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Date : 17 November 2022

Sprint - 4

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
#Extracting Data
!unzip "/content/drive/MyDrive/IBM Project/Dataset_Collection.zip"
```

```
Archive:  /content/drive/MyDrive/IBM Project/Dataset_Collection.zip
   creating: Dataset_Collection/
   creating: Dataset_Collection/Test/
   creating: Dataset_Collection/Test/dates/
  inflating: Dataset_Collection/Test/dates/100_100.jpg
  inflating: Dataset_Collection/Test/dates/101_100.jpg
  inflating: Dataset_Collection/Test/dates/102_100.jpg
  inflating: Dataset_Collection/Test/dates/103_100.jpg
  inflating: Dataset_Collection/Test/dates/104_100.jpg
  inflating: Dataset_Collection/Test/dates/105_100.jpg
  inflating: Dataset_Collection/Test/dates/106_100.jpg
  inflating: Dataset_Collection/Test/dates/107_100.jpg
  inflating: Dataset_Collection/Test/dates/108_100.jpg
  inflating: Dataset_Collection/Test/dates/109_100.jpg
  inflating: Dataset_Collection/Test/dates/10_100.jpg
  inflating: Dataset_Collection/Test/dates/110_100.jpg
  inflating: Dataset_Collection/Test/dates/111_100.jpg
  inflating: Dataset_Collection/Test/dates/112_100.jpg
  inflating: Dataset_Collection/Test/dates/113_100.jpg
  inflating: Dataset_Collection/Test/dates/114_100.jpg
  inflating: Dataset_Collection/Test/dates/115_100.jpg
  inflating: Dataset_Collection/Test/dates/116_100.jpg
  inflating: Dataset_Collection/Test/dates/117_100.jpg
  inflating: Dataset_Collection/Test/dates/118_100.jpg
  inflating: Dataset_Collection/Test/dates/119_100.jpg
  inflating: Dataset_Collection/Test/dates/11_100.jpg
  inflating: Dataset_Collection/Test/dates/120_100.jpg
  inflating: Dataset_Collection/Test/dates/121_100.jpg
  inflating: Dataset_Collection/Test/dates/122_100.jpg
  inflating: Dataset_Collection/Test/dates/123_100.jpg
  inflating: Dataset_Collection/Test/dates/124_100.jpg
  inflating: Dataset_Collection/Test/dates/125_100.jpg
  inflating: Dataset_Collection/Test/dates/126_100.jpg
  inflating: Dataset_Collection/Test/dates/127_100.jpg
  inflating: Dataset_Collection/Test/dates/128_100.jpg
  inflating: Dataset_Collection/Test/dates/129_100.jpg
  inflating: Dataset_Collection/Test/dates/12_100.jpg
```

```
inflating: Dataset_Collection/Test/dates/130_100.jpg
inflating: Dataset_Collection/Test/dates/131_100.jpg
inflating: Dataset_Collection/Test/dates/132_100.jpg
inflating: Dataset_Collection/Test/dates/133_100.jpg
inflating: Dataset_Collection/Test/dates/134_100.jpg
inflating: Dataset_Collection/Test/dates/135_100.jpg
inflating: Dataset_Collection/Test/dates/136_100.jpg
inflating: Dataset_Collection/Test/dates/137_100.jpg
inflating: Dataset_Collection/Test/dates/138_100.jpg
inflating: Dataset_Collection/Test/dates/139_100.jpg
inflating: Dataset_Collection/Test/dates/19_100.jpg
inflating: Dataset_Collection/Test/dates/246_100.jpg
inflating: Dataset_Collection/Test/dates/254_100.jpg
inflating: Dataset_Collection/Test/dates/257_100.jpg
inflating: Dataset_Collection/Test/dates/258_100.jpg
inflating: Dataset_Collection/Test/dates/265_100.jpg
inflating: Dataset_Collection/Test/dates/266_100.jpg
inflating: Dataset_Collection/Test/dates/271_100.jpg
inflating: Dataset_Collection/Test/dates/274_100.jpg
inflating: Dataset_Collection/Test/dates/275_100.jpg
inflating: Dataset_Collection/Test/dates/276_100.jpg
```

Image Augmentation / PreProcessing :

```
#Import req. Lib.
from tensorflow.keras.preprocessing.image import ImageDataGenerator


#Augmentation On Training Variable
train_datagen = ImageDataGenerator(rescale= 1./255,
                 zoom_range=0.2,
                 horizontal_flip =True)


#Augmentation On Testing Variable
test_datagen = ImageDataGenerator(rescale= 1./255)


#Augmentation On Training Variable
ftrain = train_datagen.flow_from_directory('/content/Dataset_Collection/Train',
                                           target_size=(64,64),
                                           class_mode='categorical',
                                           batch_size=100)
```

```
Found 4111 images belonging to 5 classes.
```

```
#Augmentation On Training Variable
ftest = test_datagen.flow_from_directory('/content/Dataset_Collection/Test',
                                         target_size=(64,64),
                                         class_mode='categorical',
                                         batch_size=100)
```

```
Found 429 images belonging to 5 classes.
```

Model Building

Adding Layers:

```
#Import req. Lib.
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Convolution2D, MaxPooling2D, Flatten, Dense


# Build a CNN Block:
model = Sequential() #intializing sequential model
model.add(Convolution2D(32,(3,3),activation='relu', input_shape=(64,64,3))) #convolution laye
model.add(MaxPooling2D(pool_size=(2, 2))) #Maxpooling layer
model.add(Flatten()) #Flatten layer
model.add(Dense(400,activation='relu')) #Hidden Layer 1
model.add(Dense(200,activation='relu')) #Hidden Layer 2
model.add(Dense(5,activation='softmax')) #Output Layer
```

Compiling

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

Fit/Train The Model

```
#Train Model:
model.fit_generator(ftrain,
                    steps_per_epoch=len(ftrain),
                    epochs=10,
                    validation_data=ftest,
                    validation_steps=len(ftest))
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:6: UserWarning: `Model.fit

Epoch 1/10
42/42 [==============================] - 17s 218ms/step - loss: 1.2723 - accuracy: 0.69
Epoch 2/10
42/42 [==============================] - 9s 217ms/step - loss: 0.2542 - accuracy: 0.915
Epoch 3/10
42/42 [==============================] - 9s 215ms/step - loss: 0.1912 - accuracy: 0.932
Epoch 4/10
42/42 [==============================] - 9s 211ms/step - loss: 0.1798 - accuracy: 0.937
Epoch 5/10
42/42 [==============================] - 9s 210ms/step - loss: 0.1397 - accuracy: 0.951
Epoch 6/10
42/42 [==============================] - 9s 212ms/step - loss: 0.1217 - accuracy: 0.956
```

```
Epoch 7/10
42/42 [==============================] - 9s 216ms/step - loss: 0.1196 - accuracy: 0.957
Epoch 8/10
42/42 [==============================] - 9s 214ms/step - loss: 0.1175 - accuracy: 0.962
Epoch 9/10
42/42 [==============================] - 10s 252ms/step - loss: 0.1057 - accuracy: 0.96
Epoch 10/10
42/42 [==============================] - 9s 213ms/step - loss: 0.1209 - accuracy: 0.956
<keras.callbacks.History at 0x7fe6fb02fc90>
```

Saving The Model :

```
#Save Model
model.save('fruitsmodel.h5')
```

Testing The Model :

```
#Import req. Lib.
from tensorflow.keras.preprocessing import image
import numpy as np


#Testing No 1 :-
img = image.load_img('/content/Dataset_Collection/Test/guava/108_100.jpg',target_size=(64,64)
f = image.img_to_array(img) #Convertinng image to array
f = np.expand_dims(f,axis=0) #Expanding dimensions
pred = np.argmax(model.predict(f)) #predicting higher propability index
op = ['DATES-carbs:75g,Iron:6%,protein:2.5g','GUAVA-Fat:1g,Carbohydrate:14g,Sugar:9g','ORANGE
op[pred] #List indexing with output
```

```
1/1 [==============================] - 0s 107ms/step
'GUAVA-Fat:1g,Carbohydrate:14g,Sugar:9g'
```

```
#Testing No 2 :-
img = image.load_img('/content/Dataset_Collection/Test/pinenapple/img_1191.jpeg',target_size=
f = image.img_to_array(img) #Convertinng image to array
f = np.expand_dims(f,axis=0) #Expanding dimensions
pred = np.argmax(model.predict(f)) #predicting higher propability index
op = ['DATES-carbs:75g,Iron:6%,protein:2.5g','GUAVA-Fat:1g,Carbohydrate:14g,Sugar:9g','ORANGE
op[pred] #List indexing with output
```

```
1/1 [==============================] - 0s 15ms/step
'PINEAPPLE-Fat:0.1g,Carbohydrate:13g,Sugar:10g'
```

```
#Testing No 3 :-
img = image.load_img('/content/Dataset_Collection/Test/watermelon/img_11.jpeg',target_size=(6
f = image.img_to_array(img) #Convertinng image to array
```

```
f = np.expand_dims(f,axis=0) #Expanding dimensions
pred = np.argmax(model.predict(f)) #predicting higher propability index
op = ['DATES-carbs:75g,Iron:6%,protein:2.5g','GUAVA-Fat:1g,Carbohydrate:14g,Sugar:9g','ORANGE
op[pred] #List indexing with output
```

```
1/1 [==============================] - 0s 16ms/step
'WATERMELON-Fat:0.2g,Carbohydrate:8g,Sugar:6g'
```

Model Tuning:

```
from tensorflow.keras.callbacks import EarlyStopping, ReduceLROnPlateau


early_stop = EarlyStopping(monitor='val_accuracy',
                           patience=5)

lr = ReduceLROnPlateau(monitor='val_accuracy',
                       factor=0.5,
                       min_lr=0.00001)

callback = [early_stop,lr]


# Train model

model.fit_generator(ftrain,
                    steps_per_epoch=len(ftrain),
                    epochs=100,
                    callbacks=callback,
                    validation_data=ftest,
                    validation_steps=len(ftest))
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:8: UserWarning: `Model.fit

Epoch 1/100
42/42 [==============================] - 9s 217ms/step - loss: 0.0902 - accuracy: 0.965
Epoch 2/100
42/42 [==============================] - 9s 214ms/step - loss: 0.0907 - accuracy: 0.965
Epoch 3/100
42/42 [==============================] - 9s 210ms/step - loss: 0.0721 - accuracy: 0.975
Epoch 4/100
42/42 [==============================] - 9s 206ms/step - loss: 0.0694 - accuracy: 0.977
Epoch 5/100
42/42 [==============================] - 9s 207ms/step - loss: 0.0572 - accuracy: 0.982
Epoch 6/100
42/42 [==============================] - 9s 206ms/step - loss: 0.0600 - accuracy: 0.978
Epoch 7/100
42/42 [==============================] - 9s 206ms/step - loss: 0.0768 - accuracy: 0.973
Epoch 8/100
42/42 [==============================] - 9s 205ms/step - loss: 0.0439 - accuracy: 0.983
Epoch 9/100
```

```
42/42 [==============================] - 9s 207ms/step - loss: 0.0400 - accuracy: 0.985
<keras.callbacks.History at 0x7fe6f0494cd0>
```

```
#Testing No 4 :-
img = image.load_img('/content/Dataset_Collection/Test/orange/img_1271.jpeg',target_size=(64,
f = image.img_to_array(img) #Convertinng image to array
f = np.expand_dims(f,axis=0) #Expanding dimensions
pred = np.argmax(model.predict(f)) #predicting higher propability index
op = ['DATES-carbs:75g,Iron:6%,protein:2.5g','GUAVA-Fat:1g,Carbohydrate:14g,Sugar:9g','ORANGE
op[pred] #List indexing with output
```

```
1/1 [==============================] - 0s 19ms/step
'ORANGE-Fat:0.1g,Potassium:181mg,Sugar:9g'
```

```
#Testing No 5 :-
img = image.load_img('/content/Dataset_Collection/Test/dates/104_100.jpg',target_size=(64,64)
f = image.img_to_array(img) #Convertinng image to array
f = np.expand_dims(f,axis=0) #Expanding dimensions
pred = np.argmax(model.predict(f)) #predicting higher propability index
op = ['DATES-carbs:75g,Iron:6%,protein:2.5g','GUAVA-Fat:1g,Carbohydrate:14g,Sugar:9g','ORANGE
op[pred] #List indexing with output
```

```
1/1 [==============================] - 0s 17ms/step
'DATES-carbs:75g,Iron:6%,protein:2.5g'
```

Saving the Model:

```
#Save Model
model.save('fruitsmodel.h5')
!tar -zcvf fruits-classification.tgz fruitsmodel.h5
```

```
fruitsmodel.h5
```

IBM DEPLOYMENT

```
!pip install watson-machine-learning-client
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting watson-machine-learning-client
  Downloading watson_machine_learning_client-1.0.391-py3-none-any.whl (538 kB)
     |████████████████████████████████| 538 kB 34.4 MB/s
Collecting ibm-cos-sdk
  Downloading ibm-cos-sdk-2.12.0.tar.gz (55 kB)
     |████████████████████████████████| 55 kB 4.9 MB/s
Collecting lomond
  Downloading lomond-0.3.3-py2.py3-none-any.whl (35 kB)
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (fr
Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages (from w
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (fr
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (frc
Requirement already satisfied: pandas in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (frc
Collecting boto3
  Downloading boto3-1.26.9-py3-none-any.whl (132 kB)
     |████████████████████████████████| 132 kB 64.5 MB/s
Collecting botocore<1.30.0,>=1.29.9
  Downloading botocore-1.29.9-py3-none-any.whl (9.9 MB)
     |████████████████████████████████| 9.9 MB 49.9 MB/s
Collecting jmespath<2.0.0,>=0.7.1
  Downloading jmespath-1.0.1-py3-none-any.whl (20 kB)
Collecting s3transfer<0.7.0,>=0.6.0
  Downloading s3transfer-0.6.0-py3-none-any.whl (79 kB)
     |████████████████████████████████| 79 kB 10.2 MB/s
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.
Collecting urllib3
  Downloading urllib3-1.26.12-py2.py3-none-any.whl (140 kB)
     |████████████████████████████████| 140 kB 74.5 MB/s
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (fr
Collecting ibm-cos-sdk-core==2.12.0
  Downloading ibm-cos-sdk-core-2.12.0.tar.gz (956 kB)
     |████████████████████████████████| 956 kB 69.3 MB/s
Collecting ibm-cos-sdk-s3transfer==2.12.0
  Downloading ibm-cos-sdk-s3transfer-2.12.0.tar.gz (135 kB)
     |████████████████████████████████| 135 kB 60.4 MB/s
Collecting jmespath<2.0.0,>=0.7.1
  Downloading jmespath-0.10.0-py2.py3-none-any.whl (24 kB)
Collecting requests
  Downloading requests-2.28.1-py3-none-any.whl (62 kB)
     |████████████████████████████████| 62 kB 2.0 MB/s
Requirement already satisfied: charset-normalizer<3,>=2 in /usr/local/lib/python3.7/d
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-package
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages
Building wheels for collected packages: ibm-cos-sdk, ibm-cos-sdk-core, ibm-cos-sdk-s3
```

```
!pip install ibm_watson_machine_learning
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/p
Collecting ibm_watson_machine_learning
  Downloading ibm_watson_machine_learning-1.0.257-py3-none-any.whl (1.8 MB)
     |████████████████████████████████| 1.8 MB 30.0 MB/s
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (fr
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (fr
```

```
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (frc
Requirement already satisfied: importlib-metadata in /usr/local/lib/python3.7/dist-pa
Collecting ibm-cos-sdk==2.7.*
  Downloading ibm-cos-sdk-2.7.0.tar.gz (51 kB)
     |████████████████████████████████| 51 kB 941 kB/s
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (frc
Requirement already satisfied: packaging in /usr/local/lib/python3.7/dist-packages (f
Requirement already satisfied: pandas<1.5.0,>=0.24.2 in /usr/local/lib/python3.7/dist
Requirement already satisfied: lomond in /usr/local/lib/python3.7/dist-packages (from
Collecting ibm-cos-sdk-core==2.7.0
  Downloading ibm-cos-sdk-core-2.7.0.tar.gz (824 kB)
     |████████████████████████████████| 824 kB 52.1 MB/s
Collecting ibm-cos-sdk-s3transfer==2.7.0
  Downloading ibm-cos-sdk-s3transfer-2.7.0.tar.gz (133 kB)
     |████████████████████████████████| 133 kB 55.0 MB/s
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /usr/local/lib/python3.7/dis
Collecting docutils<0.16,>=0.10
  Downloading docutils-0.15.2-py3-none-any.whl (547 kB)
     |████████████████████████████████| 547 kB 62.1 MB/s
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.
Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-package
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (fr
Requirement already satisfied: charset-normalizer<3,>=2 in /usr/local/lib/python3.7/d
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.7/dist-packages
Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (f
Requirement already satisfied: typing-extensions>=3.6.4 in /usr/local/lib/python3.7/d
Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /usr/local/lib/python3.7/d
Building wheels for collected packages: ibm-cos-sdk, ibm-cos-sdk-core, ibm-cos-sdk-s3
  Building wheel for ibm-cos-sdk (setup.py) ... done
  Created wheel for ibm-cos-sdk: filename=ibm_cos_sdk-2.7.0-py2.py3-none-any.whl size
  Stored in directory: /root/.cache/pip/wheels/47/22/bf/e1154ff0f5de93cc477acd0ca69ab
  Building wheel for ibm-cos-sdk-core (setup.py) ... done
  Created wheel for ibm-cos-sdk-core: filename=ibm_cos_sdk_core-2.7.0-py2.py3-none-an
  Stored in directory: /root/.cache/pip/wheels/6c/a2/e4/c16d02f809a3ea998e17cfd02c133
  Building wheel for ibm-cos-sdk-s3transfer (setup.py) ... done
  Created wheel for ibm-cos-sdk-s3transfer: filename=ibm_cos_sdk_s3transfer-2.7.0-py2
  Stored in directory: /root/.cache/pip/wheels/5f/b7/14/fbe02bc1ef1af890650c7e51743d1
Successfully built ibm-cos-sdk ibm-cos-sdk-core ibm-cos-sdk-s3transfer
Installing collected packages: docutils, ibm-cos-sdk-core, ibm-cos-sdk-s3transfer, ib
  Attempting uninstall: docutils
    Found existing installation: docutils 0.17.1
    Uninstalling docutils-0.17.1:
      Successfully uninstalled docutils-0.17.1
  Attempting uninstall: ibm-cos-sdk-core
    Found existing installation: ibm-cos-sdk-core 2.12.0
    Uninstalling ibm-cos-sdk-core-2.12.0:
      Successfully uninstalled ibm-cos-sdk-core-2.12.0
  Attempting uninstall: ibm-cos-sdk-s3transfer
    Found existing installation: ibm-cos-sdk-s3transfer 2.12.0
    Uninstalling ibm-cos-sdk-s3transfer-2.12.0:
```

```
from ibm_watson_machine_learning import APIClient

wml_credentials ={
```

```
    "url":"https://us-south.ml.cloud.ibm.com",
    "apikey":"dY-bQpCTpct_SDInRuFFJMZNVWvl7G3lqm03_OA8Lm7z"
}

client = APIClient(wml_credentials)
```

```
Python 3.7 and 3.8 frameworks are deprecated and will be removed in a future release. U
```

```
client
```

```
<ibm_watson_machine_learning.client.APIClient at 0x7fe5f567ae90>
```

```
client.spaces.get_details()
```

```
{'resources': [{'entity': {'compute': [{'crn': 'crn:v1:bluemix:public:pm-20:us-
south:a/5f1d24742b2b46409007fcecd93f50b8:a3169554-0b3f-4683-87a7-b26e910637ea::',
      'guid': 'a3169554-0b3f-4683-87a7-b26e910637ea',
      'name': 'Watson Machine Learning-jk',
      'type': 'machine_learning'}],
    'description': '',
    'name': 'cnn_animal',
    'scope': {'bss_account_id': '5f1d24742b2b46409007fcecd93f50b8'},
    'stage': {'production': False},
    'status': {'state': 'active'},
    'storage': {'properties': {'bucket_name': '193dedba-4ed9-4b79-b952-
98fb944885e4',
      'bucket_region': 'us-south',
      'credentials': {'admin': {'access_key_id': 'cf6018149ce24fddb6598f6a96c2b280',
        'api_key': 'javLjHhbhiq1Y3k8h-5LV4c4hS6OwcqrHlbHUFzeHGfu',
        'secret_access_key': '0ad11e874fcfb36650e6815e2f56ae83a6593a21e5ae585a',
        'service_id': 'ServiceId-be70e4f6-1244-4207-a7e6-265153d0cdcb'},
       'editor': {'access_key_id': '8eefa07f0569455786e98c5f58fad722',
        'api_key': 'IklY7V1T-SiEX5oXDd9okToH9-UW0rEkyOJ-fBGVkZ4Y',
        'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/5f1d24742b2b46409007fcecd93f50b8:db452eb8-1bb8-4f24-8b99-
a2ea7dfa6bb0::',
        'secret_access_key': '3f97db731796d849091c8aa4b86c5e841c89f5f9a75bc396',
        'service_id': 'ServiceId-a1838a24-444c-4df2-b207-883798fa3ac3'},
       'viewer': {'access_key_id': '7e12da5fabfc4b25a6ad1e9448acf8b9',
        'api_key': 'NA9X_eu4P8HFua686jTC57xLfOhmdL3fLKZo-TcAiU5E',
        'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/5f1d24742b2b46409007fcecd93f50b8:db452eb8-1bb8-4f24-8b99-
a2ea7dfa6bb0::',
        'secret_access_key': 'f4f3b5e0619da8d16627864621627411a6ed0259da97bcfd',
        'service_id': 'ServiceId-acd8e0f5-7070-407f-9169-27a8571355ad'}},
      'endpoint_url': 'https://s3.us-south.cloud-object-storage.appdomain.cloud',
      'guid': 'db452eb8-1bb8-4f24-8b99-a2ea7dfa6bb0',
      'resource_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/5f1d24742b2b46409007fcecd93f50b8:db452eb8-1bb8-4f24-8b99-
a2ea7dfa6bb0::'},
     'type': 'bmcos_object_storage'}},
   'metadata': {'created_at': '2022-10-21T17:04:48.217Z',
    'creator_id': 'IBMid-66400401RK',
```

```
    'id': '03987fa5-752c-44e0-9414-69fce484c3cf',
    'updated_at': '2022-10-21T17:05:11.918Z',
    'url': '/v2/spaces/03987fa5-752c-44e0-9414-69fce484c3cf'}},
  {'entity': {'compute': [{'crn': 'crn:v1:bluemix:public:pm-20:us-
south:a/5f1d24742b2b46409007fcecd93f50b8:a3169554-0b3f-4683-87a7-b26e910637ea::',
      'guid': 'a3169554-0b3f-4683-87a7-b26e910637ea',
      'name': 'Watson Machine Learning-jk',
      'type': 'machine_learning'}],
    'description': '',
    'name': 'AI-project_Deployment',
    'scope': {'bss_account_id': '5f1d24742b2b46409007fcecd93f50b8'},
    'stage': {'production': False},
    'status': {'state': 'active'},
    'storage': {'properties': {'bucket_name': '48dbfba7-27f5-45cb-8df3-
f1d63d0b1191',
      'bucket_region': 'us-south',
      'credentials': {'admin': {'access_key_id': '209c16beac8c4acabeac34cbff62b1f2',
        'api_key': 'xzNz0NumLOvZeDNvH7N01jmeEDUEEIJfjXU5ocuhCPKp',
        'secret_access_key': '30ef2202138f39206c78a8ac4c1473b0c7f4cd2e5260d1fa',
```

```
client.spaces.list()
```

```
Note: 'limit' is not provided. Only first 50 records will be displayed if the number of
------------------------------------  --------------------  ------------------------
ID                                    NAME                  CREATED
22fed11d-802a-47c2-beae-126cd4f68289  AI-project_Deployment  2022-11-15T01:20:55.216Z
------------------------------------  --------------------  ------------------------
```

```
space_uid ="22fed11d-802a-47c2-beae-126cd4f68289"
space_uid
```

```
'22fed11d-802a-47c2-beae-126cd4f68289'
```

```
client.set.default_space(space_uid )
```

```
'SUCCESS'
```

```
client.software_specifications.list()
```

```
------------------------------  ------------------------------------  ----
NAME                            ASSET_ID                              TYPE
default_py3.6                   0062b8c9-8b7d-44a0-a9b9-46c416adcbd9  base
kernel-spark3.2-scala2.12       020d69ce-7ac1-5e68-ac1a-31189867356a  base
pytorch-onnx_1.3-py3.7-edt      069ea134-3346-5748-b513-49120e15d288  base
scikit-learn_0.20-py3.6         09c5a1d0-9c1e-4473-a344-eb7b665ff687  base
spark-mllib_3.0-scala_2.12      09f4cff0-90a7-5899-b9ed-1ef348aebdee  base
pytorch-onnx_rt22.1-py3.9       0b848dd4-e681-5599-be41-b5f6fccc6471  base
ai-function_0.1-py3.6           0cdb0f1e-5376-4f4d-92dd-da3b69aa9bda  base
shiny-r3.6                      0e6e79df-875e-4f24-8ae9-62dcc2148306  base
tensorflow_2.4-py3.7-horovod    1092590a-307d-563d-9b62-4eb7d64b3f22  base
pytorch_1.1-py3.6               10ac12d6-6b30-4ccd-8392-3e922c096a92  base
```

```
tensorflow_1.15-py3.6-ddl      111e41b3-de2d-5422-a4d6-bf776828c4b7  base
autoai-kb_rt22.2-py3.10        125b6d9a-5b1f-5e8d-972a-b251688ccf40  base
runtime-22.1-py3.9             12b83a17-24d8-5082-900f-0ab31fbfd3cb  base
scikit-learn_0.22-py3.6        154010fa-5b3b-4ac1-82af-4d5ee5abbc85  base
default_r3.6                   1b70aec3-ab34-4b87-8aa0-a4a3c8296a36  base
pytorch-onnx_1.3-py3.6         1bc6029a-cc97-56da-b8e0-39c3880dbbe7  base
kernel-spark3.3-r3.6           1c9e5454-f216-59dd-a20e-474a5cdf5988  base
pytorch-onnx_rt22.1-py3.9-edt  1d362186-7ad5-5b59-8b6c-9d0880bde37f  base
tensorflow_2.1-py3.6           1eb25b84-d6ed-5dde-b6a5-3fbdf1665666  base
spark-mllib_3.2                20047f72-0a98-58c7-9ff5-a77b012eb8f5  base
tensorflow_2.4-py3.8-horovod   217c16f6-178f-56bf-824a-b19f20564c49  base
runtime-22.1-py3.9-cuda        26215f05-08c3-5a41-a1b0-da66306ce658  base
do_py3.8                       295addb5-9ef9-547e-9bf4-92ae3563e720  base
autoai-ts_3.8-py3.8            2aa0c932-798f-5ae9-abd6-15e0c2402fb5  base
tensorflow_1.15-py3.6          2b73a275-7cbf-420b-a912-eae7f436e0bc  base
kernel-spark3.3-py3.9          2b7961e2-e3b1-5a8c-a491-482c8368839a  base
pytorch_1.2-py3.6              2c8ef57d-2687-4b7d-acce-01f94976dac1  base
spark-mllib_2.3                2e51f700-bca0-4b0d-88dc-5c6791338875  base
pytorch-onnx_1.1-py3.6-edt     32983cea-3f32-4400-8965-dde874a8d67e  base
spark-mllib_3.0-py37           36507ebe-8770-55ba-ab2a-eafe787600e9  base
spark-mllib_2.4                390d21f8-e58b-4fac-9c55-d7ceda621326  base
autoai-ts_rt22.2-py3.10        396b2e83-0953-5b86-9a55-7ce1628a406f  base
xgboost_0.82-py3.6             39e31acd-5f30-41dc-ae44-60233c80306e  base
pytorch-onnx_1.2-py3.6-edt     40589d0e-7019-4e28-8daa-fb03b6f4fe12  base
pytorch-onnx_rt22.2-py3.10     40e73f55-783a-5535-b3fa-0c8b94291431  base
default_r36py38                41c247d3-45f8-5a71-b065-8580229facf0  base
autoai-ts_rt22.1-py3.9         4269d26e-07ba-5d40-8f66-2d495b0c71f7  base
autoai-obm_3.0                 42b92e18-d9ab-567f-988a-4240ba1ed5f7  base
pmml-3.0_4.3                   493bcb95-16f1-5bc5-bee8-81b8af80e9c7  base
spark-mllib_2.4-r_3.6          49403dff-92e9-4c87-a3d7-a42d0021c095  base
xgboost_0.90-py3.6             4ff8d6c2-1343-4c18-85e1-689c965304d3  base
pytorch-onnx_1.1-py3.6         50f95b2a-bc16-43bb-bc94-b0bed208c60b  base
autoai-ts_3.9-py3.8            52c57136-80fa-572e-8728-a5e7cbb42cde  base
spark-mllib_2.4-scala_2.11     55a70f99-7320-4be5-9fb9-9edb5a443af5  base
spark-mllib_3.0                5c1b0ca2-4977-5c2e-9439-ffd44ea8ffe9  base
autoai-obm_2.0                 5c2e37fa-80b8-5e77-840f-d912469614ee  base
spss-modeler_18.1              5c3cad7e-507f-4b2a-a9a3-ab53a21dee8b  base
cuda-py3.8                     5d3232bf-c86b-5df4-a2cd-7bb870a1cd4e  base
autoai-kb_3.1-py3.7            632d4b22-10aa-5180-88f0-f52dfb6444d7  base
pytorch-onnx_1.7-py3.8         634d3cdc-b562-5bf9-a2d4-ea90a478456b  base
-----------------------------  ------------------------------------  ----
Note: Only first 50 records were displayed. To display more use 'limit' parameter.
```

```
software_space_uid = client.software_specifications.get_uid_by_name("tensorflow_rt22.1-py3.9'
software_space_uid
```

```
'acd9c798-6974-5d2f-a657-ce06e986df4d'
```

```
model_details = client.repository.store_model(model="/content/fruits-classification.tgz", met
    client.repository.ModelMetaNames.NAME:"FRUITS Model",
    client.repository.ModelMetaNames.TYPE:"tensorflow_2.7",
    client.repository.ModelMetaNames.SOFTWARE_SPEC_UID:software_space_uid
})
```

```
model_details
```

```
{'entity': {'hybrid_pipeline_software_specs': [],
  'software_spec': {'id': 'acd9c798-6974-5d2f-a657-ce06e986df4d',
   'name': 'tensorflow_rt22.1-py3.9'},
  'type': 'tensorflow_2.7'},
 'metadata': {'created_at': '2022-11-15T02:04:12.990Z',
  'id': 'b477d01e-8bd2-42ba-b3ec-a7b9163ce686',
  'modified_at': '2022-11-15T02:04:34.710Z',
  'name': 'FRUITS Model',
  'owner': 'IBMid-66400401RK',
  'resource_key': 'a5510907-5e54-4cb4-af42-cd69edc24845',
  'space_id': '22fed11d-802a-47c2-beae-126cd4f68289'},
 'system': {'warnings': []}}
```

IF WANT TO GET MODEL AFTER SOME DAYS

```
model_id = client.repository.get_model_id(model_details)
model_id
```

```
'b477d01e-8bd2-42ba-b3ec-a7b9163ce686'
```

DOWNLOAD MODEL AGAIN

```
client.repository.download(model_id,"FRUITS_IBM_Model.tgz")
```

```
Successfully saved model content to file: 'FRUITS_IBM_Model.tgz'
'/content/FRUITS_IBM_Model.tgz'
```

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