*TEAM ID -PNT2022TMID27338 * TEAM MEMBERS:- DHARUN RAJ.K, PRANESH.T, SURYA.J, PURUSHOTHAMAN.A

```
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 datase
```

```
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:
```

```
 extracting: dataset/train_set/Cyclone/18.jpg
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

```
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 -
```

```
#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 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 watso
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
watsonCollecting 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      |████████████████████████████████| 9.9 MB 50.7 MB/s install ibm_watson_machine_learning
Collecting jmespath<2.0.0,>=0.7.1
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (from i
Downloading jmespath-1.0.1-py3-none-any.whl (20 kB)
Requirement already satisfied: pandas<1.5.0,>=0.24.2 in /usr/local/lib/python3.7/dist-
paCollecting ur lib3
Collecting ibm-cos-sdk==2.7.*  Downloading urllib3-1. 6.12-py2.py3-none-any.whl (140 kB)
  Downloading ibm-cos-sdk-2.7.0.tar.gz (51 kB)   |████████████████████████████████| 140 kB 68.8
MB/s
     |████████████████████████████████| 51 kB 834 kB/s Requirement already satisfied: python-
dateutil< .0.0,>=2.1 in /usr/local/lib/python3.7/dist
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (from
isix>=1.5 in /usr/local/lib/python3.7/dist-packages (from pyt
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (from
Collecting ibm-cos-sdk-core==2.12.0
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (from
Downloading ibm-co -sdk-core-2.12.0.tar.gz (956 kB) Collecting ibm-cos-sdk-core==2.7.0
|████████████████████████████████| 956 kB 48.6 MB/s
  Downloading ibm-cos-sdk-core-2.7.0.tar.gz (824 kB)Collecting ibm-cos-sdk-s3transfer==2 12.0
     |████████████████████████████████| 824 kB 63.9 MB/s Downloading ibm-cos-sdk-s3transfer-
2.12.0.tar.gz (135 kB)
Collecting ibm-cos-sdk-s3transfer==2.7.0     |████████████████████████████████| 135 kB 57.3
MB/s
  Downloading ibm-cos-sdk-s3transfer-2.7.0.tar.gz (133 kB)Collecting jmespath<2.0.0,>=0.7.1
     |████████████████████████████████| 133 kB 67.5 MB/s Downloading jmespath-0.10.0-py2.py3-
none-any.whl (24 kB)
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /usr/local/lib/python3.7/dist-
pCollecting requ sts
Collecting docutils<0.16,>=0.10  Downloading requests-2.28.1-py3-none-any.whl (62 kB)
  Downloading docutils-0.15.2-py3-none-any.whl (547 kB)   |████████████████████████████████| 62
kB 1.3 MB/s
     |████████████████████████████████| 547 kB 69.7 MB/s Requirement already satisfied:
idna<4,>=2.5 in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in
/usr/local/lib/python3.7/dcharset-normalizer<3,>=2 in /usr/local/lib/python3.7/dist-pa
Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-packages (fro
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from
Building whee s for collect packages: bm-cos-sdk, ibm-cos-sdk-core, ibm- os-sdk-s3transf
```

```
  Requirement already satisfied: charset-normalizer<3,>=2 in /usr/local/lib/python3.7/dist  B
  lding wheel for ibm-cos-sdk (setup.py) ... done
  Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.7/dist-packages (f
  Created wheel for ibm-cos-sdk: filename=ibm_cos_sdk-2.12.0-py3-n e-any.whl size=73931 sh
  Requirement already satisfied: typing-extensions>=3.6.4 in /usr/local/lib/python3.7/dist  Sto d
  in di ctory: /root/.cache/pip/wheels/ec/94/29/2b57327cf00664b6614304f7958abd29d77
  Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (from   B
  lding wheel for ibm-cos-sdk-core (setup.py) ... done
  Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /usr/local/lib/python3.7/dist
  Created wheel for ibm-cos-sdk-core: filename=ibm_cos_sdk_core-2.12.0-py3-none-any.whl siz
  Building wheels for collected packages: ibm-cos-sdk, ibm-cos-sdk-core, ibm-cos-sdk-s3tra
  Stored in directory: /root/.c he/pip/wheels/64/56/f /5 d6f4f40406c828a5289b95b2752a4d142
Building wheel for ibm-cos-sdk (setup.py) ... -s3transfer (setup.py) ... done  done
    Created wheel for ibm-cos-sdk: filename=ibm_cos_sdk-2.7.0-py2.py3-none-any.whl size=72-s3tra
  sf r: filename=ibm_cos_sdk_s tra sfer-2.12.0-py3-none
    Stored in directory: /root/.cache/pip/wheels/47/22/bf/e1154ff0f5de93cc477acd0ca69abfbb5 79 6a
  ffe3370ed7ebc00604f9f7676 e1e0348dc
  Successfully built ibm-cos-sdk ibm-cos-sdk-core ibm-cos-sdk-s3transfer
    Building wheel for ibm-cos-sdk-core (setup.py) ... Installing collected packages: urllib3,
  requests, jmespath, ibm-cos-sdk-core, botocore, s3tdone
    Created wheel for ibm-cos-sdk-core: filename=ibm_cos_sdk_core-2.7.0-py2.py3-none-any.w
  Attempting uninstall: urllib3
    Stored in directory: /root/.cache/pip/wheels/6c/a2/e4/c16d02f809a3ea998e17cfd02c133692
  Found existing installation: urllib3 1.24.3
Building wheel for ibm-cos-sdk-s3transfer (setup.py) ...     Uninstalling urllib3-1.24.3:   done
    Created wheel for ibm-cos-sdk-s3transfer: filename=ibm_cos_sdk_s3transfer-2.7.0-py2.py
  Successfully uninstalled urllib3-1.24.3
    Stored in directory: /root/.cache/pip/wheels/5f/b7/14/fbe02bc1ef1af890650c7e51743d1c83
  Attempting uninstall: requests
  Successfully built ibm-cos-sdk ibm-cos-sdk-core ibm-cos-sdk-s3transfer    Found existing
  installation: requests 2.23.0
  Installing collected packages: docutils, ibm-cos-sdk-core, ibm-cos-sdk-s3transfer, ibm-c
  Uninstalling requests-2.23.0:
    Attempting uninstall: docutils      Successfully uninstalled requests-2.23.0
      Found existing installation: docutils 0.17.1Successfully installed boto3-1.26.12 botocore-
  1.29.12 ibm-cos-sdk-2.12.0 ibm-cos-sdk-core-2
      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-


  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:eugb: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'},
```

```
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
```

```
      '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-a183efba21b39ae0::'},
      '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'
```

```
{'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")
```

```
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
```

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