Model Training for Real Time Communication through AI for Specially Abled

LOADING AND DEPLOYING THE DATASET

TEAM ID:PNT2022TMID19449

In [1]:
```
pwd
```

Out[1]:
```
'/home/wsuser/work'
```

In [2]:
```
!pip install tensorflow==2.7.1
```

```
Collecting tensorflow==2.7.1
  Downloading tensorflow-2.7.1-cp39-cp39-manylinux2010_x86_64.whl (495.2 MB
)
     |████████████████████████████████| 495.2 MB 29 kB/s s eta 0:00:01
Requirement already satisfied: h5py>=2.9.0 in /opt/conda/envs/Python-3.9/li
b/python3.9/site-packages (from tensorflow==2.7.1) (3.2.1)
Requirement already satisfied: wheel<1.0,>=0.32.0 in /opt/conda/envs/Python
-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (0.37.0)
Requirement already satisfied: numpy>=1.14.5 in /opt/conda/envs/Python-3.9/
lib/python3.9/site-packages (from tensorflow==2.7.1) (1.20.3)
Requirement already satisfied: six>=1.12.0 in /opt/conda/envs/Python-3.9/li
b/python3.9/site-packages (from tensorflow==2.7.1) (1.15.0)
Requirement already satisfied: google-pasta>=0.1.1 in /opt/conda/envs/Pytho
n-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (0.2.0)
Requirement already satisfied: typing-extensions>=3.6.6 in /opt/conda/envs/
Python-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (4.1.1)
Requirement already satisfied: astunparse>=1.6.0 in /opt/conda/envs/Python-
3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (1.6.3)
Requirement already satisfied: keras-preprocessing>=1.1.1 in /opt/conda/env
s/Python-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (1.1.2)
Collecting libclang>=9.0.1
  Downloading libclang-14.0.6-py2.py3-none-manylinux2010_x86_64.whl (14.1 M
B)
     |████████████████████████████████| 14.1 MB 29.9 MB/s eta 0:00:01
Requirement already satisfied: keras<2.8,>=2.7.0rc0 in /opt/conda/envs/Pyth
on-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (2.7.0)
Requirement already satisfied: termcolor>=1.1.0 in /opt/conda/envs/Python-3
.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (1.1.0)
Requirement already satisfied: absl-py>=0.4.0 in /opt/conda/envs/Python-3.9
/lib/python3.9/site-packages (from tensorflow==2.7.1) (0.12.0)
Requirement already satisfied: tensorflow-estimator<2.8,~=2.7.0rc0 in /opt/
conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1)
(2.7.0)
Requirement already satisfied: wrapt>=1.11.0 in /opt/conda/envs/Python-3.9/
lib/python3.9/site-packages (from tensorflow==2.7.1) (1.12.1)
```

```
Requirement already satisfied: gast<0.5.0,>=0.2.1 in /opt/conda/envs/Python
-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (0.4.0)
Requirement already satisfied: flatbuffers<3.0,>=1.12 in /opt/conda/envs/Py
thon-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (2.0)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /opt/conda/envs/Pytho
n-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (1.42.0)
Requirement already satisfied: tensorboard~=2.6 in /opt/conda/envs/Python-3
.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (2.7.0)
Requirement already satisfied: opt-einsum>=2.3.2 in /opt/conda/envs/Python-
3.9/lib/python3.9/site-packages (from tensorflow==2.7.1) (3.3.0)
Requirement already satisfied: protobuf>=3.9.2 in /opt/conda/envs/Python-3.
9/lib/python3.9/site-packages (from tensorflow==2.7.1) (3.19.1)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.21.0 in /opt
/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorflow==2.7.1)
(0.23.1)
Requirement already satisfied: werkzeug>=0.11.15 in /opt/conda/envs/Python-
3.9/lib/python3.9/site-packages (from tensorboard~=2.6->tensorflow==2.7.1)
(2.0.2)
Requirement already satisfied: markdown>=2.6.8 in /opt/conda/envs/Python-3.
9/lib/python3.9/site-packages (from tensorboard~=2.6->tensorflow==2.7.1) (3
.3.3)
Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in /opt/con
da/envs/Python-3.9/lib/python3.9/site-packages (from tensorboard~=2.6->tens
orflow==2.7.1) (0.4.4)
Requirement already satisfied: requests<3,>=2.21.0 in /opt/conda/envs/Pytho
n-3.9/lib/python3.9/site-packages (from tensorboard~=2.6->tensorflow==2.7.1
) (2.26.0)
Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in /opt/conda/
envs/Python-3.9/lib/python3.9/site-packages (from tensorboard~=2.6->tensorf
low==2.7.1) (1.6.0)
Requirement already satisfied: google-auth<3,>=1.6.3 in /opt/conda/envs/Pyt
hon-3.9/lib/python3.9/site-packages (from tensorboard~=2.6->tensorflow==2.7
.1) (1.23.0)
Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0 in /op
t/conda/envs/Python-3.9/lib/python3.9/site-packages (from tensorboard~=2.6-
>tensorflow==2.7.1) (0.6.1)
Requirement already satisfied: setuptools>=41.0.0 in /opt/conda/envs/Python
-3.9/lib/python3.9/site-packages (from tensorboard~=2.6->tensorflow==2.7.1)
(58.0.4)
Requirement already satisfied: pyasn1-modules>=0.2.1 in /opt/conda/envs/Pyt
hon-3.9/lib/python3.9/site-packages (from google-auth<3,>=1.6.3->tensorboar
d~=2.6->tensorflow==2.7.1) (0.2.8)
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~=2.6->
tensorflow==2.7.1) (4.7.2)
Requirement already satisfied: cachetools<5.0,>=2.0.0 in /opt/conda/envs/Py
thon-3.9/lib/python3.9/site-packages (from google-auth<3,>=1.6.3->tensorboa
rd~=2.6->tensorflow==2.7.1) (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~=2.6->tensorflow==2.7.1) (1.3.0)
Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in /opt/conda/envs/Pyth
on-3.9/lib/python3.9/site-packages (from pyasn1-modules>=0.2.1->google-auth
<3,>=1.6.3->tensorboard~=2.6->tensorflow==2.7.1) (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.
6->tensorflow==2.7.1) (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->tensorbo
ard~=2.6->tensorflow==2.7.1) (2.0.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /opt/conda/envs/Pyth
on-3.9/lib/python3.9/site-packages (from requests<3,>=2.21.0->tensorboard~
=2.6->tensorflow==2.7.1) (1.26.7)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/envs/Python-3.9/l
ib/python3.9/site-packages (from requests<3,>=2.21.0->tensorboard~=2.6->ten
sorflow==2.7.1) (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-o
authlib<0.5,>=0.4.1->tensorboard~=2.6->tensorflow==2.7.1) (3.2.1)
Installing collected packages: libclang, tensorflow
  Attempting uninstall: tensorflow
    Found existing installation: tensorflow 2.7.2
    Uninstalling tensorflow-2.7.2:
      Successfully uninstalled tensorflow-2.7.2
Successfully installed libclang-14.0.6 tensorflow-2.7.1
```

Importing the packages.

In [2]:
```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

In [3]:
```
# Training Datagen
train_datagen =
ImageDataGenerator(rescale=1/255,zoom_range=0.2,horizontal_flip=True,vertic
al_flip=False)
# Testing Datagen
test_datagen = ImageDataGenerator(rescale=1/255)
```

linking the streaming_body

In [4]:
```
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='Lzw27RyYAXpOXEjMhc04K638iQocziOKd5DbxFuLpmhc',
    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 = 'realtimecommunication-donotdelete-pr-e7yebdi9hvsfug'
object_key = 'Dataset.zip'

streaming_body_4 = 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/
```

unzipping the dataset

In [6]:
```
# Unzip the Dataset Zip File
from io import BytesIO
import zipfile
unzip = zipfile.ZipFile(BytesIO(streaming_body_4.read()), 'r')
file_paths = unzip.namelist()
for path in file_paths:
    unzip.extract(path)
```

In [7]:
```
%%bash
ls Dataset
```

```
test_set
training_set
```

In [8]:
```
# Training Dataset
x_train=train_datagen.flow_from_directory(r'/home/wsuser/work/Dataset/train
ing_set',target_size=(64,64), class_mode='categorical',batch_size=900)
# Testing Dataset
x_test=test_datagen.flow_from_directory(r'/home/wsuser/work/Dataset/test_se
t',target_size=(64,64), class_mode='categorical',batch_size=900)
```

```
Found 15750 images belonging to 9 classes.
Found 2250 images belonging to 9 classes.
```

In [9]:
```
print("Length of x-train : ", len(x_train))
print("Length of x-test : ", len(x_test))
```

```
Length of x-train :  18
Length of x-test :  3
```

In [10]:
```
# The Class Indices in Training Dataset
x_train.class_indices
```

Out[10]:
```
{'A': 0, 'B': 1, 'C': 2, 'D': 3, 'E': 4, 'F': 5, 'G': 6, 'H': 7, 'I': 8}
```

Model Creation

In [11]:

```
# Importing Libraries
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import
Convolution2D,MaxPooling2D,Flatten,Dense
```

In [12]:

```
# Creating Model
model=Sequential()
```

In [13]:

```
# Adding Layers
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(64,64,3)))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())

# Adding Hidden Layers
model.add(Dense(300,activation='relu'))
model.add(Dense(150,activation='relu'))

# Adding Output Layer
model.add(Dense(9,activation='softmax'))
```

In [14]:

```
# Compiling the Model
model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['ac
curacy'])
```

In [15]:

```
# Fitting the Model Generator
model.fit_generator(x_train,steps_per_epoch=len(x_train),epochs=10,validati
on_data=x_test,validation_steps=len(x_test))

/tmp/wsuser/ipykernel_164/1042518445.py:2: UserWarning: `Model.fit_generato
r` is deprecated and will be removed in a future version. Please use `Model
.fit`, which supports generators.
  model.fit_generator(x_train,steps_per_epoch=len(x_train),epochs=10,valida
tion_data=x_test,validation_steps=len(x_test))
Epoch 1/10
18/18 [==============================] - 71s 4s/step - loss: 1.1343 - accur
acy: 0.6152 - val_loss: 0.4147 - val_accuracy: 0.9058
Epoch 2/10
18/18 [==============================] - 69s 4s/step - loss: 0.2602 - accur
acy: 0.9239 - val_loss: 0.2582 - val_accuracy: 0.9320
Epoch 3/10
18/18 [==============================] - 71s 4s/step - loss: 0.1165 - accur
acy: 0.9669 - val_loss: 0.2227 - val_accuracy: 0.9587
Epoch 4/10
18/18 [==============================] - 72s 4s/step - loss: 0.0610 - accur
acy: 0.9846 - val_loss: 0.2374 - val_accuracy: 0.9698
Epoch 5/10
```

```
18/18 [==============================] - 73s 4s/step - loss: 0.0357 - accur
acy: 0.9902 - val_loss: 0.2313 - val_accuracy: 0.9707
Epoch 6/10
18/18 [==============================] - 72s 4s/step - loss: 0.0265 - accur
acy: 0.9939 - val_loss: 0.2498 - val_accuracy: 0.9756
Epoch 7/10
18/18 [==============================] - 71s 4s/step - loss: 0.0170 - accur
acy: 0.9965 - val_loss: 0.2795 - val_accuracy: 0.9756
Epoch 8/10
18/18 [==============================] - 72s 4s/step - loss: 0.0119 - accur
acy: 0.9977 - val_loss: 0.2573 - val_accuracy: 0.9769
Epoch 9/10
18/18 [==============================] - 72s 4s/step - loss: 0.0095 - accur
acy: 0.9981 - val_loss: 0.2782 - val_accuracy: 0.9782
Epoch 10/10
18/18 [==============================] - 72s 4s/step - loss: 0.0075 - accur
acy: 0.9987 - val_loss: 0.3134 - val_accuracy: 0.9764
```

Out[15]:

Saving the Model

In [16]:

```
model.save('SANJAI.h5')
# Current accuracy is 0.825
```

In [17]:

```
# Convert the Saved Model to a Tar Compressed Format
!tar -zcvf trainedModel.tgz SANJAI.h5
SANJAI.h5
```

In [18]:

```
%%bash
ls -ll
```

```
total 210000
drwxrwx--- 4 wsuser wscommon      4096 Nov 16 19:02 Dataset
-rw-rw---- 1 wsuser wscommon 111324760 Nov 16 19:15 SANJAI.h5
-rw-rw---- 1 wsuser wscommon 103709912 Nov 16 19:15 trainedModel.tgz
```

Watson Machine Learning

In [19]:

```
!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 8.4 MB/s eta 0:00:01
Requirement already satisfied: boto3 in /opt/conda/envs/Python-3.9/lib/pyth
on3.9/site-packages (from watson-machine-learning-client) (1.18.21)
Requirement already satisfied: requests in /opt/conda/envs/Python-3.9/lib/p
ython3.9/site-packages (from watson-machine-learning-client) (2.26.0)
Requirement already satisfied: urllib3 in /opt/conda/envs/Python-3.9/lib/py
thon3.9/site-packages (from watson-machine-learning-client) (1.26.7)
Requirement already satisfied: lomond in /opt/conda/envs/Python-3.9/lib/pyt
hon3.9/site-packages (from watson-machine-learning-client) (0.3.3)
Requirement already satisfied: tabulate in /opt/conda/envs/Python-3.9/lib/p
ython3.9/site-packages (from watson-machine-learning-client) (0.8.9)
```

```
Requirement already satisfied: tqdm in /opt/conda/envs/Python-3.9/lib/pytho
n3.9/site-packages (from watson-machine-learning-client) (4.62.3)
Requirement already satisfied: certifi in /opt/conda/envs/Python-3.9/lib/py
thon3.9/site-packages (from watson-machine-learning-client) (2022.9.24)
Requirement already satisfied: ibm-cos-sdk in /opt/conda/envs/Python-3.9/li
b/python3.9/site-packages (from watson-machine-learning-client) (2.11.0)
Requirement already satisfied: pandas in /opt/conda/envs/Python-3.9/lib/pyt
hon3.9/site-packages (from watson-machine-learning-client) (1.3.4)
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: botocore<1.22.0,>=1.21.21 in /opt/conda/envs
/Python-3.9/lib/python3.9/site-packages (from boto3->watson-machine-learnin
g-client) (1.21.41)
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /opt/conda/envs/Py
thon-3.9/lib/python3.9/site-packages (from boto3->watson-machine-learning-c
lient) (0.10.0)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /opt/conda/en
vs/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/p
ython3.9/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-mach
ine-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-le
arning-client) (2.11.0)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/envs/Python-3.9/l
ib/python3.9/site-packages (from requests->watson-machine-learning-client)
(3.3)
Requirement already satisfied: charset-normalizer~=2.0.0 in /opt/conda/envs
/Python-3.9/lib/python3.9/site-packages (from requests->watson-machine-lear
ning-client) (2.0.4)
Requirement already satisfied: pytz>=2017.3 in /opt/conda/envs/Python-3.9/l
ib/python3.9/site-packages (from pandas->watson-machine-learning-client) (2
021.3)
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 [20]:

```
from ibm_watson_machine_learning import APIClient
wml_credentials = {
    "url": "https://us-south.ml.cloud.ibm.com",
    "apikey": "_c84HIUddEc74mO6dInb_l1g8FNC4l3OAAIocQOhaWCI"
}

client = APIClient(wml_credentials)
```

In [21]:

```
client
```

Out[21]:

Save to Deployment Space

In [22]:

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

In [23]:

```
space_uid = guid_from_space_name(client, 'Real_Time')
print("Space UID : ", space_uid)
Space UID :  40cfd62c-38d1-4f55-b4a6-c1b77eab8cf5
```

In [24]:

```
client.set.default_space(space_uid)
```

Out[24]:

```
'SUCCESS'
```

In [25]:

```
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' par
ameter.
```

IN[26]:

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

Out[26]:

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

In [27]:

```
model_details = client.repository.store_model(model='trainedModel.tgz',
meta_props={
    client.repository.ModelMetaNames.NAME: "CNN",
    client.repository.ModelMetaNames.SOFTWARE_SPEC_UID: software_spec_uid,
    client.repository.ModelMetaNames.TYPE: "tensorflow_2.7"})
model_id = client.repository.get_model_id(model_details)
```

In [28]:

```
model_id
```

Out[28]:

```
'4154aedd-4fff-46f6-b056-ea4e566d3643'
```

In [29]:

```
client.repository.download(model_id,'SANJAI1.tar.gz')
```

```
Successfully saved model content to file: 'SANJAI1.tar.gz'
```

Out[29]:

```
'/home/wsuser/work/SANJAI1.tar.gz'
```

TESTING PART OF MODEL

In [30]:

```
#Testing the model.
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
```

In [31]:
```
model=load_model('SANJAI.h5')
img=image.load_img(r'/home/wsuser/work/Dataset/test_set/A/1.png',
                   target_size=(64,64))
```

In [32]:
```
img
```

Out[32]:

In [33]:
```
img=image.load_img(r"/home/wsuser/work/Dataset/test_set/A/90.png",target_si
ze=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['A','B','C','D','E','F','G','H','I']
index[y[0]]
```

Out[33]:
```
'A'
```

In [34]:
```
img=image.load_img(r"/home/wsuser/work/Dataset/test_set/C/90.png",target_si
ze=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['A','B','C','D','E','F','G','H','I']
index[y[0]]
```

Out[34]:
```
'C'
```

IN[35]:
```
img=image.load_img(r"/home/wsuser/work/Dataset/test_set/I/90.png",target_si
ze=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['A','B','C','D','E','F','G','H','I']
index[y[0]]
```

Out[35]:
```
'I'
```

In [36]:
```
img=image.load_img(r"/home/wsuser/work/Dataset/test_set/E/90.png",target_si
ze=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['A','B','C','D','E','F','G','H','I']
index[y[0]]
```

Out[36]:
```
'E'
```

In [37]:

```
img=image.load_img(r"/home/wsuser/work/Dataset/test_set/F/90.png",target_si
ze=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['A','B','C','D','E','F','G','H','I']
index[y[0]]
```

Out[37]:

```
'F'
```

Accuracy is over 90+ percentage because of the overfitting phenomenon.when we test our model with live data then the accuracy will decrease.