

Sprint 2

Import The ImageDataGenerator

```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

Configure ImageDataGenerator Class

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

```
import os
import seaborn as sns
sns.set()
os.getcwd()
```

```
 '/content'
```

```
import zipfile as zf
data = zf.ZipFile(r'Dataset.zip')
data.extractall('Dataset')
data.close()
```

Apply Image DataGenerator Functionality To Trainset And Testset

```
x_train=train_datagen.flow_from_directory(r'C:\Users\priya\Downloads\TRAIN_SET', target_size=(64, 64), batch_size=5, color_mode='rgb', class_mode='sparse')
```

Found 2626 images belonging to 1 classes.

```
x_test=test_datagen.flow_from_directory(r'C:\Users\priya\Downloads\TEST_SET', target_size=(64, 64), batch_size=5, color_mode='rgb', class_mode='sparse')
```

Found 1055 images belonging to 1 classes.

```
print(x_train.class_indices)
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}
```

```
from collections import Counter as c
c(x_train.labels)
Counter({0: 606, 1: 445, 2: 479, 3: 621, 4: 475})
```

Import Library

```
import numpy as np
import tensorflow
from tensorflow.keras.models import Sequential
```

```

from tensorflow.keras import layers
from tensorflow.keras.layers import Dense, Flatten
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Dropout

model=Sequential()
classifier = Sequential()
classifier.add(Conv2D(32, (3, 3), input_shape=(64,64,3),activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2,2)))
classifier.add(Conv2D(32, (3,3),activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2,2)))
classifier.add(Flatten())
classifier.add(Dense(units=128, activation='relu'))
classifier.add(Dense(units=5,activation='softmax'))

```

```

classifier.summary()
Model: "sequential_1"

```

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 62, 62, 32)	896
max_pooling2d (MaxPooling2D)	(None, 31, 31, 32)	0
conv2d_1 (Conv2D)	(None, 29, 29, 32)	9248
max_pooling2d_1 (MaxPooling2D)	(None, 14, 14, 32)	0
flatten (Flatten)	(None, 6272)	0
dense (Dense)	(None, 128)	802944
dense_1 (Dense)	(None, 5)	645
Total params: 813,733		
Trainable params: 813,733		
Non-trainable params: 0		

Configure the learning process

```

classifier.compile(optimizer='adam',loss='sparse_categorical_crossentropy',
metrics=['accuracy'])

```

Train model

```

classifier.fit_generator(generator=x_train,steps_per_epoch =
len(x_train),epochs=20,validation_data=x_test,validation_steps =
len(x_test))

```

Epoch 1/20
526/526 [=====] - 25s 47ms/step - loss: 0.1206 - accuracy: 0.9573 - val_loss: 0.0119 - val_accuracy: 1.0000
Epoch 2/20
526/526 [=====] - 25s 48ms/step - loss: 0.0190 - accuracy: 0.9935 - val_loss: 0.0025 - val_accuracy: 1.0000
Epoch 3/20
526/526 [=====] - 27s 51ms/step - loss: 7.5848e-04 - accuracy: 1.0000 - val_loss: 0.0036 - val_accuracy: 1.0000
Epoch 4/20
526/526 [=====] - 25s 47ms/step - loss: 4.5387e-05 - accuracy: 1.0000 - val_loss: 0.0114 - val_accuracy: 0.9943
Epoch 5/20
526/526 [=====] - 25s 48ms/step - loss: 1.5212e-05 - accuracy: 1.0000 - val_loss: 0.0091 - val_accuracy: 0.9953
Epoch 6/20
526/526 [=====] - 26s 50ms/step - loss: 7.6605e-06 - accuracy: 1.0000 - val_loss: 0.0091 - val_accuracy: 0.9962
Epoch 7/20
526/526 [=====] - 32s 60ms/step - loss: 7.5028e-06 - accuracy: 1.0000 - val_loss: 0.0100 - val_accuracy: 0.9953
Epoch 8/20
526/526 [=====] - 27s 52ms/step - loss: 4.3925e-06 - accuracy: 1.0000 - val_loss: 0.0121 - val_accuracy: 0.9953
Epoch 9/20
526/526 [=====] - 27s 51ms/step - loss: 3.7222e-06 - accuracy: 1.0000 - val_loss: 0.0118 - val_accuracy: 0.9953
Epoch 10/20
526/526 [=====] - 26s 50ms/step - loss: 2.4405e-06 - accuracy: 1.0000 - val_loss: 0.0106 - val_accuracy: 0.9972
Epoch 11/20
526/526 [=====] - 27s 51ms/step - loss: 0.0589 - accuracy: 0.9848 - val_loss: 0.0344 - val_accuracy: 0.9905
Epoch 12/20
526/526 [=====] - 28s 52ms/step - loss: 0.0097 - accuracy: 0.9962 - val_loss: 0.0801 - val_accuracy: 0.9782
Epoch 13/20
526/526 [=====] - 27s 52ms/step - loss: 9.9513e-05 - accuracy: 1.0000 - val_loss: 0.1394 - val_accuracy: 0.9754
Epoch 14/20
526/526 [=====] - 27s 52ms/step - loss: 1.0180e-05 - accuracy: 1.0000 - val_loss: 0.1620 - val_accuracy: 0.9716
Epoch 15/20
526/526 [=====] - 27s 52ms/step - loss: 8.9966e-06 - accuracy: 1.0000 - val_loss: 0.1575 - val_accuracy: 0.9725
Epoch 16/20
526/526 [=====] - 27s 51ms/step - loss: 1.0142e-05 - accuracy: 1.0000 - val_loss: 0.0317 - val_accuracy: 0.9915
Epoch 17/20
526/526 [=====] - 27s 51ms/step - loss: 2.6074e-06 - accuracy: 1.0000 - val_loss: 0.0479 - val_accuracy: 0.9829
Epoch 18/20
526/526 [=====] - 27s 52ms/step - loss: 1.7958e-06 - accuracy: 1.0000 - val_loss: 0.0500 - val_accuracy: 0.9820
Epoch 19/20
526/526 [=====] - 27s 52ms/step - loss: 1.0140e-05 - accuracy: 1.0000 - val_loss: 0.0698 - val_accuracy: 0.9791

```
Epoch 20/20
526/526 [=====] - 27s 51ms/step - loss: 2.2986e-06
- accuracy: 1.0000 - val_loss: 0.0463 - val_accuracy: 0.9829
```

Save model

```
classifier.save('nutrition.h5')
```

Test the model

```
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
```

```
import zipfile as zf
data = zf.ZipFile(r'Sample_Images.zip')
data.extractall('Sample_Images')
data.close()
```

```
!pip install tensorflow==2.3.0
```

Looking in indexes: <https://pypi.org/simple>, <https://us-python.pkg.dev/colab-wheels/public/simple/>

Requirement already satisfied: tensorflow==2.3.0 in /usr/local/lib/python3.7/dist-packages (2.3.0)

Requirement already satisfied: h5py<2.11.0,>=2.10.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (2.10.0)

Requirement already satisfied: keras-preprocessing<1.2,>=1.1.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (1.1.2)

Requirement already satisfied: wheel>=0.26 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (0.37.1)

Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (1.15.0)

Requirement already satisfied: google-pasta>=0.1.8 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (0.2.0)

Requirement already satisfied: tensorboard<3,>=2.3.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (2.9.1)

Requirement already satisfied: termcolor>=1.1.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (2.0.1)

Requirement already satisfied: grpcio>=1.8.6 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (1.50.0)

Requirement already satisfied: astunparse==1.6.3 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (1.6.3)

Requirement already satisfied: gast==0.3.3 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (0.3.3)

Requirement already satisfied: numpy<1.19.0,>=1.16.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (1.18.5)

Requirement already satisfied: tensorflow-estimator<2.4.0,>=2.3.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (2.3.0)

Requirement already satisfied: scipy==1.4.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (1.4.1)

Requirement already satisfied: wrapt>=1.11.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (1.14.1)

Requirement already satisfied: protobuf>=3.9.2 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (3.17.3)

Requirement already satisfied: absl-py>=0.7.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (1.3.0)

Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.7/dist-packages (from tensorflow==2.3.0) (3.3.0)

Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard<3,>=2.3.0->tensorflow==2.3.0) (0.6.1)

Requirement already satisfied: setuptools>=41.0.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard<3,>=2.3.0->tensorflow==2.3.0) (57.4.0)

Requirement already satisfied: werkzeug>=1.0.1 in /usr/local/lib/python3.7/dist-packages (from tensorboard<3,>=2.3.0->tensorflow==2.3.0) (1.0.1)

Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3.7/dist-packages (from tensorboard<3,>=2.3.0->tensorflow==2.3.0) (1.35.0)

Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard<3,>=2.3.0->tensorflow==2.3.0) (1.8.1)

Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.7/dist-packages (from tensorboard<3,>=2.3.0->tensorflow==2.3.0) (3.4.1)

Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in /usr/local/lib/python3.7/dist-packages (from tensorboard<3,>=2.3.0->tensorflow==2.3.0) (0.4.6)

Requirement already satisfied: requests<3,>=2.21.0 in /usr/local/lib/python3.7/dist-packages (from tensorboard<3,>=2.3.0->tensorflow==2.3.0) (2.23.0)

Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (4.9)

Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (0.2.8)

Requirement already satisfied: cachetools<5.0,>=2.0.0 in /usr/local/lib/python3.7/dist-packages (from google-auth<3,>=1.6.3->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (4.2.4)

Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.7/dist-packages (from google-auth-oauthlib<0.5,>=0.4.1->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (1.3.1)

Requirement already satisfied: importlib-metadata>=4.4 in /usr/local/lib/python3.7/dist-packages (from markdown>=2.6.8->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (4.13.0)

Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata>=4.4->markdown>=2.6.8->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (3.10.0)

Requirement already satisfied: typing-extensions>=3.6.4 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata>=4.4->markdown>=2.6.8->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (4.1.1)

Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in /usr/local/lib/python3.7/dist-packages (from pyasn1-modules>=0.2.1->google-auth<3,>=1.6.3->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (0.4.8)

Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-packages (from requests<3,>=2.21.0->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (3.0.4)

Requirement already satisfied: urllib3!=1.25.0,!1.25.1,<1.26,>=1.21.1 in /usr/local/lib/python3.7/dist-packages (from requests<3,>=2.21.0->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (1.24.3)

Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests<3,>=2.21.0->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (2.10)

Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.7/dist-packages (from requests<3,>=2.21.0->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (2022.9.24)

Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.7/dist-packages (from requests-oauthlib>=0.7.0->google-auth-oauthlib<0.5,>=0.4.1->tensorboard<3,>=2.3.0->tensorflow==2.3.0) (3.2.2)

```
img=image.load_img(r"Sample_Images/Sample_Images/Test_Image5.jpg",grayscale
=False,target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
pred=model.predict_classes(x)
pred
```

```
array([[1, 1, 1, ..., 1, 1, 1],
       [1, 1, 1, ..., 1, 1, 1],
       [1, 1, 1, ..., 1, 1, 1],
       ...,
       [1, 1, 1, ..., 1, 1, 1],
       [1, 0, 1, ..., 1, 1, 1],
       [1, 1, 1, ..., 1, 1, 2]])
```