# EMERGING METHODS FOR EARLY DETECTION OF FOREST FIRE

## <u>TRAIN IMAGE CLASSIFICATION MODEL</u>

| Date | 10 November 2022 |
|---|---|
| Team ID | PNT2022TMID26744 |
| Project Name | Emerging Methods for Early Detection of Forest Fires |

pwd

Out[1]:

'/home/wsuser/work'

In [46]:

```
!pip install keras
!pip install tensorflow
!pip install opencv-python
```

Requirement already satisfied: keras in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (2.10.0)

Requirement already satisfied: tensorflow in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (2.10.0)

Requirement already satisfied: wrapt>=1.11.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (1.12.1)

Requirement already satisfied: typing-extensions>=3.6.6 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (4.1.1)

Requirement already satisfied: grpcio<2.0,>=1.24.3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (1.42.0)

Requirement already satisfied: h5py>=2.9.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (3.2.1)

Requirement already satisfied: absl-py>=1.0.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (1.3.0)

Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (0.23.1)

Requirement already satisfied: tensorflow-estimator<2.11,>=2.10.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (2.10.0)

Requirement already satisfied: google-pasta>=0.1.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (0.2.0)

Requirement already satisfied: gast<=0.4.0,>=0.2.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (0.4.0)
Requirement already satisfied: flatbuffers>=2.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (2.0)
Requirement already satisfied: astunparse>=1.6.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (1.6.3)
Requirement already satisfied: six>=1.12.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (1.15.0)
Requirement already satisfied: libclang>=13.0.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (14.0.6)
Requirement already satisfied: keras-preprocessing>=1.1.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (1.1.2)
Requirement already satisfied: setuptools in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (58.0.4)
Requirement already satisfied: numpy>=1.20 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (1.20.3)
Requirement already satisfied: tensorboard<2.11,>=2.10 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (2.10.1)
Requirement already satisfied: protobuf<3.20,>=3.9.2 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (3.19.1)
Requirement already satisfied: packaging in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (21.3)
Requirement already satisfied: opt-einsum>=2.3.2 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (3.3.0)
Requirement already satisfied: termcolor>=1.1.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (1.1.0)
Requirement already satisfied: keras<2.11,>=2.10.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow) (2.10.0)
Requirement already satisfied: wheel<1.0,>=0.23.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from astunparse>=1.6.0->tensorflow) (0.37.0)
Requirement already satisfied: google-auth<3,>=1.6.3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorboard<2.11,>=2.10->tensorflow) (1.23.0)
Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorboard<2.11,>=2.10->tensorflow) (1.6.0)
Requirement already satisfied: werkzeug>=1.0.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorboard<2.11,>=2.10->tensorflow) (2.0.2)
Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorboard<2.11,>=2.10->tensorflow) (0.4.4)

Requirement already satisfied: requests<3,>=2.21.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorboard<2.11,>=2.10->tensorflow) (2.26.0)
Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorboard<2.11,>=2.10->tensorflow) (0.6.1)
Requirement already satisfied: markdown>=2.6.8 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorboard<2.11,>=2.10->tensorflow) (3.3.3)
Requirement already satisfied: rsa<5,>=3.1.4 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from google-auth<3,>=1.6.3->tensorboard<2.11,>=2.10->tensorflow) (4.7.2)
Requirement already satisfied: pyasn1-modules>=0.2.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from google-auth<3,>=1.6.3->tensorboard<2.11,>=2.10->tensorflow) (0.2.8)
Requirement already satisfied: cachetools<5.0,>=2.0.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from google-auth<3,>=1.6.3->tensorboard<2.11,>=2.10->tensorflow) (4.2.2)
Requirement already satisfied: requests-oauthlib>=0.7.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from google-auth-oauthlib<0.5,>=0.4.1->tensorboard<2.11,>=2.10->tensorflow) (1.3.0)
Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from pyasn1-modules>=0.2.1->google-auth<3,>=1.6.3->tensorboard<2.11,>=2.10->tensorflow) (0.4.8)
Requirement already satisfied: certifi>=2017.4.17 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests<3,>=2.21.0->tensorboard<2.11,>=2.10->tensorflow) (2022.9.24)
Requirement already satisfied: charset-normalizer~=2.0.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests<3,>=2.21.0->tensorboard<2.11,>=2.10->tensorflow) (2.0.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests<3,>=2.21.0->tensorboard<2.11,>=2.10->tensorflow) (1.26.7)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests<3,>=2.21.0->tensorboard<2.11,>=2.10->tensorflow) (3.3)
Requirement already satisfied: oauthlib>=3.0.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests-oauthlib>=0.7.0->google-auth-oauthlib<0.5,>=0.4.1->tensorboard<2.11,>=2.10->tensorflow) (3.2.1)
Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from packaging->tensorflow) (3.0.4)
Requirement already satisfied: opencv-python in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (4.6.0.66)

Requirement already satisfied: numpy>=1.17.3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from opencv-python) (1.20.3)

In [3]:

```python
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Flatten
```

In [10]:

```python
from tensorflow.keras.preprocessing.image import ImageDataGenerator
train = ImageDataGenerator(rescale=1/255)
test = ImageDataGenerator(rescale=1/255)
```

In [5]:

```python
import os, types
import pandas as pd
from botocore.client import Config
import ibm_boto3

def __iter__(self): return 0

# @hidden_cell
# The following code accesses a file in your IBM Cloud Object Storage. It
includes your credentials.
# You might want to remove those credentials before you share the notebook.
cos_client = ibm_boto3.client(service_name='s3',

ibm_api_key_id='3BMAZS_5xP1HSVGnT8KJD21UbTaJ0ulrXwY46T17Z_GT',
    ibm_auth_endpoint="https://iam.cloud.ibm.com/oidc/token",
    config=Config(signature_version='oauth'),
    endpoint_url='https://s3.private.us.cloud-object-storage.appdomain.cloud')

bucket = 'imageclassification-donotdelete-pr-xjpygf3pbzklzm'
object_key = 'archive.zip'

streaming_body_2 = cos_client.get_object(Bucket=bucket,
Key=object_key)['Body']

# Your data file was loaded into a botocore.response.StreamingBody object.
# Please read the documentation of ibm_boto3 and pandas to learn more about
the possibilities to load the data.
# ibm_boto3 documentation: https://ibm.github.io/ibm-cos-sdk-python/
```

*# pandas documentation: http://pandas.pydata.org/*

```python
from io import BytesIO
import zipfile
unzip = zipfile.ZipFile(BytesIO(streaming_body_2.read()),'r')
file_paths = unzip.namelist()
for path in file_paths:
    unzip.extract(path)
```

```python
pwd
```

```
'/home/wsuser/work'
```

```python
import os
filenames = os.listdir('/home/wsuser/work/Dataset/Dataset/train_set')
```

```python
x_train = train_dataset =
train.flow_from_directory("/home/wsuser/work/Dataset/Dataset/train_set",
                          target_size= (64,64),
                          batch_size = 32,
                          class_mode = 'binary')
x_test = test_dataset =
test.flow_from_directory("/home/wsuser/work/Dataset/Dataset/test_set",
                         target_size= (64,64),
                         batch_size = 32,
                         class_mode = 'binary')
```

```
Found 436 images belonging to 2 classes.
Found 121 images belonging to 2 classes.
```

```python
x_test.class_indices
```

```
{'forest': 0, 'with fire': 1}
```

```python
model = Sequential()
```

```python
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(64,64,3)))
```

```python
model.add(MaxPooling2D(2,2))
```

```python
model.add(Flatten())
```

```
model.add(Dense(512,activation='relu'))
model.add(Dense(1,activation='sigmoid'))
```

```
model.compile(optimizer="adam",loss="binary_crossentropy",metrics=["accura
cy"])
```

```
model.fit(x_train,steps_per_epoch=14
,epochs=10,validation_data=x_test,validation_steps=4)
```

Epoch 1/10
14/14 [==============================] - 18s 1s/step - loss: 2.4843 - accuracy: 0.6101 - val_loss: 0.2740 - val_accuracy: 0.8843
Epoch 2/10
14/14 [==============================] - 17s 1s/step - loss: 0.6150 - accuracy: 0.8142 - val_loss: 0.3429 - val_accuracy: 0.9008
Epoch 3/10
14/14 [==============================] - 17s 1s/step - loss: 0.2586 - accuracy: 0.8807 - val_loss: 0.0783 - val_accuracy: 0.9752
Epoch 4/10
14/14 [==============================] - 16s 1s/step - loss: 0.1704 - accuracy: 0.9358 - val_loss: 0.0559 - val_accuracy: 0.9835
Epoch 5/10
14/14 [==============================] - 17s 1s/step - loss: 0.1200 - accuracy: 0.9564 - val_loss: 0.0447 - val_accuracy: 0.9917
Epoch 6/10
14/14 [==============================] - 17s 1s/step - loss: 0.1003 - accuracy: 0.9656 - val_loss: 0.0306 - val_accuracy: 1.0000
Epoch 7/10
14/14 [==============================] - 17s 1s/step - loss: 0.0620 - accuracy: 0.9839 - val_loss: 0.0183 - val_accuracy: 1.0000
Epoch 8/10
14/14 [==============================] - 17s 1s/step - loss: 0.0478 - accuracy: 0.9862 - val_loss: 0.0122 - val_accuracy: 1.0000
Epoch 9/10
14/14 [==============================] - 17s 1s/step - loss: 0.0380 - accuracy: 0.9908 - val_loss: 0.0120 - val_accuracy: 1.0000
Epoch 10/10
14/14 [==============================] - 16s 1s/step - loss: 0.0286 - accuracy: 0.9954 - val_loss: 0.0094 - val_accuracy: 1.0000
```

```
model.save("forest1.h5")
```

```
!tar -zcvf image-classification-model_new.tgz forest1.h5
```

forest1.h5

```
ls -1
```

**Dataset**/
forest1.h5
image-classification-model_new.tgz

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

Collecting watson-machine-learning-client
  Downloading watson_machine_learning_client-1.0.391-py3-none-any.whl (538 kB)
|████████████████████████████████| 538 kB 15.2 MB/s eta 0:00:01
Requirement already satisfied: requests in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (2.26.0)
Requirement already satisfied: tabulate in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (0.8.9)
Requirement already satisfied: tqdm in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (4.62.3)
Requirement already satisfied: boto3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (1.18.21)
Requirement already satisfied: certifi in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (2022.9.24)
Requirement already satisfied: ibm-cos-sdk in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (2.11.0)
Requirement already satisfied: urllib3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (1.26.7)
Requirement already satisfied: pandas in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (1.3.4)
Requirement already satisfied: lomond in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (0.3.3)
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from boto3->watson-machine-learning-client) (0.10.0)
Requirement already satisfied: botocore<1.22.0,>=1.21.21 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from boto3->watson-machine-learning-client) (1.21.41)
Requirement already satisfied: s3transfer<0.6.0,>=0.5.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from boto3->watson-machine-learning-client) (0.5.0)

Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from botocore<1.22.0,>=1.21.21->boto3->watson-machine-learning-client) (2.8.2)
Requirement already satisfied: six>=1.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from python-dateutil<3.0.0,>=2.1->botocore<1.22.0,>=1.21.21->boto3->watson-machine-learning-client) (1.15.0)
Requirement already satisfied: ibm-cos-sdk-s3transfer==2.11.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk->watson-machine-learning-client) (2.11.0)
Requirement already satisfied: ibm-cos-sdk-core==2.11.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk->watson-machine-learning-client) (2.11.0)
Requirement already satisfied: charset-normalizer~=2.0.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests->watson-machine-learning-client) (2.0.4)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests->watson-machine-learning-client) (3.3)
Requirement already satisfied: pytz>=2017.3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from pandas->watson-machine-learning-client) (2021.3)
Requirement already satisfied: numpy>=1.17.3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from pandas->watson-machine-learning-client) (1.20.3)
Installing collected packages: watson-machine-learning-client
Successfully installed watson-machine-learning-client-1.0.391

In [24]:

```python
#replace the credentials that you got from Watson Machine Learning service
from ibm_watson_machine_learning import APIClient
wml_credentials = {
            "url": "https://us-south.ml.cloud.ibm.com",
            "apikey": "3ls6KARqw4K7Icbfhp-X36q5Q5UtIjkPBVHg67294jVf"
            }
client = APIClient(wml_credentials)
```

In [25]:

```python
client = APIClient(wml_credentials)
```

In [26]:

```python
def guid_from_space_name(client, space_name):
    space = client.spaces.get_details()
    #print(space)
    return(next(item for item in space['resources']if item['entity']["name"] ==
space_name)['metadata']['id'])
```

```
space_uid = guid_from_space_name(client, 'imageclassification')
print("Space UID = " + space_uid)
```

Space UID = 34eea79c-4e6f-446b-8079-3cbc5fe1e0fb

```
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' paramete
r.

In [55]:

```
software_spec_uid =
client.software_specifications.get_uid_by_name("tensorflow_rt22.1-py3.9")
software_spec_uid
```

Out[55]:

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

In [57]:

```
model_details = client.repository.store_model(model= "image-classification-
model_new.tgz",meta_props={
client.repository.ModelMetaNames.NAME:"CNN",
client.repository.ModelMetaNames.TYPE:"tensorflow_2.7",

client.repository.ModelMetaNames.SOFTWARE_SPEC_UID:software_spec_u
id}
                            )
model_id = client.repository.get_model_id(model_details)
```

In [58]:

```
model_id
```

'177ade4a-b648-4ced-9c7c-0e962b9cee9b'

```
client.repository.download(model_id, 'my_model.tar.gz')
```
Successfully saved model content to file: 'my_model.tar.gz'

'/home/wsuser/work/my_model.tar.gz'