

Team Id: PNT2022TMID07703

DATA COLLECTION AND PREPROCESSING

Nutrition image Analysis using CNN

```
In [ ]: !unzip '/content/Dataset-Fruit.zip'
```

Archive: /content/Dataset-Fruit.zip
replace Dataset/TRAIN_SET/PINEAPPLE/25_100.jpg? [y]es, [n]o, [A]ll, [N]one, [r]ename:

Importing Necessary Libraries

```
In [ ]: import numpy as np#used for numerical analysis
import tensorflow #open source used for both ML and DL for computation
from tensorflow.keras.models import Sequential #it is a plain stack of layers
from tensorflow.keras import layers #A layer consists of a tensor-in tensor-out computation function
#Dense layer is the regular deeply connected neural network layer
from tensorflow.keras.layers import Dense, Flatten
#Flatten-used for flattening the input or change the dimension
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Dropout #Convolutional layer
#MaxPooling2D-for downsampling the image
from keras.preprocessing.image import ImageDataGenerator
```

Image Data Augmentation

```
In [ ]: #setting parameter for Image Data augmentation to the training data
train_datagen = ImageDataGenerator(rescale=1./255, shear_range=0.2, zoom_range=0.2, horizontal_flip=True)
#Image Data augmentation to the testing data
test_datagen=ImageDataGenerator(rescale=1./255)
```

Loading our data and performing data augmentation

```
In [ ]: #performing data agumentation to train data
x_train = train_datagen.flow_from_directory(
    r'/content/Dataset/TRAIN_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
#performing data agumentation to test data
x_test = test_datagen.flow_from_directory(
    r'/content/Dataset/TEST_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
```

Found 4118 images belonging to 5 classes.
Found 1500 images belonging to 5 classes.

```
In [ ]: print(x_train.class_indices)#checking the number of classes

{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}
```

```
In [ ]: print(x_test.class_indices)#checking the number of classes

{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}
```

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

Out[]: Counter({0: 995, 1: 1354, 2: 1019, 3: 275, 4: 475})

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

Out[]: Counter({0: 266, 1: 415, 2: 248, 3: 224, 4: 347})

Creating the Model

```
In [ ]: # Initializing the CNN
classifier = Sequential()

# First convolution layer and pooling
classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2, 2)))

# Second convolution layer and pooling
classifier.add(Conv2D(32, (3, 3), activation='relu'))

# input_shape is going to be the pooled feature maps from the previous convolution layer
classifier.add(MaxPooling2D(pool_size=(2, 2)))

# Flattening the layers
classifier.add(Flatten())

# Adding a fully connected layer
classifier.add(Dense(units=128, activation='relu'))
classifier.add(Dense(units=5, activation='softmax')) # softmax for more than 2
```

```
In [ ]: classifier.summary()#summary of our model
```

Model: "sequential"

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
=====

Compiling The Model

```
In [ ]: # Compiling the CNN
# categorical_crossentropy for more than 2
classifier.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['accuracy'])
```

Fitting the Model

```
In [ ]: classifier.fit_generator(
    generator=x_train, steps_per_epoch = len(x_train),
    epochs=10, validation_data=x_test, validation_steps = len(x_test)) # No of images in test set
```

Epoch 1/10

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:3: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Please use `Model.fit`, which supports generators.

This is separate from the ipykernel package so we can avoid doing imports until

824/824 [=====] - 21s 15ms/step - loss: 0.5833 - accuracy: 0.7763 - val_loss: 0.3058 - val_accuracy: 0.8800

Epoch 2/10

824/824 [=====] - 12s 14ms/step - loss: 0.4275 - accuracy: 0.8397 - val_loss: 0.3872 - val_accuracy: 0.8607

Epoch 3/10

824/824 [=====] - 12s 15ms/step - loss: 0.3700 - accuracy: 0.8592 - val_loss: 0.2694 - val_accuracy: 0.8953

Epoch 4/10

824/824 [=====] - 12s 14ms/step - loss: 0.3420 - accuracy: 0.8757 - val_loss: 0.2661 - val_accuracy: 0.9073

Epoch 5/10

824/824 [=====] - 12s 14ms/step - loss: 0.3328 - accuracy: 0.8686 - val_loss: 0.2589 - val_accuracy: 0.9047

Epoch 6/10

824/824 [=====] - 12s 14ms/step - loss: 0.2955 - accuracy: 0.8849 - val_loss: 0.2387 - val_accuracy: 0.9153

Epoch 7/10

824/824 [=====] - 12s 14ms/step - loss: 0.2863 - accuracy: 0.8864 - val_loss: 0.2547 - val_accuracy: 0.9087

Epoch 8/10

824/824 [=====] - 16s 19ms/step - loss: 0.2620 - accuracy: 0.8980 - val_loss: 0.2273 - val_accuracy: 0.9160

Epoch 9/10

824/824 [=====] - 12s 14ms/step - loss: 0.2456 - accuracy: 0.9041 - val_loss: 0.2191 - val_accuracy: 0.9227

Epoch 10/10

824/824 [=====] - 12s 14ms/step - loss: 0.2408 - accuracy: 0.9114 - val_loss: 0.2333 - val_accuracy: 0.9233

tf 1:

Saving Our Model

```
[ ]: # Save the model
classifier.save('nutrition.h5')

[ ]: !tar -zcvf nutrition-analysis.tgz nutrition.h5
nutrition.h5
```

IBM Deployment

```
[ ]: !pip install watson-machine-learning-client
```

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

Collecting watson-machine-learning-client

```
Downloading watson_machine_learning_client-1.0.391-py3-none-any.whl (538
kB)
```

538 kB 40.7 MB/s

Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (4.64.1)

Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (2022.9.24)

Requirement already satisfied: pandas in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (1.3.5)

Collecting boto3

Downloading boto3-1.26.3-py3-none-any.whl (132 kB)

132 kB 74.7 MB/s

Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (2.23.0)

Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (0.8.10)

Collecting lomond

Downloading lomond-0.3.3-py2.py3-none-any.whl (35 kB)

Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (1.24.3)

Collecting ibm-cos-sdk

Downloading ibm-cos-sdk-2.12.0.tar.gz (55 kB)

55 kB 4.5 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 9.5 MB/s

Collecting botocore<1.30.0,>=1.29.3

Downloading botocore-1.29.3-py3-none-any.whl (9.8 MB)

```

9.8 MB 55.1 MB/s
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.7/dist-packages (from botocore<1.30.0,>=1.29.3->boto3->watson-machine-learning-client) (2.8.2)
Collecting urllib3
  Downloading urllib3-1.26.12-py2.py3-none-any.whl (140 kB)
    |████████████████████████████████████████| 140 kB 72.7 MB/s
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from python-dateutil<3.0.0,>=2.1->botocore<1.30.0,>=1.29.3->boto3->watson-machine-learning-client) (1.15.0)
Collecting ibm-cos-sdk-core==2.12.0
  Downloading ibm-cos-sdk-core-2.12.0.tar.gz (956 kB)
    |████████████████████████████████████████| 956 kB 64.8 MB/s
Collecting ibm-cos-sdk-s3transfer==2.12.0
  Downloading ibm-cos-sdk-s3transfer-2.12.0.tar.gz (135 kB)
    |████████████████████████████████████████| 135 kB 70.2 MB/s

    |████████████████████████████████████████| 135 kB 70.2 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 1.4 MB/s
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests->watson-machine-learning-client) (2.10)
Requirement already satisfied: charset-normalizer<3,>=2 in /usr/local/lib/python3.7/dist-packages (from requests->watson-machine-learning-client) (2.1.1)
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages (from pandas->watson-machine-learning-client) (2022.5)
Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-packages (from pandas->watson-machine-learning-client) (1.21.6)
Building wheels for collected packages: ibm-cos-sdk, ibm-cos-sdk-core, ibm-cos-sdk-s3transfer
  Building wheel for ibm-cos-sdk (setup.py) ... done
  Created wheel for ibm-cos-sdk: filename=ibm_cos_sdk-2.12.0-py3-none-any.whl size=73930 sha256=5a654d2d0a1c0d22dec4f9c66713861e46016547e25613fa5ceb06203ada9a15
  Stored in directory: /root/.cache/pip/wheels/ec/94/29/2b57327cf00664b6614304f7958abd29d77ea0e5bbece2ea57
  Building wheel for ibm-cos-sdk-core (setup.py) ... done
  Created wheel for ibm-cos-sdk-core: filename=ibm_cos_sdk_core-2.12.0-py3-none-any.whl size=562962 sha256=3336cef3e85aa6bba0b3d73be5a6d6cc4d08b22f1630e12a3625b56b11590a1d
  Stored in directory: /root/.cache/pip/wheels/64/56/fb/5cd6f4f40406c828a5289b95b2752a4d142a9afb359244ed8d
  Building wheel for ibm-cos-sdk-s3transfer (setup.py) ... done
  Created wheel for ibm-cos-sdk-s3transfer: filename=ibm_cos_sdk_s3transfer-2.12.0-py3-none-any.whl size=89778 sha256=c45ff7c36bbf526020a089fc8e985cb2107b396886588c14e2ae0edcd4c1f7b1
  Stored in directory: /root/.cache/pip/wheels/57/79/6a/ffe3370ed7ebc00604f9f76766e1e0348dcdcad2b2e32df9e1
Successfully built ibm-cos-sdk ibm-cos-sdk-core ibm-cos-sdk-s3transfer
Installing collected packages: urllib3, requests, jmespath, ibm-cos-sdk-core, botocore, s3transfer, ibm-cos-sdk-s3transfer, lomond, ibm-cos-sdk, boto3, watson-machine-learning-client

```


Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-packages (from pandas<1.5.0,>=0.24.2->ibm_watson_machine_learning) (1.21.6)

Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from python-dateutil<3.0.0,>=2.1->ibm-cos-sdk-core==2.7.0->ibm-cos-sdk==2.7.*->ibm_watson_machine_learning) (1.15.0)

Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests->ibm_watson_machine_learning) (2.10)

Requirement already satisfied: charset-normalizer<3,>=2 in /usr/local/lib/python3.7/dist-packages (from requests->ibm_watson_machine_learning) (2.1.1)

Requirement already satisfied: typing-extensions>=3.6.4 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata->ibm_watson_machine_learning) (4.1.1)

Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata->ibm_watson_machine_learning) (3.10.0)

Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /usr/local/lib/python3.7/dist-packages (from packaging->ibm_watson_machine_learning) (3.0.9)

Building wheels for collected packages: ibm-cos-sdk, ibm-cos-sdk-core, ibm-cos-sdk-s3transfer

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=72564 sha256=56105e697a72d306509b002fc17ae8c34b1d4bd76fdf0964d4d3ed080c2df207

Stored in directory: /root/.cache/pip/wheels/47/22/bf/e1154ff0f5de93cc477acd0ca69abfbb8b799c5b28a66b44c2

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-any.whl size=501013 sha256=f4332bbb19a09538eebe223970e2a21b20ae427ee257a286cd257d7b0299276

Stored in directory: /root/.cache/pip/wheels/6c/a2/e4/c16d02f809a3ea998e17cfd02c13369281f3d232aaf5902c19

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.py3-none-any.whl size=88619 sha256=d7e2db8061a6f30837c277491664797080c80dd80aa354eed8d50a8eac8d482b

Stored in directory: /root/.cache/pip/wheels/5f/b7/14/fbe02bc1ef1af890650c7e51743d1c83890852e598d164b9da

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, ibm-cos-sdk, ibm-watson-machine-learning

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:

Successfully uninstalled ibm-cos-sdk-s3transfer-2.12.0

Attempting uninstall: ibm-cos-sdk

Found existing installation: ibm-cos-sdk 2.12.0

Uninstalling ibm-cos-sdk-2.12.0:

Successfully uninstalled ibm-cos-sdk-2.12.0

Successfully installed docutils-0.15.2 ibm-cos-sdk-2.7.0 ibm-cos-sdk-core-2.7.0 ibm-cos-sdk-s3transfer-2.7.0 ibm-watson-machine-learning-1.0.257

```
In [ ]: from ibm_watson_machine_learning import APIClient

wml_credentials = {
    "url": "https://us-south.ml.cloud.ibm.com",
    "apikey": "40Ps1m7hdEW6cH-Xm9Wpcw2Wju_D7hiLhUmPZxBdYpKc"
}

client = APIClient(wml_credentials)
client
```

Python 3.7 and 3.8 frameworks are deprecated and will be removed in a future release. Use Python 3.9 framework instead.

Out[]:

```
In [ ]: client.spaces.get_details()
```

```
{'resources': [{'entity': {'compute': [{'crn': 'crn:v1:bluemix:public:pm-20:us-south:a/62d30bff2fea47468ededaf8e1999732:f217ce19-96e7-4016-a71c-99665b52bb81::',
    'guid': 'f217ce19-96e7-4016-a71c-99665b52bb81',
    'name': 'Watson Machine Learning-3e',
    'type': 'machine_learning'}]},
    'description': '',
    'name': 'IT Innovators',
    'scope': {'bss_account_id': '62d30bff2fea47468ededaf8e1999732'},
    'stage': {'production': False},
    'status': {'state': 'active'},
    'storage': {'properties': {'bucket_name': '8c5de283-e321-4129-99fc-f4c6d940d806',
    'bucket_region': 'us-south',
    'credentials': {'admin': {'access_key_id': '017f832fe7f04cf7ad7efeef9b91cele',
    'api_key': 'YgpxcJBvPBELdu_QcfxVhPc6OnB4AWhTZEz9ROKPe2IJ',
    'secret_access_key': 'ecdc78aca723ca1a3e1d03b038985603b9d26d010dde2bla',
    'service_id': 'ServiceId-77115f0a-6ae3-44b3-8c87-281e78592737'},
    'editor': {'access_key_id': '343a648836a745e1b5dad12ec558bd6b',
    'api_key': '221KjnLfy0TaJrl4qm8gIAzPFmDpL6FVLJmdyaX0p_AS',
    'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-storage:global:a/62d30bff2fea47468ededaf8e1999732:ea280dc7-c8c6-4f92-8afe-e4c1060219d5::',
    'secret_access_key': 'd3a2fe4d67da7bc498b0017f675a34ef7d062758e4563e34',
    'service_id': 'ServiceId-ef9076dd-14b3-4e0e-83ab-88cdaf33b3f7'},
    'viewer': {'access_key_id': 'de737a6c00a746c380bce5cdf96654d9',
    'api_key': '08WdhGXpH0YxGijS6smbEHEwFIiHISMQ2coBH5wnwgfy',
```

```

        'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-storage:global:a/62d30bffa47468ededa8e1999732:ea280dc7-c8c6-4f92-8afe-e4c1060219d5::',
        'secret_access_key': '44980d485cd300dcda0ae1b238012a25a99a96e4fbca2a86',
        'service_id': 'ServiceId-27575730-22b7-4cfa-aba4-e7c7ad0fed26'}},
        'endpoint_url': 'https://s3.us-south.cloud-object-storage.appdomain.cloud',
        'guid': 'ea280dc7-c8c6-4f92-8afe-e4c1060219d5',
        'resource_crn': 'crn:v1:bluemix:public:cloud-object-storage:global:a/62d30bffa47468ededa8e1999732:ea280dc7-c8c6-4f92-8afe-e4c1060219d5::',
        'type': 'bmcos_object_storage'}},
        'metadata': {'created_at': '2022-11-04T04:34:14.219Z',
        'creator_id': 'IBMid-6610044IGT',
        'id': 'dffc5933-5201-43fa-948d-465e0b994546',
        'updated_at': '2022-11-04T04:34:45.889Z',
        'url': '/v2/spaces/dffc5933-5201-43fa-948d-465e0b994546'}}}]

```

```
In [ ]: client.spaces.list()
```

Note: 'limit' is not provided. Only first 50 records will be displayed if the number of records exceed 50

```

-----
--
ID                                NAME                CREATED
dffc5933-5201-43fa-948d-465e0b994546 IT Innovators    2022-11-04T04:34:14.219Z
-----
--

```

```
In [ ]: space_uid = "dffc5933-5201-43fa-948d-465e0b994546"
        space_uid
```

```
Out[ ]: 'dffc5933-5201-43fa-948d-465e0b994546'
```

```
In [ ]: client.set.default_space(space_uid)
```

```
Out[ ]: 'SUCCESS'
```

```
In [ ]: 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
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-b6a5-3fbdff1665666	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
xgboost_0.82-py3.6	39e31acd-5f30-41dc-ae44-60233c80306e	base
pytorch-onnx_1.2-py3.6-edt	40589d0e-7019-4e28-8daa-fb03b6f4fe12	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-4240baled5f7	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
spark-mllib_2.3-r_3.6	6586b9e3-ccd6-4f92-900f-0f8cb2bd6f0c	base
tensorflow_2.4-py3.7	65e171d7-72d1-55d9-8ebb-f813d620c9bb	base
spss-modeler_18.2	687eddc9-028a-4117-b9dd-e57b36f1efa5	base

Note: Only first 50 records were displayed. To display more use 'limit' parameter.

```
In [ ]: software_space_uid = client.software_specifications.get_uid_by_name('tensorflow_rt22.1-py3.9')
        software_space_uid
```

```
Out[ ]: 'acd9c798-6974-5d2f-a657-ce06e986df4d'
```

```
In [ ]: model_details = client.repository.store_model(model = 'nutrition-analysis.tgz', meta_props={
        client.repository.ModelMetaNames.NAME:"Nutritional Analyzer",
        client.repository.ModelMetaNames.TYPE:'tensorflow_2.7',
        client.repository.ModelMetaNames.SOFTWARE_SPEC_UID:software_space_uid
    })
```

```
In [ ]: 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': '2022-11-05T16:17:59.748Z',
  'id': '57592160-88cb-4b93-b607-92e7a988625f',
  'modified_at': '2022-11-05T16:18:03.936Z',
  'name': 'Nutritional Analyzer',
  'owner': 'IBMid-6610044IGT',
  'resource_key': '95b151b5-1488-49f6-ac66-f70e8748f5e6',
  'space_id': 'dffc5933-5201-43fa-948d-465e0b994546'},
 'system': {'warnings': []}}
```

```
In [ ]: model_id = client.repository.get_model_id(model_details)
        model_id
```

```
Out[ ]: '57592160-88cb-4b93-b607-92e7a988625f'
```

```
In [ ]: client.repository.download(model_id, 'Nutritional_Analyzer_IBM_model.tar.gb')
```

Successfully saved model content to file: 'Nutritional_Analyzer_IBM_model.tar.gb'

```
Out[ ]: '/content/Nutritional_Analyzer_IBM_model.tar.gb'
```