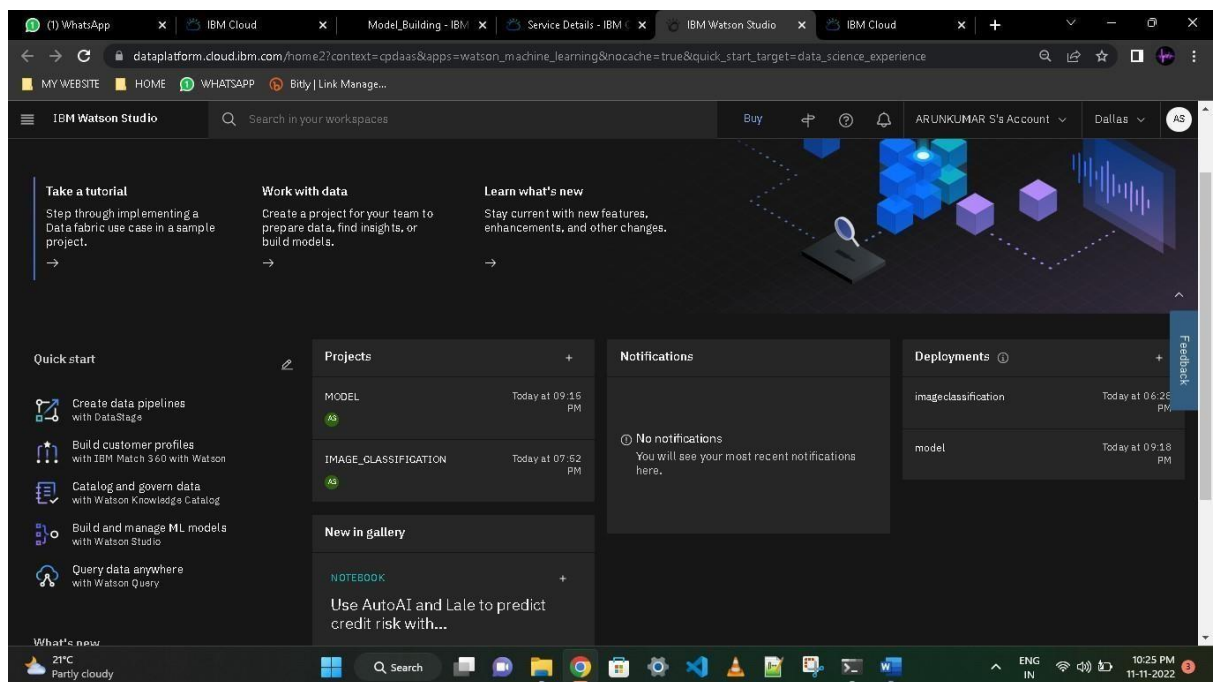


Train Model On IBM

TEAM ID : PNT2022TMID43812

PROJECT NAME : AI-powered Nutrition Analyzer for Fitness Enthusiasts



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Asset types

Data 1

Data assets 1

Notebooks 1

Notebooks

Name	Language	Last modified
Model_Building Notebook	Python 3.9	42 minutes ago Modified by you

Items per page: 20 1-1 of 1 items 1 of 1 pages

About this project

Name
IMAGE_CLASSIFICATION

Description
What's the purpose of this project?

Collaborators

ARUNKUMAR S (you)
Admin

Controls

Cloud object storage
89.2 MB used

IBM Cloud account
Name: ARUNKUMAR S's Account
ID: e877a29349614c2a84759a1df2cc02

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datapatform.cloud.ibm.com/analytics/notebooks/v2/f5e98c53-c155-4053-86ee-6aae5f67e1bd?projectid=26b5ae93-a59f-484c-802c-0c67d01c80db&context=cpd...

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File Edit View Insert Cell Kernel Help Not Trusted | Python 3.9

Date : 01 November 2022
Team ID : PNT2022TMID18332
Project Name : AI-powered Nutrition Analyzer for Fitness Enthusiasts

Data Collection

Download the dataset [here](#)

```
In [55]: pwd
Out[55]: '/home/wsuser/work'
```

```
In [ ]:
```

```
In [179]: !pip install keras==2.7.0
!pip install tensorflow==2.7.0

Collecting keras==2.7.0
  Using cached keras-2.7.0-py2.py3-none-any.whl (1.3 MB)
Installing collected packages: keras
  Attempting to uninstall: keras
```

21°C Cloudy 10:21 PM 11-11-2022

(1) WhatsApp Cloud Pak for Data - IBM Cloud Model_Building - IBM Watson Studio Service Details - IBM Cloud

datapatform.cloud.ibm.com/analytics/notebooks/v2/f5e98c53-c155-4053-86ee-6aae5f67e1bd?projectid=26b5ae93-a59f-484c-802c-0c67d01c80db&context=cpd...

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File Edit View Insert Cell Kernel Help Not Trusted | Python 3.9

```
In [ ]:
```

```
In [73]: from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Flatten
```

Image Preprocessing

```
In [58]: from keras.preprocessing.image import ImageDataGenerator
```

Image Data Augmentation

```
In [59]: train_datagen = ImageDataGenerator(rescale=1./255, shear_range=0.2, zoom_range=0.2, horizontal_flip=True)
test_datagen = ImageDataGenerator(rescale=1./255)
```

Applying Image DataGenerator Functionality To Trainset And Testset

21°C Cloudy 10:21 PM 11-11-2022

IBM Watson Studio interface showing a notebook titled "Applying Image DataGenerator Functionality To Trainset And Testset". The notebook content includes a code cell with the following code:

```
test_datagen=ImageDataGenerator(rescale=1./255)

In [60]:
import os, types
import pandas as pd
from boto3.client import Config
import boto3

def __iter__(self): return 0

# @hidden.cell
# The following code accesses a file in your IBM Cloud Object Storage. It includes your credentials.
# You might want to remove those credentials before you share the notebook.
cos_client = boto3.client(service_name='s3',
    iam_api_key_id='GaU27L_S7syPxtIQissAe5E16m9cNj532640UOYD2H1',
    iam_auth_endpoint='https://iam.cloud.ibm.com/oidc/token',
    config=Config(signature_version='oauth'),
    endpoint_url='https://s3.private.us.cloud-object-storage.appdomain.cloud')

bucket = 'imageclassification-donotdelete-pr-v1604oqevxyin'
object_key = 'Dataset.zip'

streaming_body_8 = cos_client.get_object(Bucket=bucket, Key=object_key)['Body']

# Your data file was loaded into a boto3.client.response.StreamingBody object.
```

The right sidebar shows the "Data" panel with a "Files" tab and a "Connections" tab. The "Files" tab displays a message: "Upload one file at a time. All file types accepted. 5 GB max file size." and a "Dataset.zip" file with an "Insert to code" button.

Continuation of the IBM Watson Studio interface showing the notebook content. The code cell continues with the following code:

```
from io import BytesIO
import zipfile
unzip=zipfile.ZipFile(BytesIO(streaming_body_8.read()),'r')
file_paths=unzip.namelist()
for path in file_paths:
    unzip.extract(path)

In [62]: pwd

Out[62]: '/home/wuser/work'

In [64]: import os
file_names=os.listdir('/home/wuser/work/Dataset/TRAIN_SET')

In [68]: !pip uninstall keras -y
!pip uninstall keras-nightly -y
!pip uninstall keras-Preprocessing -y
!pip uninstall keras-vis -y
!pip uninstall tensorflow -y
!pip uninstall h5py -y

Found existing installation: keras 2.7.0
Uninstalling keras-2.7.0:
  Successfully uninstalled keras-2.7.0
WARNING: Skipping keras-nightly as it is not installed.
Found existing installation: Keras-Preprocessing 1.1.2
Uninstalling Keras-Preprocessing-1.1.2:
  Successfully uninstalled Keras-Preprocessing-1.1.2
WARNING: Skipping tensorflow as it is not installed.
```

The right sidebar shows the "Data" panel with a "Files" tab and a "Connections" tab. The "Files" tab displays a message: "Upload one file at a time. All file types accepted. 5 GB max file size." and a "Dataset.zip" file with an "Insert to code" button.

IBM Watson Studio interface showing the installation of Keras and h5py. The terminal output shows the following commands and results:

```
In [69]: !pip install keras==2.0.8
!pip install h5py==2.10.0

Collecting keras==2.0.8
  Downloading keras-2.0.8-py2.py3-none-any.whl (276 kB)
    Requirement already satisfied: numpy>=1.9.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from keras==2.0.8) (1.20.3)
    Requirement already satisfied: pyyaml in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from keras==2.0.8) (5.4.1)
    Requirement already satisfied: scipy>=0.14 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from keras==2.0.8) (1.7.3)
    Requirement already satisfied: six>=1.9.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from keras==2.0.8) (1.15.0)
Installing collected packages: keras
Successfully installed keras-2.0.8
Collecting h5py==2.10.0
  Downloading h5py-2.10.0.tar.gz (301 kB)
    Requirement already satisfied: numpy>=1.7 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from h5py==2.10.0) (1.20.3)
    Requirement already satisfied: six in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from h5py==2.10.0) (1.15.0)
Building wheels for collected packages: h5py
  Building wheel for h5py (setup.py) ... done
  Created wheel for h5py: filename=h5py-2.10.0-cp39-cp39-linux_x86_64.whl size=1298125 sha256=d5165b1d61c7f8750fe235eb9603b11b9a567cc95ad905c7693b880f647e0420
  Stored in directory: /tmp/ksuser/.cache/pip/wheels/91/57/54/aa5901c840e89c1e931141d848b27421f68ad98bd285cc4036
Successfully built h5py
Installing collected packages: h5py
Successfully installed h5py-2.10.0
```

IBM Watson Studio interface showing the loading of data from a directory. The terminal output shows the following commands and results:

```
In [70]: x_train = train_datagen.flow_from_directory(
        '/home/ksuser/work/Dataset/TRAIN_SET',
        target_size=(64, 64), batch_size=5, color_mode='rgb', class_mode='sparse')

x_test = test_datagen.flow_from_directory(
        '/home/ksuser/work/Dataset/TEST_SET',
        target_size=(64, 64), batch_size=5, color_mode='rgb', class_mode='sparse')

Found 4118 images belonging to 5 classes.
Found 929 images belonging to 5 classes.

In [ ]:

In [71]: print(x_train.class_indices)
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}

In [ ]: print(x_test.class_indices)
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}

In [ ]: from collections import Counter as c
c(x_train.labels)
```


IBM Watson Studio

Projects / IMAGE_CLASSIFICATION / Model_Building

File Edit View Insert Cell Kernel Help

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Model Building

1. Importing The Model Building Libraries

```
In [75]: import numpy as np
import tensorflow as tf
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
```

ModuleNotFoundError: Traceback (most recent call last)

```
/tmp/ksuser/ipykernel_165/3963299783.py in <module>
1 import numpy as np
2 import tensorflow as tf
----> 3 from tensorflow.keras.models import Sequential
4 from tensorflow.keras import layers
5 from tensorflow.keras.layers import Dense, Flatten
```

ModuleNotFoundError: No module named 'tensorflow.keras'

In [76]:

Data

Files

Upload one file at a time. All file types accepted. 5 GB max file size.

Drag and drop files here or upload.

Dataset.zip

Insert to code

IBM Watson Studio

Projects / IMAGE_CLASSIFICATION / Model_Building

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ras/utils/_init_.py

Model Building

2. Initializing The Model

```
In [78]: model = Sequential()
```

2022-11-11 11:55:55.729213: W tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'libcuda.so.1'; dlopen: libcuda.so.1: cannot open shared object file: No such file or directory; LD_LIBRARY_PATH: /opt/ibm/dsdriver/lib:/opt/oracle/lib:/opt/conda/envs/Python-3.9/lib/python3.9/site-packages/tensorflow

2022-11-11 11:55:55.729279: W tensorflow/stream_executor/cuda/cuda_driver.cc:263] failed call to cuInit: UNKNOWN ERROR (383)

3. Adding CNN Layers

```
In [79]: 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())
```

Data

Files

Upload one file at a time. All file types accepted. 5 GB max file size.

Drag and drop files here or upload.

Dataset.zip

Insert to code

IBM Watson Studio interface showing a Jupyter Notebook titled "4. Adding Dense Layers". The notebook code includes:

```
In [80]: classifier.add(Dense(units=128, activation='relu'))
classifier.add(Dense(units=5, activation='softmax'))

In [ ]:

In [81]: classifier.summary()
```

The output shows the model summary for "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

The right sidebar shows the "Data" panel with "Files" and "Connections" tabs. The "Files" tab indicates "Upload one file at a time. All file types accepted. 5 GB max file size." and "Dataset.zip" is listed with an "Insert to code" button.

IBM Watson Studio interface showing the Jupyter Notebook output for training epochs. The output displays training progress, loss, accuracy, and validation metrics for epochs 2/20 through 11/20.

```
Epoch 2/20
824/824 [=====] - 51s 62ms/step - loss: 0.4291 - accuracy: 0.8407 - val_loss: 0.4409 - val_accuracy: 0.8202
Epoch 3/20
824/824 [=====] - 48s 59ms/step - loss: 0.3797 - accuracy: 0.8565 - val_loss: 0.5238 - val_accuracy: 0.8073
Epoch 4/20
824/824 [=====] - 49s 59ms/step - loss: 0.3626 - accuracy: 0.8621 - val_loss: 0.4525 - val_accuracy: 0.8052
Epoch 5/20
824/824 [=====] - 48s 58ms/step - loss: 0.3440 - accuracy: 0.8691 - val_loss: 0.4087 - val_accuracy: 0.8450
Epoch 6/20
824/824 [=====] - 48s 58ms/step - loss: 0.3269 - accuracy: 0.8820 - val_loss: 0.4273 - val_accuracy: 0.8418
Epoch 7/20
824/824 [=====] - 47s 57ms/step - loss: 0.3166 - accuracy: 0.8871 - val_loss: 0.5578 - val_accuracy: 0.7578
Epoch 8/20
824/824 [=====] - 46s 56ms/step - loss: 0.2916 - accuracy: 0.8898 - val_loss: 0.4375 - val_accuracy: 0.8579
Epoch 9/20
824/824 [=====] - 48s 58ms/step - loss: 0.2822 - accuracy: 0.8963 - val_loss: 0.4105 - val_accuracy: 0.8525
Epoch 10/20
824/824 [=====] - 46s 56ms/step - loss: 0.2595 - accuracy: 0.8995 - val_loss: 0.4174 - val_accuracy: 0.8547
Epoch 11/20
824/824 [=====] - 45s 54ms/step - loss: 0.2508 - accuracy: 0.9034 - val_loss: 0.4238 - val_accuracy: 0.8547
```

The right sidebar shows the "Data" panel with "Files" and "Connections" tabs. The "Files" tab indicates "Upload one file at a time. All file types accepted. 5 GB max file size." and "Dataset.zip" is listed with an "Insert to code" button.

IBM Watson Studio interface showing a Jupyter Notebook titled "Model_Building - IBM Watson Studio". The notebook is in the "Edit" mode, displaying code for configuring the learning process and training the model. The code includes:

```
In [82]: classifier.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['accuracy'])
```

6. Train The Model

```
In [83]: 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

WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x7f06d4f7cdc0> and will run it as-is.

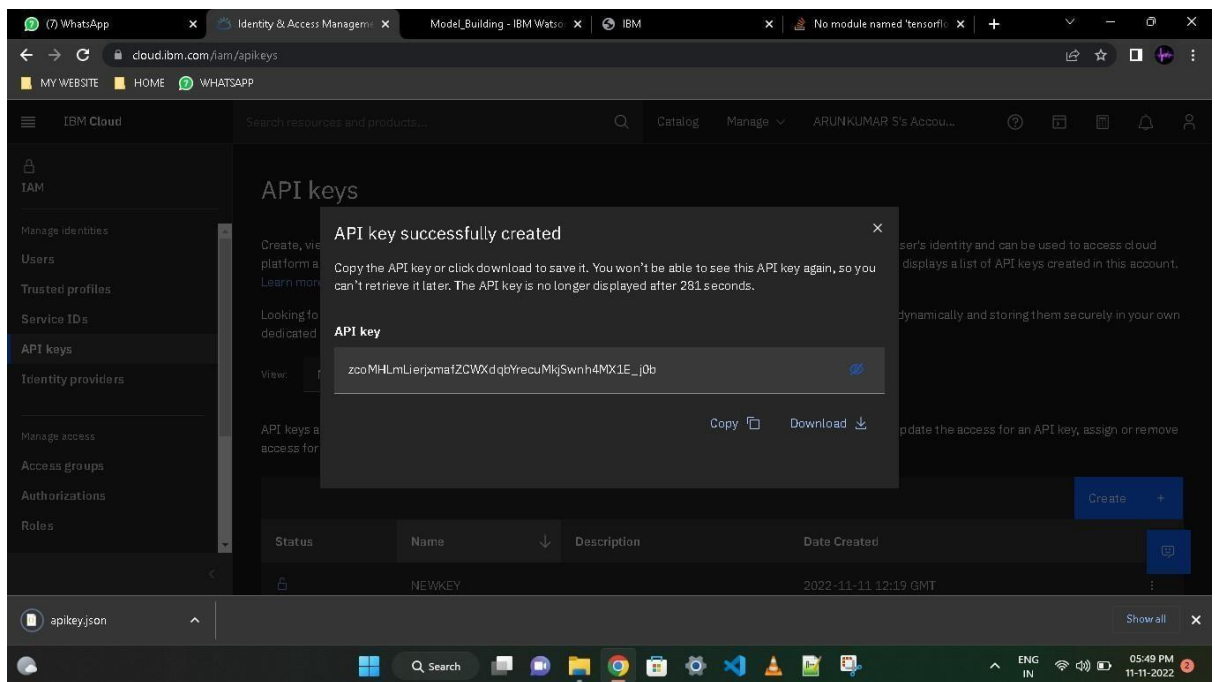
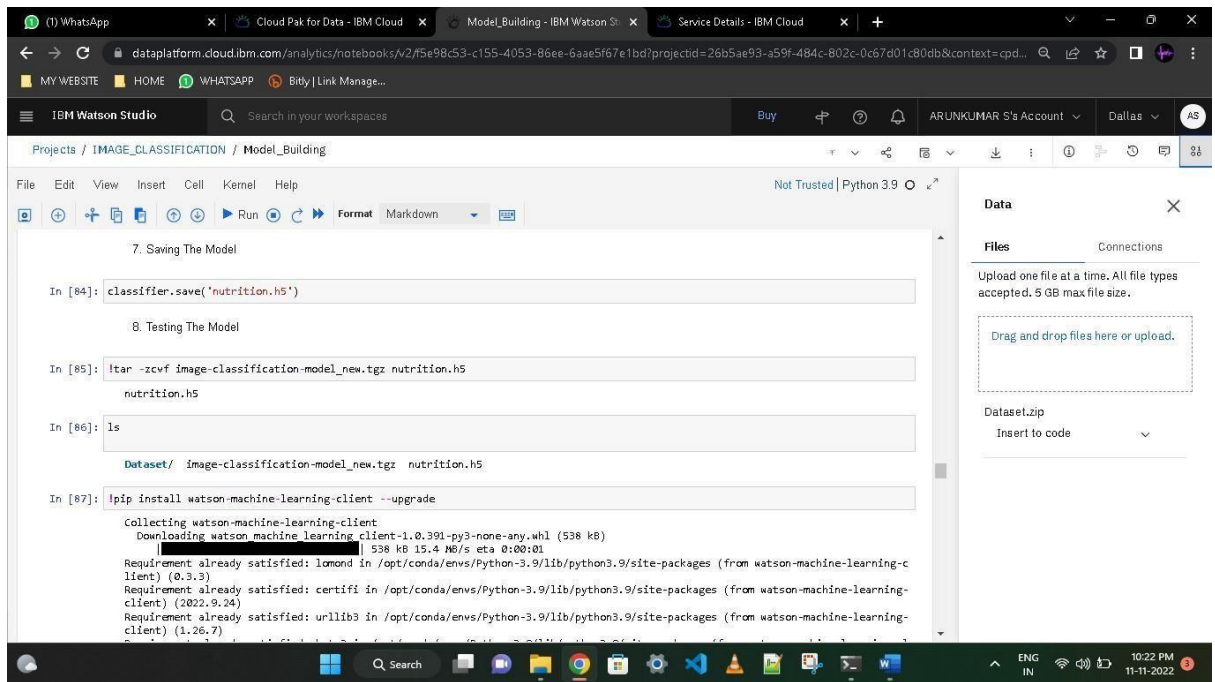
WARNING:tensorflow:AutoGraph could not transform <function Model.make_train_function.<locals>.train_function at 0x7f06d4f7cdc0> and will run it as-is.

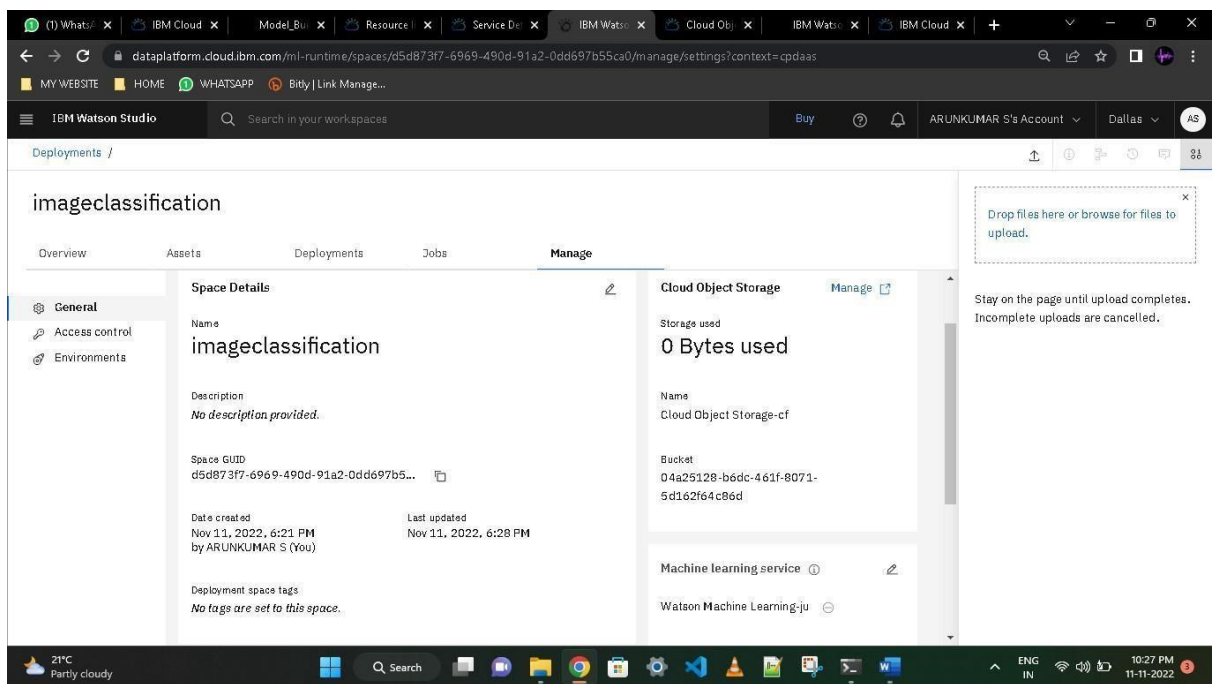
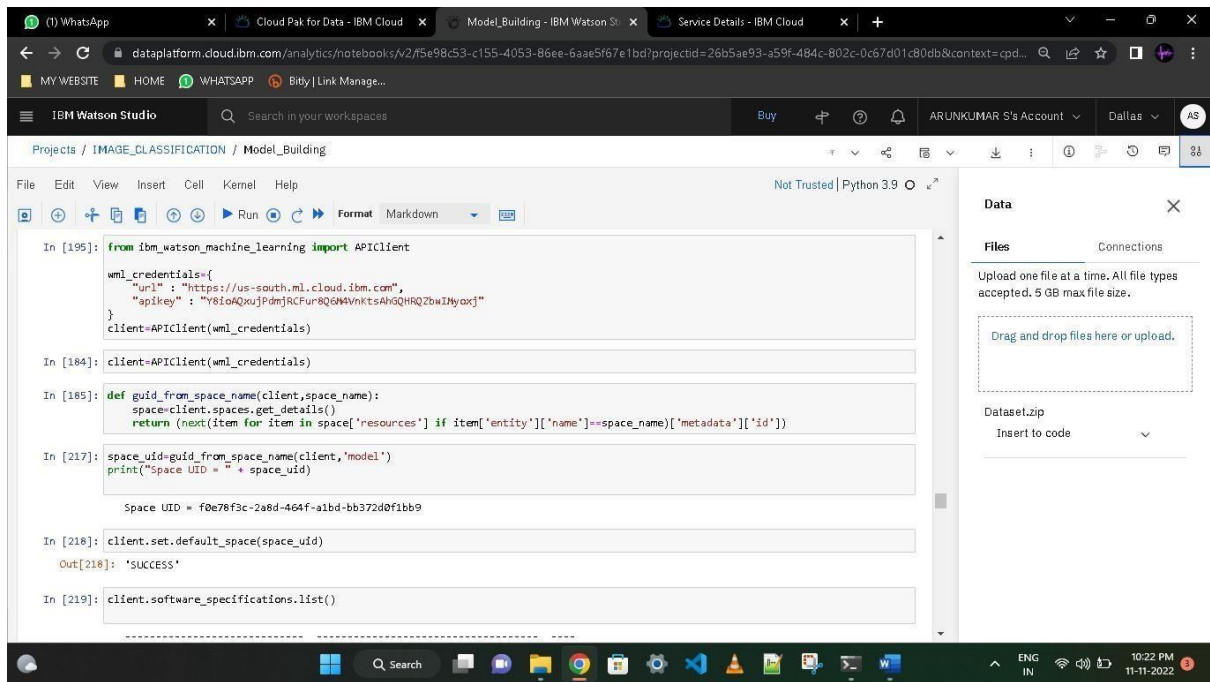
The right sidebar shows the "Data" section with a "Files" tab. It indicates that one file can be uploaded at a time, with a maximum file size of 5 GB. A "Dataset.zip" file is listed under "Files".

IBM Watson Studio interface showing the "Assets" section. The "Assets" tab is selected, displaying a list of data assets. The list includes:

Name	Last modified
Dataset.zip	6 hours ago

The "About this project" sidebar on the right provides details about the project, including the name "IMAGE_CLASSIFICATION", the description "What's the purpose of this project?", and the collaborators "ARUNKUMAR S (you)". It also shows the cloud object storage usage (89.2 MB used) and the IBM Cloud account information (Name: ARUNKUMAR S's Account, ID: e877a29349e14c2a84759a1df2cc02).





IBM Watson Studio interface showing a project named "IMAGE_CLASSIFICATION" under "Model_Building". The interface includes a file explorer, a code editor, and a data panel.

The code editor displays a list of software specifications (NAME, ASSET_ID, TYPE) for various machine learning frameworks and libraries, including default_py3.6, kernel-spark3.2-scala2.12, pytorch-onnx, scikit-learn, spark-mllib, and tensorflow.

The data panel shows a "Dataset.zip" file, which can be uploaded or inserted into the code.

The code editor also shows a Jupyter notebook cell with the following code:

```
In [220]: software_spec_uid = client.software_specifications.get_uid_by_name("default_py3.6")
software_spec_uid

Out[220]: '0062b8c9-8b7d-44a0-a9b9-46c416adcb9'
```

The code editor also shows a Jupyter notebook cell with the following code:

```
In [222]: pip install ibm_watson_machine_learning

Requirement already satisfied: ibm_watson_machine_learning in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (1.0.257)
Requirement already satisfied: importlib-metadata in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (4.8.2)
Requirement already satisfied: tabulate in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (0.8.9)
Requirement already satisfied: lomond in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (0.3.3)
Requirement already satisfied: packaging in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (21.3)
Requirement already satisfied: ibm-cos-sdk==2.11.* in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (2.11.0)
Requirement already satisfied: urllib3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (1.26.7)
Requirement already satisfied: requests in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (2.26.0)
```

IBM Watson Studio interface showing a Jupyter Notebook environment for Model Building. The notebook is titled "Model_Building - IBM Watson Studio" and is part of a project named "IMAGE_CLASSIFICATION". The environment is set to Python 3.9.

The notebook contains the following code snippets:

```
In [ ]: client.repository.download(model_id, 'my_model.tar.gz')

In [ ]: from keras.models import load_model
        from keras.preprocessing import image

In [ ]: model=load_model("nutrition.h5")

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]: from tensorflow.keras.models import load_model
        from keras.preprocessing import image
        model = load_model("nutrition.h5")

In [ ]:

In [ ]: import numpy as np
        x = image.img_to_array(img)
```

The output of the notebook shows the following results:

```
Out[58]: array([0])

In [ ]: index=['APPLES', 'BANANA', 'ORANGE', 'PINEAPPLE', 'WATERMELON']
        result=str(index[classes_x[0]])
        result
```

The right sidebar shows the "Data" panel with a "Files" tab. It indicates that one file can be uploaded at a time, with a maximum file size of 5 GB. The "Dataset.zip" file is listed, and the "Insert to code" button is visible.

The bottom status bar shows the system temperature as 21°C Humid, the time as 10:23 PM, and the date as 11-11-2022.

Cloud Pak for Data services

Launch Cloud Pak for Data

Name	Group	Location	Product	Status	Tags
Cloud Object Storage-cf	Default	Global	Cloud Object Storage	Active	
Watson Studio-ot	Default	Dallas	Watson Studio	Active	
Watson Machine Learning-ju	Default	Dallas	Watson Machine Learning	Active	

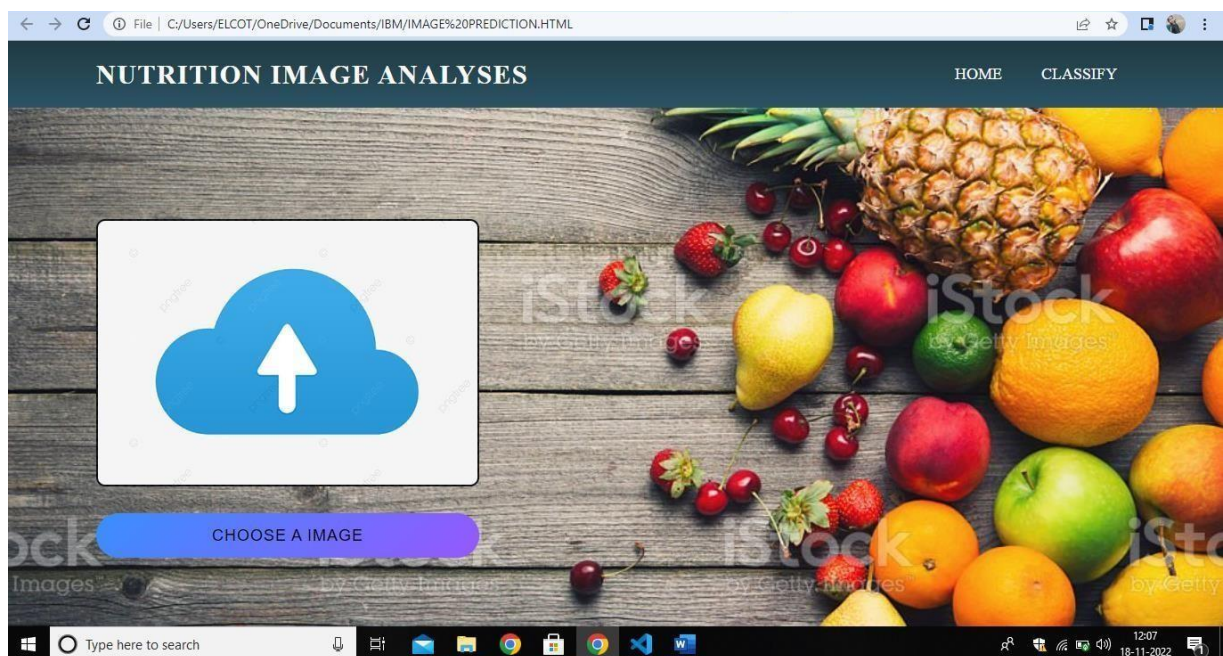
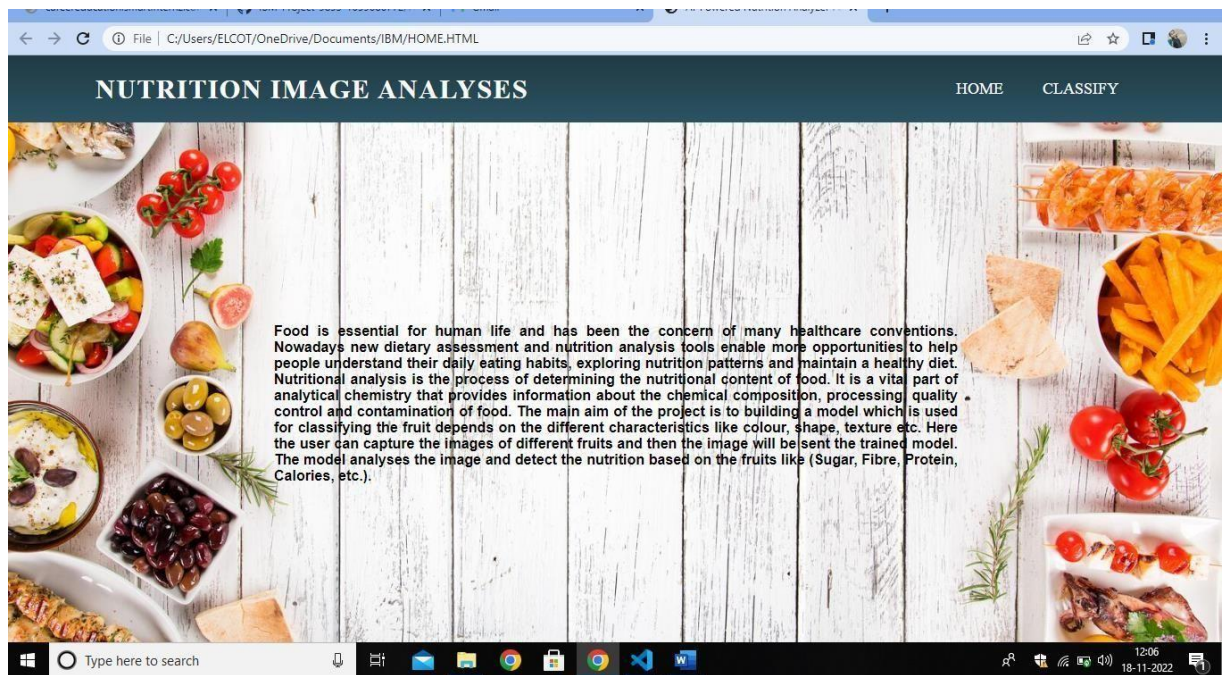
Items per page: 25 1-3 of 3 items 1 1 of 1 page

Buckets

Buckets serve as containers for objects, and can be individually configured in terms of their location, resiliency, billing rates, security, and object lifecycle rules.

Create bucket

Name	Public access	Location	Storage class	Created
04a25128-b6dc-461f-8071-5d162f64c86d	No	us-south	Standard	2022-11-11 6:21 PM
b093cbba-2293-4e6b-b5c1-a47c74f2e51c	No	us-south	Standard	2022-11-11 9:18 PM
imageclassification-donotdelete-pr-v1604oqevxytjn	No	us-geo	Standard	2022-11-11 3:44 PM
model-donotdelete-pr-wkmi3rbetz49	No	us-geo	Standard	2022-11-11 9:12 PM



Upload Image to classify:

Choose...



Food Classified is:

APPLES

```
{('sugar_g': 10.3, 'fiber_g': 2.4, 'serving_size_g': 100.0, 'sodium_mg': 1, 'name':  
'apples', 'potassium_mg': 11, 'fat_saturated_g': 0.0, 'fat_total_g': 0.2, 'calories':  
53.4, 'cholesterol_mg': 0, 'protein_g': 0.3, 'carbohydrates_total_g': 13.8)}
```

Action
Go to