*TEAM ID -PNT2022TMID04308 * TEAM MEMBERS:- DHANA SREE R, HARISH K P, DHARANIDHARAN R, DHIVAKAR P

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

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("
```

```
!unzip "/content/drive/MyDrive/dhana1810 AI-Based-Natural-Disaster-Intensity-Analysis main datas
```

```
  extracting: dataset/train_set/Cyclone/129.jpg
  extracting: dataset/train_set/Cyclone/13.jpg
  extracting: dataset/train_set/Cyclone/130.jpg
  extracting: dataset/train_set/Cyclone/120.jpg
  extracting: dataset/train_set/Cyclone/131.jpg
  extracting: dataset/train_set/Cyclone/132.jpg
  extracting: dataset/train_set/Cyclone/133.jpg
  extracting: dataset/train_set/Cyclone/134.jpg
  extracting: dataset/train_set/Cyclone/135.jpg
  extracting: dataset/train_set/Cyclone/137.jpg
  extracting: dataset/train_set/Cyclone/128.jpg
  extracting: dataset/train_set/Cyclone/136.jpg
  extracting: dataset/train_set/Cyclone/138.jpg
  extracting: dataset/train_set/Cyclone/139.jpg
  extracting: dataset/train_set/Cyclone/14.jpg
  extracting: dataset/train_set/Cyclone/140.jpg
  extracting: dataset/train_set/Cyclone/142.jpg
  extracting: dataset/train_set/Cyclone/141.jpg
  extracting: dataset/train_set/Cyclone/143.jpg
  extracting: dataset/train_set/Cyclone/144.jpg
  extracting: dataset/train_set/Cyclone/145.jpg
  extracting: dataset/train_set/Cyclone/148.jpg
  extracting: dataset/train_set/Cyclone/147.jpg
  extracting: dataset/train_set/Cyclone/149.jpg
  extracting: dataset/train_set/Cyclone/15.jpg
  extracting: dataset/train_set/Cyclone/150.jpg
  extracting: dataset/train_set/Cyclone/146.jpg
  extracting: dataset/train_set/Cyclone/151.jpg
  extracting: dataset/train_set/Cyclone/125.jpg
  extracting: dataset/train_set/Cyclone/153.jpg
  extracting: dataset/train_set/Cyclone/155.jpg
  extracting: dataset/train_set/Cyclone/152.jpg
  extracting: dataset/train_set/Cyclone/154.jpg
  extracting: dataset/train_set/Cyclone/156.jpg
  extracting: dataset/train_set/Cyclone/16.jpg
  extracting: dataset/train_set/Cyclone/157.jpg
  extracting: dataset/train_set/Cyclone/158.jpg
  extracting: dataset/train_set/Cyclone/161.jpg
  extracting: dataset/train_set/Cyclone/162.jpg
  extracting: dataset/train_set/Cyclone/163.jpg
  extracting: dataset/train_set/Cyclone/160.jpg
  extracting: dataset/train_set/Cyclone/164.jpg
  extracting: dataset/train_set/Cyclone/166.jpg
  extracting: dataset/train_set/Cyclone/167.jpg
  extracting: dataset/train_set/Cyclone/159.jpg
  extracting: dataset/train_set/Cyclone/168.jpg
  extracting: dataset/train_set/Cyclone/169.jpg
  extracting: dataset/train_set/Cyclone/170.jpg
  extracting: dataset/train_set/Cyclone/18.jpg
```

```
 extracting: dataset/train_set/Cyclone/184.jpg
 extracting: dataset/train_set/Cyclone/17.jpg
 extracting: dataset/train_set/Cyclone/185.jpg
 extracting: dataset/train_set/Cyclone/186.jpg
 extracting: dataset/train_set/Cyclone/188.jpg
 extracting: dataset/train_set/Cyclone/165.jpg
 extracting: dataset/train_set/Cyclone/19.jpg
 extracting: dataset/train_set/Cyclone/187.jpg
```

```
#data agumentation
from tensorflow.keras.preprocessing.image import ImageDataGenerator
train_gen=ImageDataGenerator(rescale=1./255,zoom_range=0.2,horizontal_flip=True)
test_gen=ImageDataGenerator(rescale=1./255)
```

```
#passing the data
xtrain=train_gen.flow_from_directory("/content/drive/MyDrive/dataset/train_set",
                                     target_size=(64,64),
                                     class_mode="categorical",
                                     batch_size=50,)
```

```
Found 652 images belonging to 4 classes.
```

```
xtest=test_gen.flow_from_directory("/content/drive/MyDrive/dataset/test_set",
                                   target_size=(64,64),
                                   class_mode="categorical",
                                   batch_size=50)
```

```
Found 198 images belonging to 4 classes.
```

```
#creating cnn model
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Convolution2D,MaxPool2D,Flatten,Dense

CNN_model=Sequential()
CNN_model.add(Convolution2D(32,(3,3),activation="relu",input_shape=(64,64,3)))
CNN_model.add(MaxPool2D(pool_size=(2,2)))
CNN_model.add(Flatten())
#fully connected layers
CNN_model.add(Dense(300,activation="relu"))
CNN_model.add(Dense(200,activation="relu"))
CNN_model.add(Dense(150,activation="relu"))
CNN_model.add(Dense(120,activation="relu"))
CNN_model.add(Dense(950,activation="relu"))
CNN_model.add(Dense(100,activation="relu"))
CNN_model.add(Dense(105,activation="relu"))
CNN_model.add(Dense(190,activation="relu"))
CNN_model.add(Dense(130,activation="relu"))
CNN_model.add(Dense(4,activation="softmax"))
```

```
CNN_model.summary()
```

```
Model: "sequential_1"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
```

```
=================================================================
 conv2d_1 (Conv2D)           (None, 62, 62, 32)        896

 max_pooling2d_1 (MaxPooling  (None, 31, 31, 32)       0
 2D)

 flatten_1 (Flatten)         (None, 30752)             0

 dense_10 (Dense)            (None, 300)               9225900

 dense_11 (Dense)            (None, 200)               60200

 dense_12 (Dense)            (None, 150)               30150

 dense_13 (Dense)            (None, 120)               18120

 dense_14 (Dense)            (None, 950)               114950

 dense_15 (Dense)            (None, 100)               95100

 dense_16 (Dense)            (None, 105)               10605

 dense_17 (Dense)            (None, 190)               20140

 dense_18 (Dense)            (None, 130)               24830

 dense_19 (Dense)            (None, 4)                 524

=================================================================
Total params: 9,601,415
Trainable params: 9,601,415
Non-trainable params: 0
_________________________________________________________________
```

```
CNN_model.compile(optimizer="adam",loss="categorical_crossentropy",metrics=["accuracy"])
```

```
CNN_model.save("Disasters.h5")
```

Testing

```
#tuning
from keras.callbacks import EarlyStopping,ReduceLROnPlateau

earlystopping=EarlyStopping(monitor="val_accuracy",patience=5)
reduce_lr=ReduceLROnPlateau(monitor="val_accuracy",patience=5,factor=0.5,min_lr=0.00001)
callback=[reduce_lr,earlystopping]
```

```
CNN_model.fit_generator(xtrain,
                        steps_per_epoch=len(xtrain),
                        epochs=100,
                        callbacks=callback,
                        validation_data=xtest,
                        validation_steps=len(xtest))
```

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

Epoch 1/100
14/14 [==============================] - 350s 26s/step - loss: 1.3749 - accuracy: 0.2669

Epoch 2/100
```

```
Epoch 2/100
14/14 [==============================] - 28s 2s/step - loss: 1.3098 - accuracy: 0.3635 -
Epoch 3/100
14/14 [==============================] - 30s 2s/step - loss: 1.2024 - accuracy: 0.4387 -
Epoch 4/100
14/14 [==============================] - 28s 2s/step - loss: 1.0765 - accuracy: 0.5169 -
Epoch 5/100
14/14 [==============================] - 30s 2s/step - loss: 1.0698 - accuracy: 0.4847 -
Epoch 6/100
14/14 [==============================] - 28s 2s/step - loss: 0.9399 - accuracy: 0.6043 -
Epoch 7/100
14/14 [==============================] - 30s 2s/step - loss: 0.8290 - accuracy: 0.6564 -
Epoch 8/100
14/14 [==============================] - 28s 2s/step - loss: 0.7876 - accuracy: 0.6626 -
Epoch 9/100
14/14 [==============================] - 30s 2s/step - loss: 0.6706 - accuracy: 0.7239 -
Epoch 10/100
14/14 [==============================] - 28s 2s/step - loss: 0.6606 - accuracy: 0.7423 -
Epoch 11/100
14/14 [==============================] - 30s 2s/step - loss: 0.8115 - accuracy: 0.6610 -
Epoch 12/100
14/14 [==============================] - 28s 2s/step - loss: 0.9221 - accuracy: 0.6028 -
Epoch 13/100
14/14 [==============================] - 29s 2s/step - loss: 1.0430 - accuracy: 0.5092 -
Epoch 14/100
14/14 [==============================] - 28s 2s/step - loss: 0.9114 - accuracy: 0.6350 -
Epoch 15/100
14/14 [==============================] - 29s 2s/step - loss: 0.7440 - accuracy: 0.7040 -
Epoch 16/100
14/14 [==============================] - 28s 2s/step - loss: 0.6683 - accuracy: 0.7285 -
Epoch 17/100
14/14 [==============================] - 29s 2s/step - loss: 0.6357 - accuracy: 0.7393 -
Epoch 18/100
14/14 [==============================] - 28s 2s/step - loss: 0.6338 - accuracy: 0.7239 -
Epoch 19/100
14/14 [==============================] - 28s 2s/step - loss: 0.6185 - accuracy: 0.7423 -
Epoch 20/100
14/14 [==============================] - 28s 2s/step - loss: 0.5438 - accuracy: 0.7715 -
Epoch 21/100
14/14 [==============================] - 29s 2s/step - loss: 0.4980 - accuracy: 0.8113 -
Epoch 22/100
14/14 [==============================] - 28s 2s/step - loss: 0.4550 - accuracy: 0.8144 -
Epoch 23/100
14/14 [==============================] - 29s 2s/step - loss: 0.4878 - accuracy: 0.8037 -
Epoch 24/100
14/14 [==============================] - 28s 2s/step - loss: 0.4323 - accuracy: 0.8482 -
Epoch 25/100
14/14 [==============================] - 29s 2s/step - loss: 0.5288 - accuracy: 0.7991 -
Epoch 26/100
14/14 [==============================] - 28s 2s/step - loss: 0.4726 - accuracy: 0.8160 -
Epoch 27/100
14/14 [==============================] - 29s 2s/step - loss: 0.4945 - accuracy: 0.7883 -
<keras.callbacks.History at 0x7fc6000fa810>
```

```
import numpy as np
from tensorflow.keras.preprocessing import image
img=image.load_img("/content/drive/MyDrive/dataset/train_set/Flood/229.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
op=['Cyclone', 'Earthquake', 'Flood', 'Wildfire']
pred=np.argmax(CNN_model.predict(x))
op[pred]
```

```
1/1 [==============================] - 0s 16ms/step
'Flood'
```

```
#saving in tar
!tar -zvcf natural-disaster.tgz Disasters.h5
```

```
Disasters.h5
```

IBM DEPLOYMENT

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

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/
Collecting watson-machine-learning-client
  Downloading watson_machine_learning_client-1.0.391-py3-none-any.whl (538 kB)
     |████████████████████████████████| 538 kB 32.2 MB/s
Requirement already satisfied: pandas in /usr/local/lib/python3.7/dist-packages (from watsc
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (from wats
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (from wats
Collecting lomond
  Downloading lomond-0.3.3-py2.py3-none-any.whl (35 kB)
Collecting ibm-cos-sdk
  Downloading ibm-cos-sdk-2.12.0.tar.gz (55 kB)
     |████████████████████████████████| 55 kB 3.8 MB/s
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (from wat
Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages (from watson-
Collecting boto3
  Downloading boto3-1.26.12-py3-none-any.whl (132 kB)
     |████████████████████████████████| 132 kB 70.0 MB/s
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (from wat
Collecting s3transfer<0.7.0,>=0.6.0
  Downloading s3transfer-0.6.0-py3-none-any.whl (79 kB)
     |████████████████████████████████| 79 kB 8.0 MB/s
Collecting botocore<1.30.0,>=1.29.12
  Downloading botocore-1.29.12-py3-none-any.whl (9.9 MB)
```

```
!pip install ibm_watson_machine_learning
```

```
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (from i
Requirement already satisfied: pandas<1.5.0,>=0.24.2 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 834 kB/s
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (from i
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: requests 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 63.9 MB/s
Collecting ibm-cos-sdk-s3transfer==2.7.0
  Downloading ibm-cos-sdk-s3transfer-2.7.0.tar.gz (133 kB)
     |████████████████████████████████| 133 kB 67.5 MB/s
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /usr/local/lib/python3.7/dist-p
Collecting docutils<0.16,>=0.10
  Downloading docutils-0.15.2-py3-none-any.whl (547 kB)
     |████████████████████████████████| 547 kB 69.7 MB/s
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.7/d
Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-packages (
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages (f
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: charset-normalizer<3,>=2 in /usr/local/lib/python3.7/dist
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.7/dist-packages (f
Requirement already satisfied: typing-extensions>=3.6.4 in /usr/local/lib/python3.7/dist
Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /usr/local/lib/python3.7/dist
Building wheels for collected packages: ibm-cos-sdk, ibm-cos-sdk-core, ibm-cos-sdk-s3tra
  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=72
  Stored in directory: /root/.cache/pip/wheels/47/22/bf/e1154ff0f5de93cc477acd0ca69abfbb

  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.w
  Stored in directory: /root/.cache/pip/wheels/6c/a2/e4/c16d02f809a3ea998e17cfd02c133692
  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.py
  Stored in directory: /root/.cache/pip/wheels/5f/b7/14/fbe02bc1ef1af890650c7e51743d1c83
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-c
  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-
```

```
from ibm_watson_machine_learning import APIClient

wml_credentials={
    "url":"https://eu-gb.ml.cloud.ibm.com",
    "apikey":"HB46tjrB8ofPHr3t99kpPqBJTHgi1VTH0R_MqCJ82Iu7"
}
client=APIClient(wml_credentials)
client
```

```
Python 3.7 and 3.8 frameworks are deprecated and will be removed in a future release. Use P
<ibm_watson_machine_learning.client.APIClient at 0x7f59da5f4a50>
```

Double-click (or enter) to edit

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


```
{'resources': [{'entity': {'compute': [{'crn': 'crn:v1:bluemix:public:pm-20:eu-
gb:a/3d279877e7b24df8a13f08375b4442df:ec6d8a8b-9450-4fbb-8a25-a6c8862a814c::',
      'guid': 'ec6d8a8b-9450-4fbb-8a25-a6c8862a814c',
      'name': 'Watson Machine Learning-4e',
      'type': 'machine_learning'}],
    'description': '',
    'name': 'natural_disaster',
    'scope': {'bss_account_id': '3d279877e7b24df8a13f08375b4442df'},
    'stage': {'production': False},
    'status': {'state': 'active'},
    'storage': {'properties': {'bucket_name': '2da63678-8c84-4e4c-81bc-b94a274da897',
      'bucket_region': 'eu-gb-standard',
      'credentials': {'admin': {'access_key_id': 'ebe3b2e566d34c92a80be05c7c82299d',
        'api_key': '_OZ7LYZZ80xpILxTSLJSdczrm5MN-__QG7lb1XSxU0Gj',
        'secret_access_key': '0bf974da1f493d84bdd98c61074456d38b63b69194ac302b',
        'service_id': 'ServiceId-45043394-7c4a-4d8d-a79e-305ca38c3b47'},
       'editor': {'access_key_id': '64140fb9d9674d1cbf374e8e534e425a',
        'api_key': '5qyVTVmU5_rbk8NKADdE61N-t1ETJfzhMLU5Bd0X1w9W',
        'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/3d279877e7b24df8a13f08375b4442df:9ff94fea-d7fa-4a71-a183-efba21b39ae0::',
        'secret_access_key': '74f8075ee0833d60a28175356ed1d443cd5d7396f5ef4903',
        'service_id': 'ServiceId-16512034-4f34-45c3-af2e-5a5b347c3e3a'},
       'viewer': {'access_key_id': 'dd1ee9e59bdf467ab0cc2ccb1aba477f',
```

```
          'api_key': 'OgZlMpzuRynS-vPa_KqnOc94fg4QUMxE2MZZju5ExcPC',
          'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-
    storage:global:a/3d279877e7b24df8a13f08375b4442df:9ff94fea-d7fa-4a71-a183-efba21b39ae0::',
          'secret_access_key': '760119b4e9f48ee4cc4e0ee02d86b823d347db5b000a971b',
          'service_id': 'ServiceId-37dccf9a-473b-4eec-83a7-ed0c018e20f0'}},
        'endpoint_url': 'https://s3.eu-gb.cloud-object-storage.appdomain.cloud',
        'guid': '9ff94fea-d7fa-4a71-a183-efba21b39ae0',
        'resource_crn': 'crn:v1:bluemix:public:cloud-object-
    storage:global:a/3d279877e7b24df8a13f08375b4442df:9ff94fea-d7fa-4a71-a183-
    efba21b39ae0::'},
       'type': 'bmcos_object_storage'}},
     'metadata': {'created_at': '2022-11-14T11:25:01.964Z',
      'creator_id': 'IBMid-6620043LBW',
      'id': '48209198-588a-4f20-b4a5-c8222d4c2e33',
      'updated_at': '2022-11-14T11:25:20.958Z',
      'url': '/v2/spaces/48209198-588a-4f20-b4a5-c8222d4c2e33'}}]}
```


```
def guid_id(client,natural_disaster):
  space=client.spaces.get_details()
  return (next(item for item in space["resources"] if item['entity']['name']==natural_disaster)[
```

```
space_uid=guid_id(client,"natural_disaster")
space_uid
```

```
'48209198-588a-4f20-b4a5-c8222d4c2e33'
```

```
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='natural-disaster.tgz',meta_props={
    client.repository.ModelMetaNames.NAME:"CNN Natural Disaster",
    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': '2022-11-17T11:55:34.446Z',
  'id': 'b9d4cfd3-1b9b-416f-aa93-9eb9adc7274d',
  'modified_at': '2022-11-17T11:55:40.955Z',
  'name': 'CNN Natural Disaster',
  'owner': 'IBMid-6620043LBW',
  'resource_key': 'f112c306-8a85-425a-ab63-5826b45c9480',
  'space_id': '48209198-588a-4f20-b4a5-c8222d4c2e33'},
 'system': {'warnings': []}}
```


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

```
'b9d4cfd3-1b9b-416f-aa93-9eb9adc7274d'
```

```
client.repository.download(model_id,"IDM_cloud_model.tar.gb")
```

```
Successfully saved model content to file: 'IDM_cloud_model.tar.gb'
'/content/IDM_cloud_model.tar.gb'
```