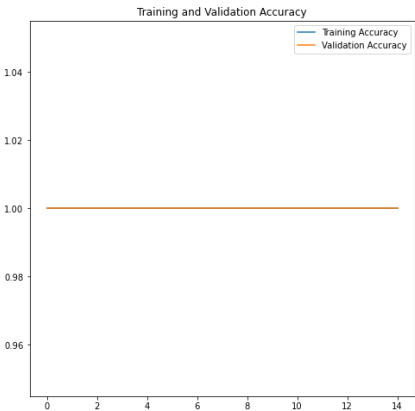
Fit The Model

```
In [14]: epochs=15
history = model.fit(train_data,validation_data=val_data_set,epochs=epochs)

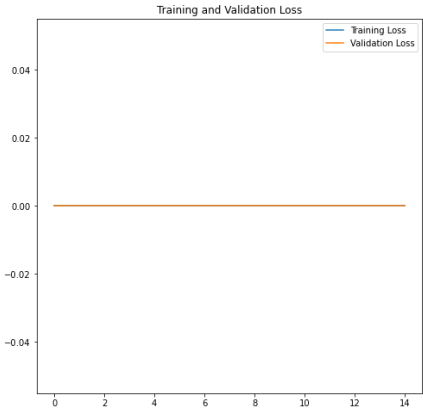
Epoch 1/15
203/203 [=====] - 33s 154ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 2/15
203/203 [=====] - 28s 140ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 3/15
203/203 [=====] - 29s 141ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 4/15
203/203 [=====] - 29s 143ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 5/15
203/203 [=====] - 28s 139ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 6/15
203/203 [=====] - 29s 140ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 7/15
203/203 [=====] - 28s 140ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 8/15
203/203 [=====] - 29s 144ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 9/15
203/203 [=====] - 28s 137ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 10/15
203/203 [=====] - 28s 137ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 11/15
203/203 [=====] - 28s 139ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 12/15
203/203 [=====] - 29s 142ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 13/15
203/203 [=====] - 28s 140ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 14/15
203/203 [=====] - 29s 143ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
Epoch 15/15
203/203 [=====] - 29s 141ms/step - loss: 0.0000e+00 - accuracy: 1.0000 - val_loss: 0.0000e+00 - val_accuracy: 1.0000
```

```
In [15]: epochs_range = range(epochs)

plt.figure(figsize=(8, 8))
plt.plot(epochs_range, history.history['accuracy'], label='Training Accuracy')
plt.plot(epochs_range, history.history['val_accuracy'], label='Validation Accuracy')
plt.legend()
plt.title('Training and Validation Accuracy')
plt.show()
```



```
In [16]: plt.figure(figsize=(8, 8))
plt.plot(epochs_range, history.history['loss'], label='Training Loss')
plt.plot(epochs_range, history.history['val_loss'], label='Validation Loss')
plt.legend()
plt.title('Training and Validation Loss')
plt.show()
```



Save The Model

```
In [17]: model.save("./flowers.h5")

In [18]: model.load_weights('./flowers.h5')
```

Test The Model

```
In [19]: from tensorflow.keras.preprocessing import image
import numpy as np
```

In [28]:

img=image.load_img('C:\\Users\\Harini\\Flowers-Dataset\\flowers\\rose\\5172171681_5934378f08.jpg',target_size=(70,70))
img



In []: