ASSIGNMENT – 3

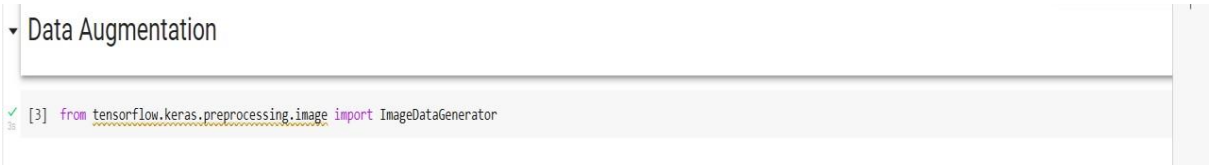
PROBLEM STATEMENT: Build CNN Model for Classification of Flowers.

QUESTION – 1:

DOWNLOAD THE DATASET

QUESTION – 2:

DATA/ IMAGE AUGMENTATION



QUESTION – 3:

TRAINING & TESTING

Training and Testing

```
train_datagen=ImageDataGenerator(rescale=1./255,zoom_range=0.2,horizontal_flip=True)
test_datagen=ImageDataGenerator(rescale=1./255)
```

```
In [9]: xtrain=train_datagen.flow_from_directory('M:\\software\\AI_TRAINING_IBM\\flowers',class_mode='categorical',target_size=(64,64),batch_size=100)
```

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

```
In [10]: xtest=test_datagen.flow_from_directory('M:\\software\\AI_TRAINING_IBM\\flowers',class_mode='categorical',target_size=(64,64),batch_size=100)
```

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

QUESTION – 4 & QUESTION -5:

CREATE MODEL:

ADD LAYERS

Importing the models and the layers

```
[7]  from tensorflow.keras.models import Sequential
     from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense
```

```
model=Sequential()
model.add(Convolution2D(64,(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'))
```

QUESTION – 6:

COMPILE THE MODEL:

Compile

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

QUESTION – 7:

FIT THE MODEL:

Fit the model.

```
model.fit_generator(xtrain,
                    steps_per_epoch=len(xtrain),
                    epochs=20,
                    validation_data=xtest,
                    validation_steps=len(xtest))
```

```
C:\Users\mm\AppData\Local\Temp\ipykernel_6696\312721451.py:1: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version.
Please use `Model.fit`, which supports generators.
  model.fit_generator(xtrain,
```

```
Epoch 1/20
44/44 [==============================] - 37s 835ms/step - loss: 1.9038 - ac
curacy: 0.3836 - Val loss: 1.1672 - Val accuracy: 0.5219
Epoch 2/20
44/44 [==============================] - 34s 779ms/step - loss: 1.0908 - ac
curacy: 0.5606 - Val loss: 1.0398 - Val accuracy: 0.5965 Epoch
3/20
44/44 [==============================] - 36s 815ms/step - loss: 1.0262 - ac
curacy: 0.5925 - Val loss: 1.0038 - Val accuracy: 0.6185
Epoch 4/20
44/44 [==============================] - 36s 823ms/step - loss: 0.9335 - ac
curacy: 0.6410 - Val loss: 0.8923 - Val accuracy: 0.6560
Epoch 5/20
44/44 [==============================] - 36s 809ms/step - loss: 0.8781 - ac
curacy: 0.6604 - Val loss: 0.8886 - Val accuracy: 0.6646 Epoch 6/20
44/44 [==============================] - 34s 764ms/step - loss: 0.8512 - ac
curacy: 0.6713 - Val loss: 0.8784 - Val accuracy: 0.6771
Epoch 7/20
44/44 [==============================] - 33s 758ms/step - loss: 0.7922 - ac
curacy: 0.6931 - Val loss: 0.7586 - Val accuracy: 0.7121
Epoch 8/20
44/44 [==============================] - 35s 811ms/step - loss: 0.7471 - ac
curacy: 0.7107 - Val loss: 0.6955 - Val accuracy: 0.7262 Epoch
9/20
44/44 [==============================] - 35s 795ms/step - loss: 0.7157 - ac
```

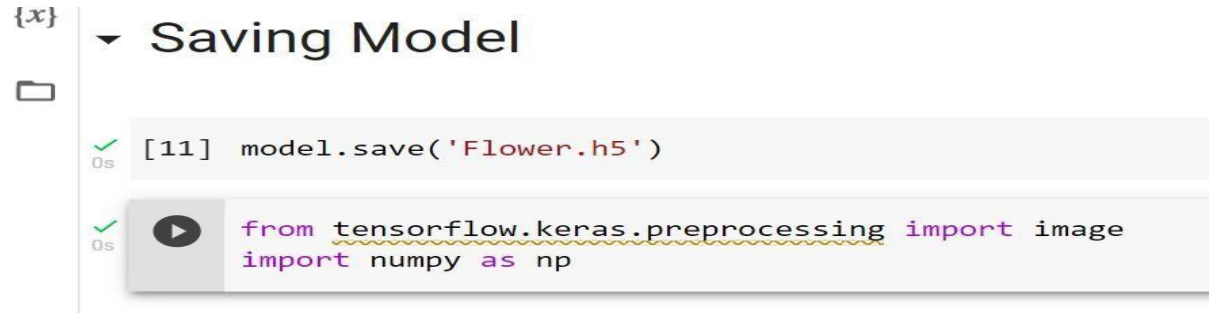
```
curacy: 0.7311 - Val loss: 0.6671 - Val accuracy: 0.7482
Epoch 10/20
 44/44 [==============================] - 36s 817ms/step - loss: 0.6867 - ac
curacy: 0.7336 - Val loss: 0.6537 - Val accuracy: 0.7524
Epoch 11/20
 44/44 [==============================] - 37s 851ms/step - loss: 0.6314 - ac
curacy: 0.7628 - Val loss: 0.6081 - Val accuracy: 0.7751
Epoch 12/20
 44/44 [==============================] - 34s 773ms/step - loss: 0.6109 - ac
curacy: 0.7744 - Val loss: 0.6052 - Val accuracy: 0.7716
Epoch 13/20
 44/44 [==============================] - 34s 777ms/step - loss: 0.5710 - ac
curacy: 0.7853 - Val loss: 0.5747 - Val accuracy: 0.7760
Epoch 14/20
 44/44 [==============================] - 33s 763ms/step - loss: 0.5516 - ac
curacy: 0.7924 - Val loss: 0.4951 - Val accuracy: 0.8112
Epoch 15/20
 44/44 [==============================] - 34s 769ms/step - loss: 0.5265 - ac
curacy: 0.8019 - Val loss: 0.4531 - Val accuracy: 0.8334
Epoch 16/20
 44/44 [==============================] - 32s 721ms/step - loss: 0.4957 - ac
curacy: 0.8177 - Val loss: 0.3755 - Val accuracy: 0.8631
Epoch 17/20
 44/44 [==============================] - 32s 739ms/step - loss: 0.4737 - ac
curacy: 0.8272 - Val loss: 0.5578 - Val accuracy: 0.7797
Epoch 18/20
 44/44 [==============================] - 30s 680ms/step - loss: 0.4653 - ac
curacy: 0.8274 - Val loss: 0.3953 - Val accuracy: 0.8511
Epoch 19/20
 44/44 [==============================] - 25s 578ms/step - loss: 0.4252 - ac
curacy: 0.8395 - Val loss: 0.3990 - Val accuracy: 0.8550
Epoch 20/20
 44/44 [==============================] - 26s 597ms/step - loss: 0.3946 - ac
 curacy: 0.8529 - Val loss: 0.3112 - Val accuracy: 0.8888
```

Out[19]:

```
<Keras.callbacks.History at 0x2b10b08c370>
```

QUESTION – 8:

SAVING THE MODEL



QUESTION – 9: TEST

THE MODEL

Testing the model

In [22]:
```
img=image.load_img('M:\\software\\AI_TRAINING_IBM\\flowers\\sunflower\\6953297_8576bf4ea3.jpg',target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
prediction=np.argmax(model.predict(x))
op=['daisy','dandelion','rose','sunflower','tulip']
op[prediction]
```

```
1/1 [==============================] - 0s 22ms/step
```

Out[22]:
```
'sunflower'
```

QUESTION -10:

TESTING THE MODEL

In [24]:
```
img=image.load_img('M:\\software\\AI_TRAINING_IBM\\download.jpg',target_size=(64,64))#randomly downloaded testing
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
prediction=np.argmax(model.predict(x))
op=['daisy','dandelion','rose','sunflower','tulip']
op[prediction]
```

```
1/1 [==============================] - 0s 22ms/step
```

Out[24]:
```
'sunflower'
```

In [ ]:
```

```