

## ASSIGNMENT-3

Assignment Date	30 September 2022
Student Name	A.K.Hasmath Sahina
Student Roll Number	962719106008
Maximum Marks	2 Marks

### 1. Download the Dataset

Link: [https://drive.google.com/file/d/1zZ87e7GDpN90-Sa\\_AKbvMm3EEfQkEQ\\_R/view](https://drive.google.com/file/d/1zZ87e7GDpN90-Sa_AKbvMm3EEfQkEQ_R/view)

### 2. Image Augmentation

Solution:

```
pwd
from tensorflow.keras.preprocessing.image import ImageDataGenerator
train_datagen=ImageDataGenerator(rescale=1./255, zoom_range=0.2, horizontal_flip=True, vertical_flip=False)
test_datagen=ImageDataGenerator(rescale=1./255)
ls
pwd
x_train=train_datagen.flow_from_directory(r"/content/drive/MyDrive/flowers", target_size=(64, 64),
                                         class_mode='categorical', batch_size=24)
x_test=test_datagen.flow_from_directory(r"/content/drive/MyDrive/flowers", target_size=(64, 64),
                                       class_mode='categorical', batch_size=24)
x_train.class_indices
```



```
Image Augmentation

[9] pwd
/content/drive/MyDrive

[10] from tensorflow.keras.preprocessing.image import ImageDataGenerator

[11] train_datagen=ImageDataGenerator(rescale=1./255, zoom_range=0.2, horizontal_flip=True, vertical_flip=False)

[12] test_datagen=ImageDataGenerator(rescale=1./255)

[13] ls
685imguf_NAD-student-registration-Process19.pdf  Flowers-Dataset.zip
Classroom/                                       'Getting started.pdf'
'Colab Notebooks'                               'Student Registration'
flowers/                                         'Student Registration (1)'

[14] pwd
/content/drive/MyDrive
```

```
FILE 3/ STUDENT REGISTRATION (2)

[14] pwd

'/content/drive/MyDrive'

[15] x_train=train_datagen.flow_from_directory(r"/content/drive/MyDrive/flowers",target_size=(64,64),
class_mode='categorical',batch_size=24)

Found 4317 images belonging to 6 classes.

[16] x_test=test_datagen.flow_from_directory(r"/content/drive/MyDrive/flowers",target_size=(64,64),
class_mode='categorical',batch_size=24)

Found 4317 images belonging to 6 classes.

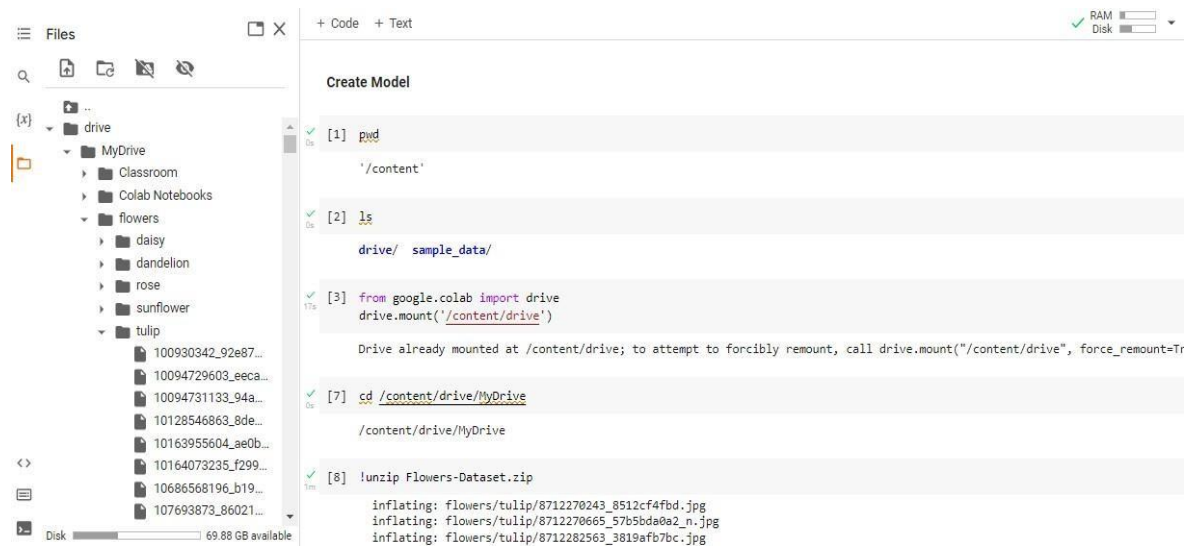
[18] x_train.class_indices

{'_ipyynb_checkpoints': 0,
'daisy': 1,
'dandelion': 2,
'rose': 3,
'sunflower': 4,
'tulip': 5}
```

### 3. Create Model

Solution:

```
pwd
ls
from google.colab import drive
drive.mount('/content/drive')
cd /content/drive/MyDrive
!unzip Flowers-Dataset.zip
```



The screenshot shows the Google Colab interface. On the left, the 'Files' pane displays a directory tree with 'drive' containing 'MyDrive', which includes 'Classroom', 'Colab Notebooks', 'flowers' (with subfolders 'daisy', 'dandelion', 'rose', 'sunflower', 'tulip'), and 'tulip' (containing several image files). The main area shows a code editor with the following code:

```
Create Model

[1] pwd

'/content'

[2] ls

drive/ sample_data/

[3] from google.colab import drive
drive.mount('/content/drive')

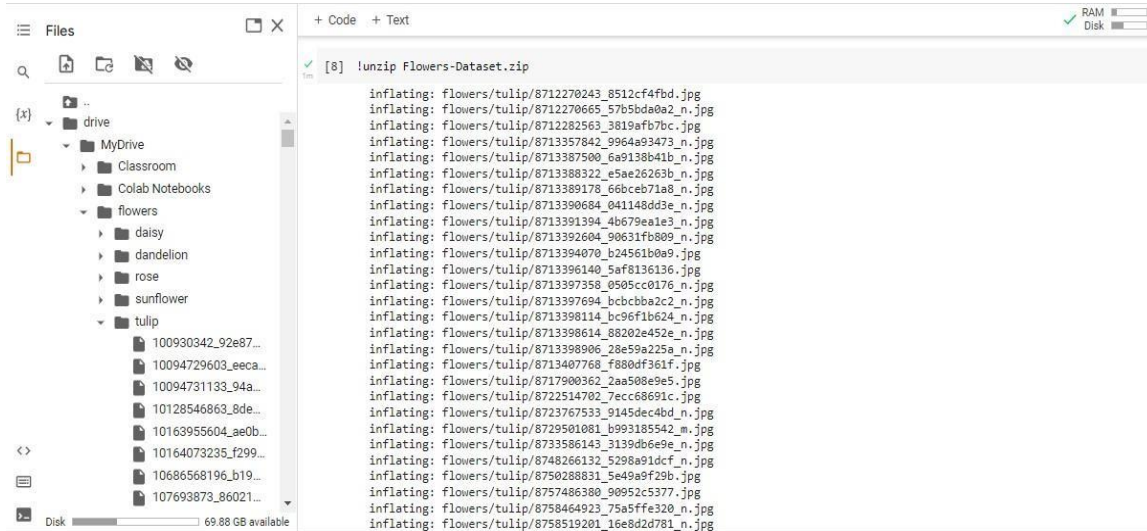
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True)

[7] cd /content/drive/MyDrive

/content/drive/MyDrive

[8] !unzip Flowers-Dataset.zip

inflating: flowers/tulip/8712270243_8512cf4fbd.jpg
inflating: flowers/tulip/8712270665_57b5bda0a2_n.jpg
inflating: flowers/tulip/8712282563_3819afb7bc.jpg
```



#### 4. Add Layers(Convolution,Maxpooling,Flatten,Dense-(Hidden Layers),Output)

Solution:

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense,Convolution2D,MaxPooling2D,Flatten
model=Sequential()
model.add(Convolution2D(32,(3,3),input_shape=(64,64,3),activation='relu'))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())
model.summary()
32*(3*3*3+1)
```

Hidden layer

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

Output layer

```
model.add(Dense(4,activation='softmax'))
```



The top screenshot shows the model summary for a sequential model:

```
[24] model.summary()
```

Model: "sequential"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 62, 62, 32)	896
max_pooling2d (MaxPooling2D)	(None, 31, 31, 32)	0
flatten (Flatten)	(None, 30752)	0

Total params: 896  
Trainable params: 896  
Non-trainable params: 0

The bottom screenshot shows the addition of three dense hidden layers and one dense output layer:

```
[25] 32*(3*3*3+1)
896
Hidden Layers

[26] model.add(Dense(300,activation='relu'))
model.add(Dense(150,activation='relu'))
Output Layers

[27] model.add(Dense(4,activation='softmax'))
Compile the model

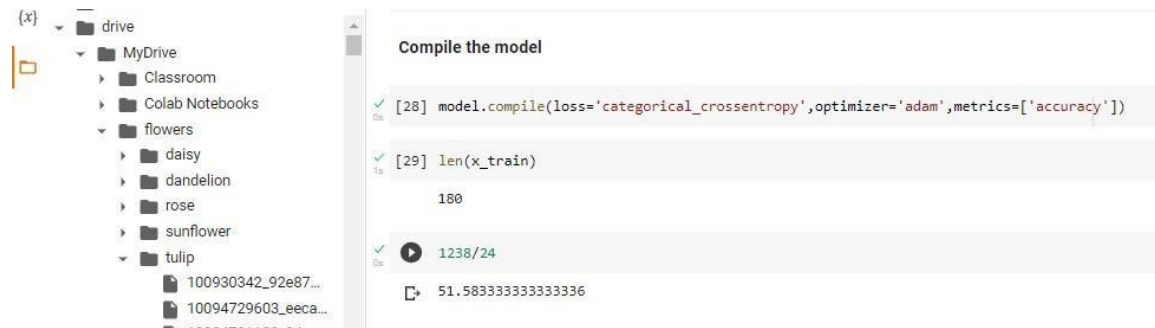
[28] model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])

[29] len(x_train)
180
```

## 5. Compile The Model

Solution:

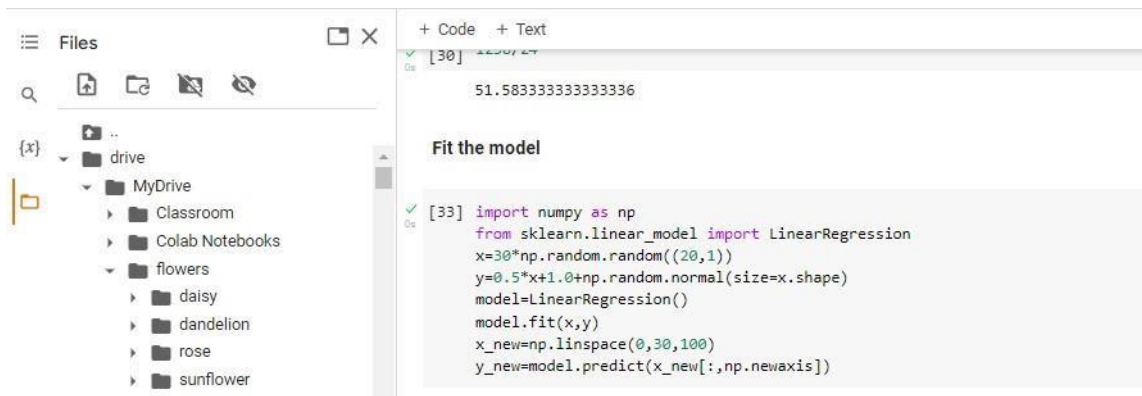
```
model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])
len(x_train)
1238/24
```



## 6. Fit The Model

Solution:

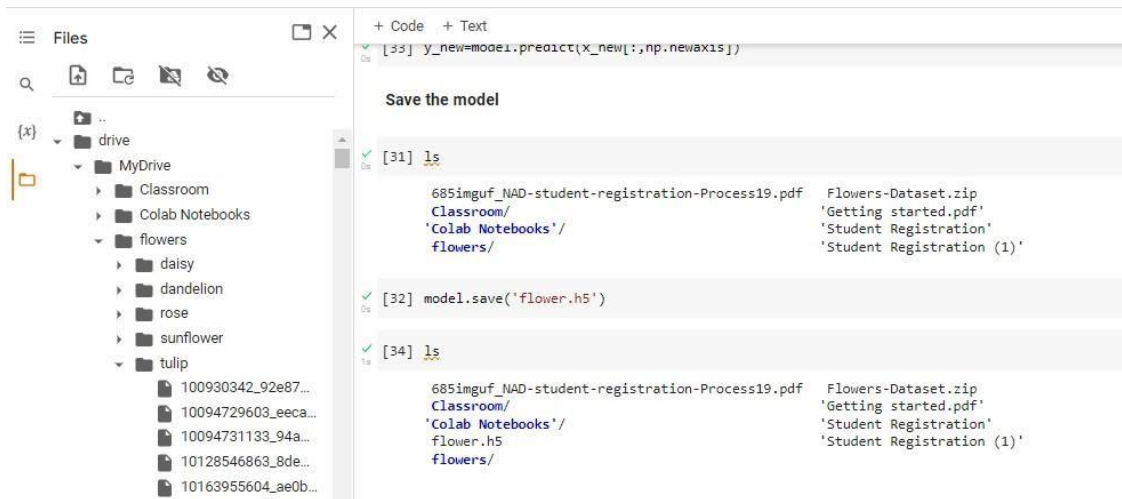
```
import numpy as np
from sklearn.linear_model import LinearRegression
x=30*np.random.random((20,1))
y=0.5*x+1.0+np.random.normal(size=x.shape)
model=LinearRegression()
model.fit(x,y)
x_new=np.linspace(0,30,100)
y_new=model.predict(x_new[:,np.newaxis])
```



## 7. Save The Model

Solution:

```
ls
model.save('flower.h5')
ls
```



## 8. Test The Model

Solution:

```
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
#load the model
model=load_model('flower.h5')
img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10503217854_e66a804309.jpg")
img
img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10503217854_e66a804309.jpg",t
target_size=(64,64))
img
x=image.img_to_array(img)
x
x=np.expand_dims(x,axis=0)
x
y=np.argmax(model.predict(x),axis=1)
y
x_train.class_indices
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
```

```
img=image.load_img(r"/content/drive/MyDrive/flowers/daisy/100080576_f52e8ee070_n.jpg",
target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
```

```
img=image.load_img(r"/content/drive/MyDrive/flowers/dandelion/10043234166_e6dd915111_n
.jpg",target_size=(64,64))
```

```
img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10090824183_d02c613f10_m.jpg",
target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index= ['daisy', 'dandelion', 'rose', 'sunflower', 'tulip']
index[y[0]]
```


```
img=image.load_img(r"/content/drive/MyDrive/flowers/tulip/100930342_92e8746431_n.jpg",
target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
```



Files + Code + Text RAM Disk Edit

drive  
MyDrive  
Classroom  
Colab Notebooks  
flowers  
daisy  
dandelion  
rose  
sunflower  
tulip  
100930342\_92e87...  
10094729603\_eeca...  
10094731133\_94a...  
10128546863\_8de...  
10163955604\_ae0b...  
10164073235\_f299...  
10686568196\_b19...  
107693873\_86021...

```
[39] img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10503217854_e66a804309.jpg",target_size=(64,64))
img
```



```
[40] x=image.img_to_array(img)
x
```

```
array([[[[ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         ...,
         [ 92., 14.,  0.],
         [ 61., 13.,  9.],
         [ 17.,  7.,  5.]],
        [[ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         ...,
         [150.,  3.,  0.],
         [ 85., 10.,  7.],
         [119.,  4.,  1.]],
        [[ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         ...,
         [150.,  3.,  0.],
         [ 85., 10.,  7.],
         [119.,  4.,  1.]]], dtype=float32)]
```

Disk 69.88 GB available

Files + Code + Text

```
[40] [[ 0.,  2.,  0.],
      [ 0.,  2.,  0.],
      [ 1.,  1.,  0.],
      ...,
      [ 29.,  5.,  1.],
      [ 41., 13.,  0.],
      [ 5.,  4.,  0.]], dtype=float32)
```

```
[41] x=np.expand_dims(x,axis=0)
x
```

```
array([[[[ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         ...,
         [ 92., 14.,  0.],
         [ 61., 13.,  9.],
         [ 17.,  7.,  5.]],
        [[ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         ...,
         [150.,  3.,  0.],
         [ 85., 10.,  7.],
         [119.,  4.,  1.]],
        [[ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         [ 0.,  2.,  0.],
         ...,
         [150.,  3.,  0.],
         [ 85., 10.,  7.],
         [119.,  4.,  1.]]], dtype=float32)])
```

Disk 69.88 GB available



Files

- drive
  - MyDrive
    - Classroom
    - Colab Notebooks
    - flowers
      - daisy
      - dandelion
      - rose
      - sunflower
      - tulip
        - 100930342\_92e87...
        - 10094729603\_eeca...
        - 10094731133\_94a...
        - 10128546863\_8de...
        - 10163955604\_ae0b...
        - 10164073235\_f299...
        - 10686568196\_b19...
        - 107693873\_86021...

```
[42] y=np.argmax(model.predict(x),axis=1)
y
array([3])

[43] x_train.class_indices
{'_ipynb_checkpoints': 0,
 'daisy': 1,
 'dandelion': 2,
 'rose': 3,
 'sunflower': 4,
 'tulip': 5}

[44] index=['daisy','dandelion','rose','sunflower','tulip']

[46] index[y[0]]
'sunflower'

[50] img=image.load_img(r"/content/drive/MyDrive/flowers/daisy/100080576_f52e8ee070_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
```

Files

- drive
  - MyDrive
    - Classroom
    - Colab Notebooks
    - flowers
      - daisy
      - dandelion
      - rose
      - sunflower
      - tulip
        - 100930342\_92e87...
        - 10094729603\_eeca...
        - 10094731133\_94a...
        - 10128546863\_8de...
        - 10163955604\_ae0b...
        - 10164073235\_f299...
        - 10686568196\_b19...
        - 107693873\_86021...

```
[50] img=image.load_img(r"/content/drive/MyDrive/flowers/daisy/100080576_f52e8ee070_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'sunflower'

[51] img=image.load_img(r"/content/drive/MyDrive/flowers/dandelion/10043234166_e6dd915111_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'rose'

[52] img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10090824183_d02c613f10_m.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'sunflower'
```

Files

- drive
  - MyDrive
    - Classroom
    - Colab Notebooks
    - flowers
      - daisy
      - dandelion
      - rose
      - sunflower
      - tulip
        - 100930342\_92e87...
        - 10094729603\_eeca...
        - 10094731133\_94a...
        - 10128546863\_8de...
        - 10163955604\_ae0b...
        - 10164073235\_f299...
        - 10686568196\_b19...
        - 107693873\_86021...

```
img=image.load_img(r"/content/drive/MyDrive/flowers/sunflower/1000000420_094707604_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'rose'

[54] img=image.load_img(r"/content/drive/MyDrive/flowers/tulip/100930342_92e8746431_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'dandelion'
```