

## SAVING THE MODEL

```
In[:  
#saving the model  
model.save('realtime.h5')  
  
In[:  
#converting to tar  
!tar -zcvf realtime.tar realtime.h5  
  
realtime.h5
```

## CLOUD DEPLOYMENT

```
In[:  
!pip install watson-machine-learning-client  
  
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-  
wheels/public/simple/  
Collecting watson-machine-learning-client  
  Downloading watson_machine_learning_client-1.0.391-py3-none-any.whl (538  
kB)  
    |████████████████████████████████████████| 538 kB 7.3 MB/s  
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-  
packages (from watson-machine-learning-client) (2.23.0)  
Collecting lomond  
  Downloading lomond-0.3.3-py2.py3-none-any.whl (35 kB)  
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-  
packages (from watson-machine-learning-client) (0.8.10)  
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-  
packages (from watson-machine-learning-client) (2022.9.24)  
Collecting boto3  
  Downloading boto3-1.26.8-py3-none-any.whl (132 kB)  
    |████████████████████████████████████████| 132 kB 39.8 MB/s  
Requirement already satisfied: pandas in /usr/local/lib/python3.7/dist-  
packages (from watson-machine-learning-client) (1.3.5)  
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-  
packages (from watson-machine-learning-client) (1.24.3)  
Collecting ibm-cos-sdk  
  Downloading ibm-cos-sdk-2.12.0.tar.gz (55 kB)  
    |████████████████████████████████████████| 55 kB 4.8 MB/s  
Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages  
(from watson-machine-learning-client) (4.64.1)  
Collecting s3transfer<0.7.0,>=0.6.0  
  Downloading s3transfer-0.6.0-py3-none-any.whl (79 kB)  
    |████████████████████████████████████████| 79 kB 9.2 MB/s  
Collecting botocore<1.30.0,>=1.29.8  
  Downloading botocore-1.29.8-py3-none-any.whl (9.9 MB)  
    |████████████████████████████████████████| 9.9 MB 53.6 MB/s  
Collecting jmespath<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<1.30.0,>=1.29.8->boto3->  
watson-machine-learning-client) (2.8.2)
```

```
Collecting urllib3
  Downloading urllib3-1.26.12-py2.py3-none-any.whl (140 kB)
    |████████████████████████████████████████| 140 kB 59.3 MB/s
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from python-dateutil<3.0.0,>=2.1->botocore<1.30.0,>=1.29.8->boto3->watson-machine-learning-client) (1.15.0)
Collecting ibm-cos-sdk-core==2.12.0
  Downloading ibm-cos-sdk-core-2.12.0.tar.gz (956 kB)
    |████████████████████████████████████████| 956 kB 54.0 MB/s
Collecting ibm-cos-sdk-s3transfer==2.12.0
  Downloading ibm-cos-sdk-s3transfer-2.12.0.tar.gz (135 kB)
    |████████████████████████████████████████| 135 kB 51.1 MB/s
Collecting jmespath<2.0.0,>=0.7.1
  Downloading jmespath-0.10.0-py2.py3-none-any.whl (24 kB)
Collecting requests
  Downloading requests-2.28.1-py3-none-any.whl (62 kB)
    |████████████████████████████████████████| 62 kB 1.4 MB/s
Requirement already satisfied: 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) (2022.6)
Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-packages (from pandas->watson-machine-learning-client) (1.21.6)
Building wheels for collected packages: ibm-cos-sdk, ibm-cos-sdk-core, ibm-cos-sdk-s3transfer
  Building wheel for ibm-cos-sdk (setup.py) ... done
  Created wheel for ibm-cos-sdk: filename=ibm_cos_sdk-2.12.0-py3-none-any.whl size=73931 sha256=5d002be559f85f7e6ef7c2b32b189820477291215672a0c2ba61eb4944fb902c
    Stored in directory: /root/.cache/pip/wheels/ec/94/29/2b57327cf00664b6614304f7958abd29d77ea0e5bbec e2ea57
  Building wheel for ibm-cos-sdk-core (setup.py) ... done
  Created wheel for ibm-cos-sdk-core: filename=ibm_cos_sdk_core-2.12.0-py3-none-any.whl size=562962 sha256=898299ee401f79fd8ad67a1115474b84f8bde2c5a4dfc4d9bf146ae727ab2c33
    Stored in directory: /root/.cache/pip/wheels/64/56/fb/5cd6f4f40406c828a5289b95b2752a4d142a9afb3592 44ed8d
  Building wheel for ibm-cos-sdk-s3transfer (setup.py) ... done
  Created wheel for ibm-cos-sdk-s3transfer: filename=ibm_cos_sdk_s3transfer-2.12.0-py3-none-any.whl size=89778 sha256=87cd52eb26669ea97269f11a6119523adac3c132633f3f52496ee0df122daa56
    Stored in directory: /root/.cache/pip/wheels/57/79/6a/ffe3370ed7ebc00604f9f76766e1e0348dcdcad2b2e3 2df9e1
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 boto3-1.26.8 botocore-1.29.8 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
In []:
!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-1.0.257-py3-none-any.whl (1.8 MB)
    |████████████████████████████████████████| 1.8 MB 6.3 MB/s
Requirement already satisfied: packaging in /usr/local/lib/python3.7/dist-
packages (from ibm_watson_machine_learning) (21.3)
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-
packages (from ibm_watson_machine_learning) (1.26.12)
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-
packages (from ibm_watson_machine_learning) (2022.9.24)
Requirement already satisfied: importlib-metadata in
/usr/local/lib/python3.7/dist-packages (from ibm_watson_machine_learning)
(4.13.0)
Requirement already satisfied: lomond in /usr/local/lib/python3.7/dist-
packages (from ibm_watson_machine_learning) (0.3.3)
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-
packages (from ibm_watson_machine_learning) (2.28.1)
Collecting ibm-cos-sdk==2.7.*
  Downloading ibm-cos-sdk-2.7.0.tar.gz (51 kB)
    |████████████████████████████████████████| 51 kB 902 kB/s
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-
packages (from ibm_watson_machine_learning) (0.8.10)
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-core==2.7.0
  Downloading ibm-cos-sdk-core-2.7.0.tar.gz (824 kB)
    |████████████████████████████████████████| 824 kB 50.2 MB/s
Collecting ibm-cos-sdk-s3transfer==2.7.0
  Downloading ibm-cos-sdk-s3transfer-2.7.0.tar.gz (133 kB)
    |████████████████████████████████████████| 133 kB 57.0 MB/s
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)
    |████████████████████████████████████████| 547 kB 48.1 MB/s
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: pytz>=2017.3 in /usr/local/lib/python3.7/dist-
packages (from pandas<1.5.0,>=0.24.2->ibm_watson_machine_learning) (2022.6)

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Requirement          already          satisfied:          numpy>=1.17.3          in
/usr/local/lib/python3.7/dist-packages          (from          pandas<1.5.0,>=0.24.2-
>ibm_watson_machine_learning) (1.21.6)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-
packages (from python-dateutil<3.0.0,>=2.1->ibm-cos-sdk-core==2.7.0->ibm-cos-
sdk==2.7.*->ibm_watson_machine_learning) (1.15.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.7/dist-
packages (from requests->ibm_watson_machine_learning) (2.10)
Requirement          already          satisfied:          charset-normalizer<3,>=2          in
/usr/local/lib/python3.7/dist-packages          (from          requests-
>ibm_watson_machine_learning) (2.1.1)
Requirement          already          satisfied:          typing-extensions>=3.6.4          in
/usr/local/lib/python3.7/dist-packages          (from          importlib-metadata-
>ibm_watson_machine_learning) (4.1.1)
Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-
packages (from importlib-metadata->ibm_watson_machine_learning) (3.10.0)
Requirement          already          satisfied:          pyparsing!=3.0.5,>=2.0.2          in
/usr/local/lib/python3.7/dist-packages          (from          packaging-
>ibm_watson_machine_learning) (3.0.9)
Building wheels for collected packages: ibm-cos-sdk, ibm-cos-sdk-core, ibm-
cos-sdk-s3transfer
  Building wheel for ibm-cos-sdk (setup.py) ... done
  Created wheel for ibm-cos-sdk: filename=ibm_cos_sdk-2.7.0-py2.py3-none-
any.whl size=72563
sha256=85acfdaf3f232b65d3165854c3cf4651cc494f01dc7874276f118863e97fcf8c
  Stored in directory:
/root/.cache/pip/wheels/47/22/bf/e1154ff0f5de93cc477acd0ca69abfbb8b799c5b28a6
6b44c2
  Building wheel for ibm-cos-sdk-core (setup.py) ... done
  Created wheel for ibm-cos-sdk-core: filename=ibm_cos_sdk_core-2.7.0-
py2.py3-none-any.whl size=501013
sha256=dfdd3d79b764119c0dfbc72b7436f7523e387abbbde90178014432a4d0dbbd1c
  Stored in directory:
/root/.cache/pip/wheels/6c/a2/e4/c16d02f809a3ea998e17cfd02c13369281f3d232aaf5
902c19
  Building wheel for ibm-cos-sdk-s3transfer (setup.py) ... done
  Created wheel for ibm-cos-sdk-s3transfer: filename=ibm_cos_sdk_s3transfer-
2.7.0-py2.py3-none-any.whl size=88622
sha256=d873231166da3e2723cdd9e44570258db0735b07a5f7c505365cbdb0f8cb74be
  Stored in directory:
/root/.cache/pip/wheels/5f/b7/14/fbe02bc1ef1af890650c7e51743d1c83890852e598d1
64b9da
Successfully built ibm-cos-sdk ibm-cos-sdk-core ibm-cos-sdk-s3transfer
Installing collected packages: docutils, ibm-cos-sdk-core, ibm-cos-sdk-
s3transfer, ibm-cos-sdk, ibm-watson-machine-learning
  Attempting uninstall: docutils
    Found existing installation: docutils 0.17.1
    Uninstalling docutils-0.17.1:
      Successfully uninstalled docutils-0.17.1
  Attempting uninstall: ibm-cos-sdk-core
    Found existing installation: ibm-cos-sdk-core 2.12.0
    Uninstalling ibm-cos-sdk-core-2.12.0:
      Successfully uninstalled ibm-cos-sdk-core-2.12.0
  Attempting uninstall: ibm-cos-sdk-s3transfer
    Found existing installation: ibm-cos-sdk-s3transfer 2.12.0
    Uninstalling ibm-cos-sdk-s3transfer-2.12.0:
      Successfully uninstalled ibm-cos-sdk-s3transfer-2.12.0

```

```

Attempting uninstall: ibm-cos-sdk
Found existing installation: ibm-cos-sdk 2.12.0
Uninstalling ibm-cos-sdk-2.12.0:
Successfully uninstalled ibm-cos-sdk-2.12.0
Successfully installed docutils-0.15.2 ibm-cos-sdk-2.7.0 ibm-cos-sdk-core-
2.7.0 ibm-cos-sdk-s3transfer-2.7.0 ibm-watson-machine-learning-1.0.257
In[:
from ibm_watson_machine_learning import APIClient

cloud_credentials={
    "url":"https://eu-gb.ml.cloud.ibm.com",
    "apikey":"JjbZw3a4R8S9mlhkHRzyhox5pPW_l5Cc39WxdpFYy_eA"
}

client=APIClient(cloud_credentials)

Python 3.7 and 3.8 frameworks are deprecated and will be removed in a future
release. Use Python 3.9 framework instead.
In[:
client.spaces.get_details()

Out[:
{'resources': [{'entity': {'compute': [{'crn': 'crn:v1:bluemix:public:pm-
20:eu-gb:a/baf2fc8d7ee845f0b6f7ac004c72284e:66c03ce9-a400-4357-8963-
42f65995d1d6::',
    'guid': '66c03ce9-a400-4357-8963-42f65995d1d6',
    'name': 'Watson Machine Learning-oy',
    'type': 'machine_learning'}]},
    'description': '',
    'name': 'realtime_deploy',
    'scope': {'bss_account_id': 'baf2fc8d7ee845f0b6f7ac004c72284e'},
    'stage': {'production': False},
    'status': {'state': 'active'},
    'storage': {'properties': {'bucket_name': 'ea8ff2b0-81e6-4923-aa78-
fe4cbelddcd18',
    'bucket_region': 'eu-gb-standard',
    'credentials': {'admin': {'access_key_id':
'e999e8ed9ad2445ca88ae10af451d567',
    'api_key': 'fkP3B06ykhgejJJwiaTEmtxAjRznQ1cnQoFwx6ZYhi2q',
    'secret_access_key':
'3148c14f7dfbe93c803cd44ab7906253620836f95549b74f',
    'service_id': 'ServiceId-a8d83975-cb8a-45b6-8a0b-2ef8c5e46143'},
    'editor': {'access_key_id': 'f024630ce04d42339708fac182f0ab39',
    'api_key': 'mcCE4FeS7xgQJkxKtxFFqWepQy8KM4G1SCVBSCN-fwUj',
    'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/baf2fc8d7ee845f0b6f7ac004c72284e:b3296065-0e0c-41e2-94ef-
9ce2d0f52335::',
    'secret_access_key':
'7153814f9855ae7da467ce49bbfcfbac82758402be72ecb',
    'service_id': 'ServiceId-c681d0d0-1da1-4b75-a76e-966b2d01ac94'},
    'viewer': {'access_key_id': '3a85fecc33094296a617c4fb8671a6a8',
    'api_key': 'h7Q07ClgcxsXIiQxTxqzr0810f0RSup7ObHelCsAsueb',
    'resource_key_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/baf2fc8d7ee845f0b6f7ac004c72284e:b3296065-0e0c-41e2-94ef-
9ce2d0f52335::',
    'secret_access_key':
'402f3531b91713996a937d5d03b47f6dc8f1392371275b8a',
    'service_id': 'ServiceId-f4cdb334-b0d8-4f02-9cff-ffb579be7ad9'}}}],

```

```

        'endpoint_url': 'https://s3.eu-gb.cloud-object-
storage.appdomain.cloud',
        'guid': 'b3296065-0e0c-41e2-94ef-9ce2d0f52335',
        'resource_crn': 'crn:v1:bluemix:public:cloud-object-
storage:global:a/baf2fc8d7ee845f0b6f7ac004c72284e:b3296065-0e0c-41e2-94ef-
9ce2d0f52335::'},
        'type': 'bmcos_object_storage'}}},
        'metadata': {'created_at': '2022-11-12T08:02:21.536Z',
        'creator_id': 'IBMid-663003YGW8',
        'id': '4afa8b26-897b-4309-b86e-5a89d939e183',
        'updated_at': '2022-11-12T08:02:35.769Z',
        'url': '/v2/spaces/4afa8b26-897b-4309-b86e-5a89d939e183'}}]]}

```

```

In [ ]:
space_uid='4afa8b26-897b-4309-b86e-5a89d939e183'
space_uid

```

```

Out [ ]:
'4afa8b26-897b-4309-b86e-5a89d939e183'

```

```

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

```

```

Out [ ]:
'SUCCESS'

```

```

In [ ]:
software_space_uid=client.software_specifications.get_uid_by_name('tensorflow
_rt22.1-py3.9')
software_space_uid

```

```

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

```

```

In [ ]:
model_details=client.repository.store_model(model='realtime.tgz',meta_props={
    client.repository.ModelMetaNames.NAME:"REALTIME_CLOUD",
    client.repository.ModelMetaNames.TYPE:"tensorflow_2.7",
    client.repository.ModelMetaNames.SOFTWARE_SPEC_UID:software_space_uid})

```

```

In [ ]:
model_details

```

```

Out [ ]:
{'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': '2022-11-12T08:27:11.689Z',
    'id': '1966b2e6-917e-402f-9587-bfaca4a14953',
    'modified_at': '2022-11-12T08:27:17.972Z',
    'name': 'REALTIME_CLOUD',
    'owner': 'IBMid-663003YGW8',
    'resource_key': '46bcf134-f27f-4620-a04e-8b9798c79b9a',
    'space_id': '4afa8b26-897b-4309-b86e-5a89d939e183'},
  'system': {'warnings': []}}

```

```

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

```

```

Out [ ]:
'1966b2e6-917e-402f-9587-bfaca4a14953'

```

```

In [ ]:

```

```
client.repository.download(model_id, 'REALTIME_CLOUD.tar.gb')  
Successfully saved model content to file: 'REALTIME_CLOUD.tar.gb'  
Out[ ]:  
'/content/REALTIME_CLOUD.tar.gb'
```