import tensorflow as tf

from keras.preprocessing.image import ImageDataGenerator

#Augmenting the input training images

train\_datagen = ImageDataGenerator(

rescale=1./255,

shear\_range=0.2,

zoom\_range=0.2,

horizontal\_flip=True)

training\_set = train\_datagen.flow\_from\_directory(

'training',

target\_size=(64, 64),

batch\_size=32,

class\_mode='categorical')

Found 4103 images belonging to 5 classes.

test\_datagen = ImageDataGenerator(

rescale=1./255)

test\_data = test\_datagen.flow\_from\_directory(

'Testing',

target\_size=(64, 64),

batch\_size=32,

class\_mode='categorical')

Found 214 images belonging to 5 classes.

#Building the model

cnn = tf.keras.models.Sequential()

#Adding convolution layer

cnn.add(tf.keras.layers.Conv2D(filters=64,kernel\_size=3,activation ="relu",input\_shape =[64,64,3]))

cnn.add(tf.keras.layers.MaxPool2D(pool\_size = 2,strides=2))

cnn.add(tf.keras.layers.Conv2D(filters=64,kernel\_size=3,activation ="relu"))

cnn.add(tf.keras.layers.MaxPool2D(pool\_size = 2,strides=2))

cnn.add(tf.keras.layers.Dropout(0.5))

# Flattening the layers

cnn.add(tf.keras.layers.Flatten())

# Adding dense layers(Hidden Layers)

cnn.add(tf.keras.layers.Dense(units=128 ,activation ="relu"))

cnn.add(tf.keras.layers.Dense(units=5,activation="softmax"))

#compilation of the neural network model

cnn.compile(optimizer="rmsprop",loss="categorical\_crossentropy" ,metrics =["accuracy"])

#Fitting the neural network model and training it

cnn.fit(x = training\_set , validation\_data =test\_data , epochs = 30 )

Epoch 1/30

129/129 [==============================] - 34s 254ms/step - loss: 1.3400 - accuracy: 0.4350 - val\_loss: 1.0596 - val\_accuracy: 0.6168

Epoch 2/30

129/129 [==============================] - 33s 253ms/step - loss: 1.0957 - accuracy: 0.5659 - val\_loss: 1.1546 - val\_accuracy: 0.6168

Epoch 3/30

129/129 [==============================] - 36s 279ms/step - loss: 0.9823 - accuracy: 0.6176 - val\_loss: 1.0383 - val\_accuracy: 0.5841

Epoch 4/30

129/129 [==============================] - 37s 285ms/step - loss: 0.9194 - accuracy: 0.6432 - val\_loss: 0.8612 - val\_accuracy: 0.6776

Epoch 5/30

129/129 [==============================] - 37s 289ms/step - loss: 0.8707 - accuracy: 0.6727 - val\_loss: 1.1994 - val\_accuracy: 0.5514

Epoch 6/30

129/129 [==============================] - 41s 315ms/step - loss: 0.8155 - accuracy: 0.6856 - val\_loss: 0.9825 - val\_accuracy: 0.6916

Epoch 7/30

129/129 [==============================] - 37s 285ms/step - loss: 0.7836 - accuracy: 0.7002 - val\_loss: 0.9143 - val\_accuracy: 0.6636

Epoch 8/30

129/129 [==============================] - 36s 280ms/step - loss: 0.7603 - accuracy: 0.7090 - val\_loss: 0.8084 - val\_accuracy: 0.7243

Epoch 9/30

129/129 [==============================] - 33s 257ms/step - loss: 0.7361 - accuracy: 0.7187 - val\_loss: 0.8042 - val\_accuracy: 0.7150

Epoch 10/30

129/129 [==============================] - 32s 250ms/step - loss: 0.6901 - accuracy: 0.7387 - val\_loss: 0.9286 - val\_accuracy: 0.6589

Epoch 11/30

129/129 [==============================] - 35s 273ms/step - loss: 0.6722 - accuracy: 0.7453 - val\_loss: 1.0362 - val\_accuracy: 0.6822

Epoch 12/30

129/129 [==============================] - 35s 270ms/step - loss: 0.6659 - accuracy: 0.7534 - val\_loss: 0.7733 - val\_accuracy: 0.7056

Epoch 13/30

129/129 [==============================] - 34s 261ms/step - loss: 0.6291 - accuracy: 0.7655 - val\_loss: 0.8955 - val\_accuracy: 0.6916

Epoch 14/30

129/129 [==============================] - 37s 284ms/step - loss: 0.6128 - accuracy: 0.7702 - val\_loss: 0.9361 - val\_accuracy: 0.6542

Epoch 15/30

129/129 [==============================] - 36s 279ms/step - loss: 0.5988 - accuracy: 0.7780 - val\_loss: 0.8789 - val\_accuracy: 0.6916

Epoch 16/30

129/129 [==============================] - 36s 281ms/step - loss: 0.5822 - accuracy: 0.7775 - val\_loss: 0.9812 - val\_accuracy: 0.6729

Epoch 17/30

129/129 [==============================] - 38s 298ms/step - loss: 0.5802 - accuracy: 0.7870 - val\_loss: 0.8973 - val\_accuracy: 0.7056

Epoch 18/30

129/129 [==============================] - 40s 306ms/step - loss: 0.5724 - accuracy: 0.7875 - val\_loss: 0.8542 - val\_accuracy: 0.7056

Epoch 19/30

129/129 [==============================] - 39s 305ms/step - loss: 0.5624 - accuracy: 0.7955 - val\_loss: 0.7468 - val\_accuracy: 0.7430

Epoch 20/30

129/129 [==============================] - 39s 303ms/step - loss: 0.5542 - accuracy: 0.7919 - val\_loss: 0.8988 - val\_accuracy: 0.7150

Epoch 21/30

129/129 [==============================] - 43s 329ms/step - loss: 0.5241 - accuracy: 0.8040 - val\_loss: 1.0677 - val\_accuracy: 0.6963

Epoch 22/30

129/129 [==============================] - 38s 296ms/step - loss: 0.5146 - accuracy: 0.8172 - val\_loss: 0.8774 - val\_accuracy: 0.7243

Epoch 23/30

129/129 [==============================] - 39s 302ms/step - loss: 0.5153 - accuracy: 0.8172 - val\_loss: 0.8348 - val\_accuracy: 0.6963

Epoch 24/30

129/129 [==============================] - 45s 348ms/step - loss: 0.5067 - accuracy: 0.8153 - val\_loss: 0.9380 - val\_accuracy: 0.6916

Epoch 25/30

129/129 [==============================] - 44s 342ms/step - loss: 0.4726 - accuracy: 0.8284 - val\_loss: 0.9572 - val\_accuracy: 0.7056

Epoch 26/30

129/129 [==============================] - 41s 318ms/step - loss: 0.4762 - accuracy: 0.8360 - val\_loss: 0.8506 - val\_accuracy: 0.7056

Epoch 27/30

129/129 [==============================] - 39s 302ms/step - loss: 0.4734 - accuracy: 0.8216 - val\_loss: 1.2935 - val\_accuracy: 0.6168

Epoch 28/30

129/129 [==============================] - 39s 300ms/step - loss: 0.4611 - accuracy: 0.8272 - val\_loss: 0.8751 - val\_accuracy: 0.6869

Epoch 29/30

129/129 [==============================] - 37s 290ms/step - loss: 0.4375 - accuracy: 0.8372 - val\_loss: 0.9651 - val\_accuracy: 0.6729

Epoch 30/30

129/129 [==============================] - 39s 299ms/step - loss: 0.4292 - accuracy: 0.8501 - val\_loss: 1.0778 - val\_accuracy: 0.6963

cnn.fit(x = training\_set , validation\_data =test\_data , epochs = 30 )

Epoch 1/30

129/129 [==============================] - 45s 347ms/step - loss: 0.4250 - accuracy: 0.8496 - val\_loss: 0.9867 - val\_accuracy: 0.6729

Epoch 2/30

129/129 [==============================] - 44s 341ms/step - loss: 0.4170 - accuracy: 0.8469 - val\_loss: 1.0115 - val\_accuracy: 0.7056

Epoch 3/30

129/129 [==============================] - 44s 341ms/step - loss: 0.4203 - accuracy: 0.8550 - val\_loss: 0.8851 - val\_accuracy: 0.7150

Epoch 4/30

129/129 [==============================] - 44s 341ms/step - loss: 0.4077 - accuracy: 0.8513 - val\_loss: 1.1110 - val\_accuracy: 0.6916

Epoch 5/30

129/129 [==============================] - 40s 309ms/step - loss: 0.3930 - accuracy: 0.8603 - val\_loss: 1.2546 - val\_accuracy: 0.7103

Epoch 6/30

129/129 [==============================] - 42s 327ms/step - loss: 0.4018 - accuracy: 0.8630 - val\_loss: 0.9946 - val\_accuracy: 0.6916

Epoch 7/30

129/129 [==============================] - 41s 313ms/step - loss: 0.3879 - accuracy: 0.8640 - val\_loss: 1.0004 - val\_accuracy: 0.7243

Epoch 8/30

129/129 [==============================] - 42s 324ms/step - loss: 0.3729 - accuracy: 0.8655 - val\_loss: 1.0725 - val\_accuracy: 0.6916

Epoch 9/30

129/129 [==============================] - 41s 319ms/step - loss: 0.3805 - accuracy: 0.8582 - val\_loss: 1.0544 - val\_accuracy: 0.6916

Epoch 10/30

129/129 [==============================] - 42s 327ms/step - loss: 0.3742 - accuracy: 0.8652 - val\_loss: 0.9719 - val\_accuracy: 0.6963

Epoch 11/30

129/129 [==============================] - 42s 326ms/step - loss: 0.3737 - accuracy: 0.8686 - val\_loss: 0.9270 - val\_accuracy: 0.7336

Epoch 12/30

129/129 [==============================] - 43s 334ms/step - loss: 0.3898 - accuracy: 0.8647 - val\_loss: 0.9987 - val\_accuracy: 0.7196

Epoch 13/30

129/129 [==============================] - 44s 338ms/step - loss: 0.3701 - accuracy: 0.8718 - val\_loss: 0.8642 - val\_accuracy: 0.7196

Epoch 14/30

129/129 [==============================] - 44s 339ms/step - loss: 0.3546 - accuracy: 0.8786 - val\_loss: 1.1820 - val\_accuracy: 0.6822

Epoch 15/30

129/129 [==============================] - 50s 390ms/step - loss: 0.3510 - accuracy: 0.8762 - val\_loss: 1.0773 - val\_accuracy: 0.7150

Epoch 16/30

129/129 [==============================] - 41s 315ms/step - loss: 0.3433 - accuracy: 0.8852 - val\_loss: 1.3577 - val\_accuracy: 0.7009

Epoch 17/30

129/129 [==============================] - 68s 527ms/step - loss: 0.3400 - accuracy: 0.8796 - val\_loss: 1.0770 - val\_accuracy: 0.7150

Epoch 18/30

129/129 [==============================] - 63s 477ms/step - loss: 0.3444 - accuracy: 0.8755 - val\_loss: 0.9273 - val\_accuracy: 0.7243

Epoch 19/30

129/129 [==============================] - 70s 539ms/step - loss: 0.3386 - accuracy: 0.8835 - val\_loss: 1.1471 - val\_accuracy: 0.6776

Epoch 20/30

129/129 [==============================] - 71s 548ms/step - loss: 0.3300 - accuracy: 0.8869 - val\_loss: 1.1275 - val\_accuracy: 0.7103

Epoch 21/30

129/129 [==============================] - 77s 599ms/step - loss: 0.3330 - accuracy: 0.8864 - val\_loss: 1.2780 - val\_accuracy: 0.6963

Epoch 22/30

129/129 [==============================] - 66s 515ms/step - loss: 0.3249 - accuracy: 0.8867 - val\_loss: 1.0580 - val\_accuracy: 0.7056

Epoch 23/30

129/129 [==============================] - 82s 622ms/step - loss: 0.3225 - accuracy: 0.8903 - val\_loss: 1.2799 - val\_accuracy: 0.7383

Epoch 24/30

129/129 [==============================] - 101s 785ms/step - loss: 0.3164 - accuracy: 0.8884 - val\_loss: 1.3724 - val\_accuracy: 0.7056

Epoch 25/30

129/129 [==============================] - 50s 382ms/step - loss: 0.3218 - accuracy: 0.8945 - val\_loss: 1.2431 - val\_accuracy: 0.7009

Epoch 26/30

129/129 [==============================] - 61s 469ms/step - loss: 0.3212 - accuracy: 0.8945 - val\_loss: 0.9750 - val\_accuracy: 0.7056

Epoch 27/30

129/129 [==============================] - 111s 851ms/step - loss: 0.3087 - accuracy: 0.9020 - val\_loss: 1.4106 - val\_accuracy: 0.7056

Epoch 28/30

129/129 [==============================] - 61s 466ms/step - loss: 0.3077 - accuracy: 0.8935 - val\_loss: 0.9878 - val\_accuracy: 0.7243

Epoch 29/30

129/129 [==============================] - 59s 458ms/step - loss: 0.3071 - accuracy: 0.8976 - val\_loss: 1.1608 - val\_accuracy: 0.6963

Epoch 30/30

129/129 [==============================] - 38s 295ms/step - loss: 0.3014 - accuracy: 0.8913 - val\_loss: 1.4083 - val\_accuracy: 0.7336

#preprocess the test image

import numpy as np

image = tf.keras.preprocessing.image.load\_img("prediction/tu.jpg",target\_size=(64,64)) input\_arr = tf.keras.preprocessing.image.img\_to\_array(image)

input\_arr = np.expand\_dims(input\_arr,axis=0)

result = cnn.predict(input\_arr)

1/1 [==============================] - 0s 79ms/step

training\_set.class\_indices

{'Daisy': 0, 'Dandelion': 1, 'rose': 2, 'sunflower': 3, 'tulip': 4}

print(result)

[[0. 0. 0. 0. 1.]]

#Mapping the result to the values

if result[0][0] == 1:

print("daisy")

elif result[0][1] == 1:

print("dandelion")

elif result[0][2] == 1:

print("rose")

elif result[0][3] ==1:

print("suflower")

elif result[0][4] == 1:

print("tulip")

tulip

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