```
                                        #CNN - Flower Recognition

#Importing Lib
from tensorflow.keras.preprocessing.image import ImageDataGenerator

#Data Augmentaton on training variable
train_datagen = ImageDataGenerator(rescale = 1./255,zoom_range = 0.2,
horizontal_flip = True)

#Data Augmentation on testing variable
test_datagen = ImageDataGenerator(rescale = 1./255)

#Data Augmentation on Traning Data
xtrain =
train_datagen.flow_from_directory('/home/anonimouz/Music/dataset/Train
ing', target_size = (64,64), class_mode = 'categorical', batch_size =
100)

Found 4317 images belonging to 5 classes.

#Data AUgmentation on Testing Data
xtest =
test_datagen.flow_from_directory('/home/anonimouz/Music/dataset/Testin
g', target_size = (64,64), class_mode = 'categorical', batch_size =
100)

Found 4317 images belonging to 5 classes.

#CNN MODEL TRAINING

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Convolution2D, MaxPooling2D,
Flatten, Dense

#Building CNN Block
model = Sequential()
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'))

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

#Model Tuning Library
from tensorflow.keras.callbacks import EarlyStopping,
ReduceLROnPlateau
```

```
#Tuning
early_stop = EarlyStopping(monitor='val_accuracy',patience = 5)
lr =
ReduceLROnPlateau(monitor='val_accuracy',factor=0.5,min_lr=0.00001)
callback = [early_stop,lr]

#Model Training Modified
model.fit_generator(xtrain,steps_per_epoch =
len(xtrain),epochs=100,callbacks=callback,validation_data=xtest,valida
tion_steps=len(xtest))
```

```
/tmp/ipykernel_46018/1288530072.py:2: 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,steps_per_epoch =
len(xtrain),epochs=100,callbacks=callback,validation_data=xtest,valida
tion_steps=len(xtest))

Epoch 1/100
44/44 [==============================] - 19s 428ms/step - loss: 1.5326
- accuracy: 0.3938 - val_loss: 1.1711 - val_accuracy: 0.5332 - lr:
0.0010
Epoch 2/100
44/44 [==============================] - 18s 419ms/step - loss: 1.1019
- accuracy: 0.5420 - val_loss: 1.1625 - val_accuracy: 0.5402 - lr:
0.0010
Epoch 3/100
44/44 [==============================] - 18s 417ms/step - loss: 1.0178
- accuracy: 0.5979 - val_loss: 1.0305 - val_accuracy: 0.6104 - lr:
0.0010
Epoch 4/100
44/44 [==============================] - 18s 417ms/step - loss: 0.9452
- accuracy: 0.6324 - val_loss: 0.9345 - val_accuracy: 0.6479 - lr:
0.0010
Epoch 5/100
44/44 [==============================] - 18s 420ms/step - loss: 0.8813
- accuracy: 0.6604 - val_loss: 0.9314 - val_accuracy: 0.6588 - lr:
0.0010
Epoch 6/100
44/44 [==============================] - 18s 420ms/step - loss: 0.8410
- accuracy: 0.6817 - val_loss: 0.8008 - val_accuracy: 0.7012 - lr:
0.0010
Epoch 7/100
44/44 [==============================] - 18s 419ms/step - loss: 0.7986
- accuracy: 0.7019 - val_loss: 0.7124 - val_accuracy: 0.7392 - lr:
0.0010
Epoch 8/100
44/44 [==============================] - 20s 452ms/step - loss: 0.7729
- accuracy: 0.7093 - val_loss: 0.6667 - val_accuracy: 0.7596 - lr:
0.0010
Epoch 9/100
```

```
44/44 [==============================] - 19s 444ms/step - loss: 0.7335
- accuracy: 0.7264 - val_loss: 0.6949 - val_accuracy: 0.7334 - lr:
0.0010
Epoch 10/100
44/44 [==============================] - 19s 440ms/step - loss: 0.7087
- accuracy: 0.7366 - val_loss: 0.7649 - val_accuracy: 0.7044 - lr:
0.0010
Epoch 11/100
44/44 [==============================] - 19s 435ms/step - loss: 0.7083
- accuracy: 0.7350 - val_loss: 0.6139 - val_accuracy: 0.7684 - lr:
0.0010
Epoch 12/100
44/44 [==============================] - 19s 440ms/step - loss: 0.6247
- accuracy: 0.7635 - val_loss: 0.6764 - val_accuracy: 0.7464 - lr:
0.0010
Epoch 13/100
44/44 [==============================] - 19s 436ms/step - loss: 0.6263
- accuracy: 0.7612 - val_loss: 0.5053 - val_accuracy: 0.8158 - lr:
0.0010
Epoch 14/100
44/44 [==============================] - 19s 439ms/step - loss: 0.6210
- accuracy: 0.7693 - val_loss: 0.6114 - val_accuracy: 0.7725 - lr:
0.0010
Epoch 15/100
44/44 [==============================] - 19s 441ms/step - loss: 0.6084
- accuracy: 0.7739 - val_loss: 0.5817 - val_accuracy: 0.7790 - lr:
0.0010
Epoch 16/100
44/44 [==============================] - 20s 450ms/step - loss: 0.5603
- accuracy: 0.7913 - val_loss: 0.5009 - val_accuracy: 0.8087 - lr:
0.0010
Epoch 17/100
44/44 [==============================] - 19s 436ms/step - loss: 0.5071
- accuracy: 0.8087 - val_loss: 0.4351 - val_accuracy: 0.8376 - lr:
0.0010
Epoch 18/100
44/44 [==============================] - 19s 441ms/step - loss: 0.4886
- accuracy: 0.8198 - val_loss: 0.4321 - val_accuracy: 0.8304 - lr:
0.0010
Epoch 19/100
44/44 [==============================] - 20s 463ms/step - loss: 0.5104
- accuracy: 0.8096 - val_loss: 0.4484 - val_accuracy: 0.8265 - lr:
0.0010
Epoch 20/100
44/44 [==============================] - 19s 441ms/step - loss: 0.4694
- accuracy: 0.8293 - val_loss: 0.4277 - val_accuracy: 0.8416 - lr:
0.0010
Epoch 21/100
44/44 [==============================] - 19s 441ms/step - loss: 0.4154
- accuracy: 0.8420 - val_loss: 0.4512 - val_accuracy: 0.8344 - lr:
```

```
0.0010
Epoch 22/100
44/44 [==============================] - 19s 437ms/step - loss: 0.4106
- accuracy: 0.8504 - val_loss: 0.3722 - val_accuracy: 0.8659 - lr:
0.0010
Epoch 23/100
44/44 [==============================] - 19s 435ms/step - loss: 0.3830
- accuracy: 0.8612 - val_loss: 0.2783 - val_accuracy: 0.9004 - lr:
0.0010
Epoch 24/100
44/44 [==============================] - 19s 446ms/step - loss: 0.3762
- accuracy: 0.8640 - val_loss: 0.3108 - val_accuracy: 0.8918 - lr:
0.0010
Epoch 25/100
44/44 [==============================] - 19s 433ms/step - loss: 0.3757
- accuracy: 0.8673 - val_loss: 0.2447 - val_accuracy: 0.9171 - lr:
0.0010
Epoch 26/100
44/44 [==============================] - 19s 432ms/step - loss: 0.3506
- accuracy: 0.8726 - val_loss: 0.3147 - val_accuracy: 0.8904 - lr:
0.0010
Epoch 27/100
44/44 [==============================] - 19s 437ms/step - loss: 0.3399
- accuracy: 0.8782 - val_loss: 0.3562 - val_accuracy: 0.8698 - lr:
0.0010
Epoch 28/100
44/44 [==============================] - 19s 436ms/step - loss: 0.3253
- accuracy: 0.8858 - val_loss: 0.2506 - val_accuracy: 0.9120 - lr:
0.0010
Epoch 29/100
44/44 [==============================] - 19s 433ms/step - loss: 0.2923
- accuracy: 0.8967 - val_loss: 0.2348 - val_accuracy: 0.9210 - lr:
0.0010
Epoch 30/100
44/44 [==============================] - 19s 430ms/step - loss: 0.2747
- accuracy: 0.9069 - val_loss: 0.1939 - val_accuracy: 0.9296 - lr:
0.0010
Epoch 31/100
44/44 [==============================] - 19s 434ms/step - loss: 0.2750
- accuracy: 0.9053 - val_loss: 0.3478 - val_accuracy: 0.8877 - lr:
0.0010
Epoch 32/100
44/44 [==============================] - 19s 435ms/step - loss: 0.2659
- accuracy: 0.9085 - val_loss: 0.1680 - val_accuracy: 0.9446 - lr:
0.0010
Epoch 33/100
44/44 [==============================] - 19s 440ms/step - loss: 0.2313
- accuracy: 0.9233 - val_loss: 0.1449 - val_accuracy: 0.9541 - lr:
0.0010
Epoch 34/100
```

```
44/44 [==============================] - 19s 433ms/step - loss: 0.2399
- accuracy: 0.9127 - val_loss: 0.1561 - val_accuracy: 0.9534 - lr:
0.0010
Epoch 35/100
44/44 [==============================] - 19s 438ms/step - loss: 0.2038
- accuracy: 0.9277 - val_loss: 0.1347 - val_accuracy: 0.9541 - lr:
0.0010
Epoch 36/100
44/44 [==============================] - 19s 437ms/step - loss: 0.1935
- accuracy: 0.9331 - val_loss: 0.1674 - val_accuracy: 0.9416 - lr:
0.0010
Epoch 37/100
44/44 [==============================] - 19s 437ms/step - loss: 0.2363
- accuracy: 0.9185 - val_loss: 0.1927 - val_accuracy: 0.9277 - lr:
0.0010
Epoch 38/100
44/44 [==============================] - 19s 427ms/step - loss: 0.1822
- accuracy: 0.9375 - val_loss: 0.1593 - val_accuracy: 0.9412 - lr:
0.0010

<keras.callbacks.History at 0x7ff3d332dfd0>
```

```
#Testing The Model

from tensorflow.keras.preprocessing import image
import numpy as np

img =
image.load_img('/home/anonimouz/Music/dataset/Training/sunflower/67871
4585_addc9aaaef.jpg', target_size=(64,64))
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = np.argmax(model.predict(x))
op = ['Daisy','Dandelion','Rose','Sunflower','Tulip']
op[pred]

1/1 [==============================] - 0s 60ms/step

'Sunflower'
```