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!unzip '/content/Data Set.zip'
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Archive: /content/Data Set.zip
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inflating: Data Set/train/5/10.jpg
inflating: Data Set/train/5/11.jpg
inflating: Data Set/train/5/12.jpg
inflating: Data Set/train/5/13.jpg
inflating: Data Set/train/5/14.jpg
inflating: Data Set/train/5/15.jpg
inflating: Data Set/train/5/16.jpg

inflating: Data Set/train/5/17.jpg
inflating: Data Set/train/5/18.jpg
inflating: Data Set/train/5/19.jpg
inflating: Data Set/train/5/2.jpg
inflating: Data Set/train/5/20.jpg
inflating: Data Set/train/5/21.jpg
inflating: Data Set/train/5/22.jpg
inflating: Data Set/train/5/23.jpg
inflating: Data Set/train/5/24.jpg
inflating: Data Set/train/5/25.jpg
inflating: Data Set/train/5/26.jpg
inflating: Data Set/train/5/27.jpg
inflating: Data Set/train/5/28.jpg
inflating: Data Set/train/5/29.jpg
inflating: Data Set/train/5/3.jpg
inflating: Data Set/train/5/30.jpg
inflating: Data Set/train/5/31.jpg
inflating: Data Set/train/5/32.jpg
inflating: Data Set/train/5/33.jpg
inflating: Data Set/train/5/34.jpg
inflating: Data Set/train/5/35.jpg
inflating: Data Set/train/5/36.jpg
inflating: Data Set/train/5/37.jpg
inflating: Data Set/train/5/38.jpg
inflating: Data Set/train/5/39.jpg
inflating: Data Set/train/5/4.jpg
inflating: Data Set/train/5/40.jpg
inflating: Data Set/train/5/41.jpg
inflating: Data Set/train/5/42.jpg
inflating: Data Set/train/5/43.jpg
inflating: Data Set/train/5/44.jpg
inflating: Data Set/train/5/45.jpg
extracting: Data Set/train/5/46.jpg
inflating: Data Set/train/5/47.jpg
inflating: Data Set/train/5/48.jpg
inflating: Data Set/train/5/49.jpg
inflating: Data Set/train/5/5.jpg
inflating: Data Set/train/5/50.jpg
inflating: Data Set/train/5/51.jpg
inflating: Data Set/train/5/52.jpg
extracting: Data Set/train/5/53.jpg
inflating: Data Set/train/5/54.jpg
inflating: Data Set/train/5/55.jpg
inflating: Data Set/train/5/56.jpg
inflating: Data Set/train/5/57.jpg
inflating: Data Set/train/5/58.jpg
inflating: Data Set/train/5/59.jpg
inflating: Data Set/train/5/6.jpg
extracting: Data Set/train/5/60.jpg
inflating: Data Set/train/5/61.jpg

inflating: Data Set/train/5/62.jpg
inflating: Data Set/train/5/63.jpg
extracting: Data Set/train/5/64.jpg
extracting: Data Set/train/5/65.jpg
inflating: Data Set/train/5/66.jpg
inflating: Data Set/train/5/67.jpg
inflating: Data Set/train/5/68.jpg
inflating: Data Set/train/5/69.jpg
inflating: Data Set/train/5/7.jpg
inflating: Data Set/train/5/70.jpg
inflating: Data Set/train/5/71.jpg
inflating: Data Set/train/5/72.jpg
inflating: Data Set/train/5/73.jpg
extracting: Data Set/train/5/74.jpg
inflating: Data Set/train/5/75.jpg
inflating: Data Set/train/5/76.jpg
inflating: Data Set/train/5/77.jpg
inflating: Data Set/train/5/78.jpg
inflating: Data Set/train/5/79.jpg
inflating: Data Set/train/5/8.jpg
inflating: Data Set/train/5/80.jpg
inflating: Data Set/train/5/81.jpg
inflating: Data Set/train/5/82.jpg
extracting: Data Set/train/5/83.jpg
inflating: Data Set/train/5/84.jpg
inflating: Data Set/train/5/85.jpg
inflating: Data Set/train/5/86.jpg
inflating: Data Set/train/5/87.jpg
inflating: Data Set/train/5/88.jpg
inflating: Data Set/train/5/89.jpg
inflating: Data Set/train/5/9.jpg
inflating: Data Set/train/5/90.jpg
extracting: Data Set/train/5/91.jpg
inflating: Data Set/train/5/92.jpg
inflating: Data Set/train/5/93.jpg
inflating: Data Set/train/5/94.jpg
inflating: Data Set/train/5/95.jpg
inflating: Data Set/train/5/96.jpg
inflating: Data Set/train/5/97.jpg
extracting: Data Set/train/5/98.jpg
inflating: Data Set/train/5/99.jpg

```
import numpy as np
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Flatten, Dropout
from tensorflow.keras.layers import Convolution2D, MaxPooling2D
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from tensorflow.keras.models import Model
```

```

traindata =
ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
testdata = ImageDataGenerator(rescale=1./255)

train = traindata.flow_from_directory(r"/content/Data
Set/train",target_size=(64,
64),batch_size=3,color_mode='grayscale',class_mode='categorical')
test = testdata.flow_from_directory(r"/content/Data
Set/test",target_size=(64,
64),batch_size=3,color_mode='grayscale',class_mode='categorical')

Found 594 images belonging to 6 classes.
Found 30 images belonging to 6 classes.

print(train.class_indices)

{'0': 0, '1': 1, '2': 2, '3': 3, '4': 4, '5': 5}

model = Sequential()

model.add(Convolution2D(32, (3, 3), input_shape=(64, 64, 1),
activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))

model.add(Convolution2D(32, (3, 3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2,2)))

model.add(Flatten())

model.add(Dense(units=512 , activation='relu'))

model.add(Dense(units=6, activation='softmax'))

model.summary()

Model: "sequential"

```

| Layer (type) | Output Shape | Param # |
|--------------------------------|--------------------|---------|
| conv2d (Conv2D) | (None, 62, 62, 32) | 320 |
| 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, 512) | 3211776 |

dense_1 (Dense) (None, 6) 3078

```
=====
Total params: 3,224,422
Trainable params: 3,224,422
Non-trainable params: 0
```

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

```
model.fit(train, steps_per_epoch = 594/3 , epochs = 25, validation_data
= test, validation_steps = 30/3 )
```

Epoch 1/25

```
198/198 [=====] - 7s 34ms/step - loss: 1.3182
- accuracy: 0.4731 - val_loss: 0.7131 - val_accuracy: 0.6667
```

Epoch 2/25

```
198/198 [=====] - 7s 33ms/step - loss: 0.6174
- accuracy: 0.7576 - val_loss: 0.5878 - val_accuracy: 0.7667
```

Epoch 3/25

```
198/198 [=====] - 7s 34ms/step - loss: 0.3630
- accuracy: 0.8502 - val_loss: 0.8042 - val_accuracy: 0.7333
```

Epoch 4/25

```
198/198 [=====] - 7s 34ms/step - loss: 0.2901
- accuracy: 0.8939 - val_loss: 0.3793 - val_accuracy: 0.9000
```

Epoch 5/25

```
198/198 [=====] - 7s 34ms/step - loss: 0.1839
- accuracy: 0.9259 - val_loss: 0.2383 - val_accuracy: 0.9333
```

Epoch 6/25

```
198/198 [=====] - 7s 34ms/step - loss: 0.1547
- accuracy: 0.9444 - val_loss: 0.2046 - val_accuracy: 0.8667
```

Epoch 7/25

```
198/198 [=====] - 7s 34ms/step - loss: 0.1177
- accuracy: 0.9512 - val_loss: 0.3603 - val_accuracy: 0.9000
```

Epoch 8/25

```
198/198 [=====] - 7s 34ms/step - loss: 0.0878
- accuracy: 0.9731 - val_loss: 0.3200 - val_accuracy: 0.8667
```

Epoch 9/25

```
198/198 [=====] - 7s 34ms/step - loss: 0.1056
- accuracy: 0.9613 - val_loss: 0.2862 - val_accuracy: 0.9333
```

Epoch 10/25

```
198/198 [=====] - 7s 33ms/step - loss: 0.1108
- accuracy: 0.9680 - val_loss: 0.2498 - val_accuracy: 0.9667
```

Epoch 11/25

```
198/198 [=====] - 7s 34ms/step - loss: 0.0722
- accuracy: 0.9697 - val_loss: 0.2355 - val_accuracy: 0.9667
```

Epoch 12/25

```
198/198 [=====] - 7s 33ms/step - loss: 0.0284
- accuracy: 0.9933 - val_loss: 0.2855 - val_accuracy: 0.9333
```

```
Epoch 13/25
198/198 [=====] - 7s 34ms/step - loss: 0.1348
- accuracy: 0.9646 - val_loss: 0.3068 - val_accuracy: 0.9333
Epoch 14/25
198/198 [=====] - 7s 33ms/step - loss: 0.0462
- accuracy: 0.9865 - val_loss: 0.2538 - val_accuracy: 0.9333
Epoch 15/25
198/198 [=====] - 7s 33ms/step - loss: 0.0474
- accuracy: 0.9714 - val_loss: 0.2672 - val_accuracy: 0.9333
Epoch 16/25
198/198 [=====] - 7s 33ms/step - loss: 0.0828
- accuracy: 0.9731 - val_loss: 0.2400 - val_accuracy: 0.9333
Epoch 17/25
198/198 [=====] - 7s 33ms/step - loss: 0.0354
- accuracy: 0.9899 - val_loss: 0.1490 - val_accuracy: 0.9667
Epoch 18/25
198/198 [=====] - 7s 33ms/step - loss: 0.0111
- accuracy: 0.9966 - val_loss: 0.2738 - val_accuracy: 0.9667
Epoch 19/25
198/198 [=====] - 6s 33ms/step - loss: 0.0598
- accuracy: 0.9747 - val_loss: 0.2337 - val_accuracy: 0.9333
Epoch 20/25
198/198 [=====] - 7s 33ms/step - loss: 0.0234
- accuracy: 0.9882 - val_loss: 0.2338 - val_accuracy: 0.9667
Epoch 21/25
198/198 [=====] - 7s 33ms/step - loss: 0.0094
- accuracy: 0.9983 - val_loss: 0.1385 - val_accuracy: 0.9667
Epoch 22/25
198/198 [=====] - 7s 37ms/step - loss: 0.0464
- accuracy: 0.9848 - val_loss: 0.1625 - val_accuracy: 0.9667
Epoch 23/25
198/198 [=====] - 7s 33ms/step - loss: 0.0397
- accuracy: 0.9848 - val_loss: 0.1474 - val_accuracy: 0.9333
Epoch 24/25
198/198 [=====] - 7s 33ms/step - loss: 0.0849
- accuracy: 0.9731 - val_loss: 0.4239 - val_accuracy: 0.9333
Epoch 25/25
198/198 [=====] - 7s 33ms/step - loss: 0.0436
- accuracy: 0.9865 - val_loss: 0.5118 - val_accuracy: 0.9000
```

```
<keras.callbacks.History at 0x7f302fbe8490>
```

```
model.save('Hand.h5')
```

```
model_json = model.to_json()
with open("model-bw.json", "w") as json_file:
    json_file.write(model_json)
```

```
!tar -zcvf hand-gesture.tgz Hand.h5
```

```
Hand.h5
```



```
!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)
ent already satisfied: tabulate in /usr/local/lib/python3.7/dist-
packages (from watson-machine-learning-client) (0.8.10)
Requirement already satisfied: requests in
/usr/local/lib/python3.7/dist-packages (from watson-machine-learning-
client) (2.23.0)
Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-
packages (from watson-machine-learning-client) (4.64.1)
Requirement already satisfied: urllib3 in
/usr/local/lib/python3.7/dist-packages (from watson-machine-learning-
client) (1.24.3)
Collecting lomond
  Downloading lomond-0.3.3-py2.py3-none-any.whl (35 kB)
Collecting boto3
  Downloading boto3-1.25.5-py3-none-any.whl (132 kB)
-cos-sdk
  Downloading ibm-cos-sdk-2.12.0.tar.gz (55 kB)
ent already satisfied: pandas in /usr/local/lib/python3.7/dist-
packages (from watson-machine-learning-client) (1.3.5)
Requirement already satisfied: certifi in
/usr/local/lib/python3.7/dist-packages (from watson-machine-learning-
client) (2022.9.24)
Collecting botocore<1.29.0,>=1.28.5
  Downloading botocore-1.28.5-py3-none-any.whl (9.3 MB)
espath<2.0.0,>=0.7.1
  Downloading jmespath-1.0.1-py3-none-any.whl (20 kB)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in
/usr/local/lib/python3.7/dist-packages (from botocore<1.29.0,>=1.28.5-
>boto3->watson-machine-learning-client) (2.8.2)
Collecting urllib3
  Downloading urllib3-1.26.12-py2.py3-none-any.whl (140 kB)
ent already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-
packages (from python-dateutil<3.0.0,>=2.1->botocore<1.29.0,>=1.28.5-
>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)
-cos-sdk-s3transfer==2.12.0
  Downloading ibm-cos-sdk-s3transfer-2.12.0.tar.gz (135 kB)
espath<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)
ent 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: idna<4,>=2.5 in
/usr/local/lib/python3.7/dist-packages (from requests->watson-machine-
learning-client) (2.10)
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) ... -cos-sdk:
filename=ibm_cos_sdk-2.12.0-py3-none-any.whl size=73930
sha256=ba7b07c17e056c1d03137781c8c012e2a998075f64d24bba8349a8d2fc69ba8
e
  Stored in directory:
/root/.cache/pip/wheels/ec/94/29/2b57327cf00664b6614304f7958abd29d77ea
0e5bbece2ea57
  Building wheel for ibm-cos-sdk-core (setup.py) ... -cos-sdk-core:
filename=ibm_cos_sdk_core-2.12.0-py3-none-any.whl size=562962
sha256=5cf69266ced5ea0bec0a4fa7b1afb06b478e6fbcbb5b0b8f2e652db3e00f5c9
8
  Stored in directory:
/root/.cache/pip/wheels/64/56/fb/5cd6f4f40406c828a5289b95b2752a4d142a9
afb359244ed8d
  Building wheel for ibm-cos-sdk-s3transfer (setup.py) ... -cos-sdk-
s3transfer: filename=ibm_cos_sdk_s3transfer-2.12.0-py3-none-any.whl
size=89778
sha256=99ed9492707504430606632d2851d5937484959fb2300a06aef1a40bca9b2a7
f
  Stored in directory:
/root/.cache/pip/wheels/57/79/6a/ffe3370ed7ebc00604f9f76766e1e0348dcdc
ad2b2e32df9e1
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
  Attempting uninstall: urllib3
    Found existing installation: urllib3 1.24.3
    Uninstalling urllib3-1.24.3:
      Successfully uninstalled urllib3-1.24.3
  Attempting uninstall: requests
    Found existing installation: requests 2.23.0
    Uninstalling requests-2.23.0:
      Successfully uninstalled requests-2.23.0
Successfully installed boto3-1.25.5 botocore-1.28.5 ibm-cos-sdk-2.12.0
ibm-cos-sdk-core-2.12.0 ibm-cos-sdk-s3transfer-2.12.0 jmespath-0.10.0
lomond-0.3.3 requests-2.28.1 s3transfer-0.6.0 urllib3-1.26.12 watson-
machine-learning-client-1.0.391
```

```
{"pip_warning":{"packages":["requests","urllib3"]}}
```

```
!pip install ibm_watson_machine_learning
```

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

```
Collecting ibm_watson_machine_learning
```

```
  Downloading ibm_watson_machine_learning-1.0.256-py3-none-any.whl  
(1.8 MB)
```

```
Requirement already satisfied: packaging in /usr/local/lib/python3.7/dist-  
packages (from ibm_watson_machine_learning) (21.3)
```

```
Requirement already satisfied: importlib-metadata in  
/usr/local/lib/python3.7/dist-packages (from  
ibm_watson_machine_learning) (4.13.0)
```

```
Requirement already satisfied: requests in  
/usr/local/lib/python3.7/dist-packages (from  
ibm_watson_machine_learning) (2.28.1)
```

```
Requirement already satisfied: certifi in  
/usr/local/lib/python3.7/dist-packages (from  
ibm_watson_machine_learning) (2022.9.24)
```

```
Requirement already satisfied: urllib3 in  
/usr/local/lib/python3.7/dist-packages (from  
ibm_watson_machine_learning) (1.26.12)
```

```
Requirement already satisfied: tabulate in  
/usr/local/lib/python3.7/dist-packages (from  
ibm_watson_machine_learning) (0.8.10)
```

```
Requirement already satisfied: lomond in  
/usr/local/lib/python3.7/dist-packages (from  
ibm_watson_machine_learning) (0.3.3)
```

```
Requirement already satisfied: pandas<1.5.0,>=0.24.2 in  
/usr/local/lib/python3.7/dist-packages (from  
ibm_watson_machine_learning) (1.3.5)
```

```
Collecting ibm-cos-sdk==2.7.*
```

```
  Downloading ibm-cos-sdk-2.7.0.tar.gz (51 kB)
```

```
-cos-sdk-core==2.7.0
```

```
  Downloading ibm-cos-sdk-core-2.7.0.tar.gz (824 kB)
```

```
-cos-sdk-s3transfer==2.7.0
```

```
  Downloading ibm-cos-sdk-s3transfer-2.7.0.tar.gz (133 kB)
```

```
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in  
/usr/local/lib/python3.7/dist-packages (from ibm-cos-sdk==2.7.*-  
>ibm_watson_machine_learning) (0.10.0)
```

```
Collecting docutils<0.16,>=0.10
```

```
  Downloading docutils-0.15.2-py3-none-any.whl (547 kB)
```

```
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in  
/usr/local/lib/python3.7/dist-packages (from ibm-cos-sdk-core==2.7.0-  
>ibm-cos-sdk==2.7.*->ibm_watson_machine_learning) (2.8.2)
```

```
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: pytz>=2017.3 in  
/usr/local/lib/python3.7/dist-packages (from pandas<1.5.0,>=0.24.2-
```

```

>ibm_watson_machine_learning) (2022.5)
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: charset-normalizer<3,>=2 in
/usr/local/lib/python3.7/dist-packages (from requests-
>ibm_watson_machine_learning) (2.1.1)
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: zipp>=0.5 in
/usr/local/lib/python3.7/dist-packages (from importlib-metadata-
>ibm_watson_machine_learning) (3.10.0)
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: 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) ... -cos-sdk:
filename=ibm_cos_sdk-2.7.0-py2.py3-none-any.whl size=72564
sha256=d3c0fda10effa37ead2378758ea16480c0a0ffd3a4c6c01708e009073370d63
5
  Stored in directory:
/root/.cache/pip/wheels/47/22/bf/e1154ff0f5de93cc477acd0ca69abfbb8b799
c5b28a66b44c2
  Building wheel for ibm-cos-sdk-core (setup.py) ... -cos-sdk-core:
filename=ibm_cos_sdk_core-2.7.0-py2.py3-none-any.whl size=501013
sha256=91ecf33e8445d6c08ecdc07c57e89e9b6f4c42da1a2e99047700c0caa84948c
e
  Stored in directory:
/root/.cache/pip/wheels/6c/a2/e4/c16d02f809a3ea998e17cfd02c13369281f3d
232aaf5902c19
  Building wheel for ibm-cos-sdk-s3transfer (setup.py) ... -cos-sdk-
s3transfer: filename=ibm_cos_sdk_s3transfer-2.7.0-py2.py3-none-any.whl
size=88619
sha256=9e001c649ce361e578b6d085ee1b15402c962dd7d31b50a639a7ad856f78af6
c
  Stored in directory:
/root/.cache/pip/wheels/5f/b7/14/fbe02bc1ef1af890650c7e51743d1c8389085
2e598d164b9da
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-
1.0.256

```

```

from ibm_watson_machine_learning import APIClient

```

```

wml_credentials={
    "url": "https://us-south.ml.cloud.ibm.com",
    "apikey": "kvW2sbDbTgwpN_pd4sfIR1HSXHL64KwaML3Lq0fkL3W0"
}

```

```

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.

```

<ibm_watson_machine_learning.client.APIClient at 0x7f2fb2aebbd0>

```

```

client.spaces.get_details()

```

```

{'resources': [{'entity': {'compute': [{'crn':
'crn:v1:bluemix:public:pm-20:us-south:a/6d5f4f848d3d47fab0d0a11c07ba5e
cc:215cf2c3-d68b-49d5-b7e4-3b28b5226247::',
  'guid': '215cf2c3-d68b-49d5-b7e4-3b28b5226247',
  'name': 'Watson Machine Learning-f9',
  'type': 'machine_learning'}]},
'description': '',
'name': 'Gesture',
'scope': {'bss_account_id': '6d5f4f848d3d47fab0d0a11c07ba5ecc'},
'stage': {'production': False},
'status': {'state': 'active'},
'storage': {'properties': {'bucket_name': '10464344-5757-4c38-
9942-38d2ea6e9864',
  'bucket_region': 'us-south',
  'credentials': {'admin': {'access_key_id':
'ac92b86cafec49389cf955ba712a22a1',
  'api_key': 'rTrulieUj5Qb_107tPAG7RAu08oak91dM3G7tvSYEdzF',

```

```

        'secret_access_key':
'64ae8b74ab4660373c5342a15278c00051f81e7e0efd9263',
        'service_id': 'ServiceId-62a66813-7608-46c1-bac3-
bfb2701d8e07'},
        'editor': {'access_key_id': 'b2adba240c3647cdab13ad1d8618c611',
'api_key': 'iq0eTz9R5lc_rY_LSwufSDdKjhbnElZlh8M0DutEvf4v',
'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/6d5f4f848d3d47fab0d0a11c07ba5ecc:861bae2a-147c-42be-
aeea-be4c7da2462a::',
        'secret_access_key':
'd52d861a1473023d3d9cc9661ebfd4b8f6c45d5aaebb8d09',
        'service_id': 'ServiceId-fda2e439-68c4-41b9-b100-
d58da1f68ce1'},
        'viewer': {'access_key_id': '93ea0f9b3d904d94aa8e9bb6dc4fc39e',
'api_key': '5Hd5W0qgL5gHM2ayPeVVN0k0ztNlZlyaE0hx0iEhHw20',
'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/6d5f4f848d3d47fab0d0a11c07ba5ecc:861bae2a-147c-42be-
aeea-be4c7da2462a::',
        'secret_access_key':
'00fcc4152eabd136ab97731e4b0f9fcfd76d035a0d11eab5',
        'service_id': 'ServiceId-4a27cccd-9af7-4c89-a1b6-
a0545ec014de'}}},
        'endpoint_url': 'https://s3.us-south.cloud-object-
storage.appdomain.cloud',
        'guid': '861bae2a-147c-42be-aeea-be4c7da2462a',
        'resource_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/6d5f4f848d3d47fab0d0a11c07ba5ecc:861bae2a-147c-42be-
aeea-be4c7da2462a::'},
        'type': 'bmcos_object_storage'}}},
        'metadata': {'created_at': '2022-11-01T14:28:42.149Z',
'creator_id': 'IBMid-665002HY57',
'id': 'db6020f5-fa05-48be-8006-5c34793f7acb',
'updated_at': '2022-11-01T14:29:04.752Z',
'url': '/v2/spaces/db6020f5-fa05-48be-8006-5c34793f7acb'}}}}

```

```

def guid_space_name(client,Gesture_Deployment):
    space = client.spaces.get_details()
    return(next(item for item in space['resources'] if item['entity']
['name']==Gesture_Deployment)['metadata']['id'])

```

```

space_uid = guid_space_name(client,'Gesture')
space_uid

```

```

{"type":"string"}

```

```

client.set.default_space(space_uid)

```

```

{"type":"string"}

```

```

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-b6a5-3fbdf1665666 |
| 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 | |
| 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.

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

```
{"type": "string"}
```

```
model_details = client.repository.store_model(model='hand-
gesture.tgz', meta_props={
    client.repository.ModelMetaNames.NAME: "Model Training",
    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': '2022-11-01T15:02:02.504Z',
  'id': '3fe5d47a-a49e-4356-86a4-6b5a794e165f',
  'modified_at': '2022-11-01T15:02:12.740Z',
  'name': 'Model Training',
  'owner': 'IBMid-665002HY57',
  'resource_key': '65746a45-fc2c-49c7-b9b3-2837ff7255f7',
  'space_id': 'db6020f5-fa05-48be-8006-5c34793f7acb'},
'system': {'warnings': []}}
```

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

```
{"type": "string"}
```

```
client.repository.download(model_id, 'gesture.tar.gb')
```

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

```
{"type": "string"}
```