**\*Import required libraries\***

**from keras.datasets import mnist**

**import matplotlib.pyplot as plt**

**from keras.utils import np\_utils**

**from tensorflow.keras.models import Sequential**

**from tensorflow.keras.layers import Conv2D,Dense,Flatten**

**from tensorflow.keras.optimizers import Adam**

**Loading the dataset**

**(X\_train,y\_train),(X\_test,y\_test) =mnist.load\_data()**

**print(X\_train.shape)**

**print(X\_test.shape)**

**print(y\_test.shape)**

**print(y\_train.shape)**

**Downloading data from** [**https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz**](https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz)

**11490434/11490434 [==============================] - 0s 0us/step**

**(60000, 28, 28)**

**(10000, 28, 28)**

**(10000,)**

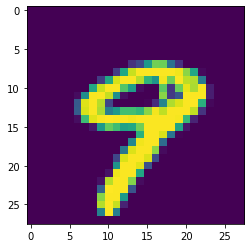
**(60000,)**

**Fetch the data from the dataset**

**print("The label value is ",y\_test[9]) #Value in y\_test**

**plt.imshow(X\_test[9])**

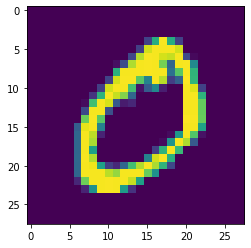
**The label value is 9**

****

**print("The label value is ",y\_test[10]) #Value in y\_test**

**plt.imshow(X\_test[10])**

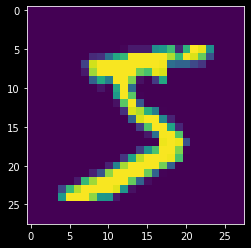
**The label value is 0**

****

**print("The label value is ",y\_test[23]) #Value in y\_test**

**plt.imshow(X\_test[23])**

**The label value is 5**

****

**Applying one hot encoding**

**X\_train.shape**

**(60000, 28, 28)**

**X\_test.shape**

**(10000, 28, 28)**

**X\_train1 = X\_train.reshape(60000, 28, 28, 1).astype('float32')**

**X\_test1 = X\_test.reshape(10000, 28, 28, 1).astype('float32')**

**number\_of\_classes= 12**

**y\_train1 = np\_utils.to\_categorical(y\_train,number\_of\_classes)**

**y\_test1 = np\_utils.to\_categorical(y\_test,number\_of\_classes)**

**Encoding the value**

**print("After encoding the value",y\_test[9] ,"become", y\_test1[9])**

**After encoding the value 9 become [0. 0. 0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]**

**print("After encoding the value",y\_test[10] ,"become", y\_test1[10])**

**After encoding the value 0 become [1. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]**

**print("After encoding the value",y\_test[23] ,"become", y\_test1[23])**

**After encoding the value 5 become [0. 0. 0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]**

**Add CNN layers**

**model = Sequential()**

**model.add(Conv2D(64, (3, 3), input\_shape=(28, 28, 1), activation="relu"))**

**model.add(Conv2D(32, (3, 3), activation="relu"))**

**model.add(Flatten())**

**model.add(Dense(number\_of\_classes, activation="softmax"))**

**Compile the model**

**model.compile(loss='categorical\_crossentropy', optimizer="Adam", metrics=["accuracy"])**

**Train the model**

**model.fit(X\_train1, y\_train1, batch\_size=32, epochs=10, validation\_data=(X\_test1,y\_test1))**

**Epoch 1/10**

**1875/1875 [==============================] - 194s 103ms/step - loss: 0.2549 - accuracy: 0.9504 - val\_loss: 0.0902 - val\_accuracy: 0.9730**

**Epoch 2/10**

**1875/1875 [==============================] - 194s 104ms/step - loss: 0.0726 - accuracy: 0.9782 - val\_loss: 0.0820 - val\_accuracy: 0.9742**

**Epoch 3/10**

**1875/1875 [==============================] - 194s 103ms/step - loss: 0.0496 - accuracy: 0.9848 - val\_loss: 0.0817 - val\_accuracy: 0.9759**

**Epoch 4/10**

**1875/1875 [==============================] - 195s 104ms/step - loss: 0.0383 - accuracy: 0.9880 - val\_loss: 0.0899 - val\_accuracy: 0.9785**

**Epoch 5/10**

**1875/1875 [==============================] - 195s 104ms/step - loss: 0.0313 - accuracy: 0.9907 - val\_loss: 0.1074 - val\_accuracy: 0.9761**

**Epoch 6/10**

**1875/1875 [==============================] - 194s 104ms/step - loss: 0.0244 - accuracy: 0.9928 - val\_loss: 0.1156 - val\_accuracy: 0.9773**

**Epoch 7/10**

**1875/1875 [==============================] - 193s 103ms/step - loss: 0.0218 - accuracy: 0.9936 - val\_loss: 0.1221 - val\_accuracy: 0.9771**

**Epoch 8/10**

**1875/1875 [==============================] - 192s 102ms/step - loss: 0.0196 - accuracy: 0.9946 - val\_loss: 0.1727 - val\_accuracy: 0.9778**

**Epoch 9/10**

**1875/1875 [==============================] - 192s 103ms/step - loss: 0.0171 - accuracy: 0.9953 - val\_loss: 0.1468 - val\_accuracy: 0.9785**

**Epoch 10/10**

**1875/1875 [==============================] - 193s 103ms/step - loss: 0.0144 - accuracy: 0.9962 - val\_loss: 0.1704 - val\_accuracy: 0.9777**

**Observing the metrics**

**metrics = model.evaluate(X\_test1, y\_test1, verbose=0)**

**print("Checking the Metrics (Test Loss & Test Accuracy): ")**

**print(metrics)**

**Checking the Metrics (Test Loss & Test Accuracy):**

**[11.306961059570312, 0.12229999899864197]**

**Test the model**

**prediction = model.predict(X\_test1[:4])**

**print(prediction)**

**1/1 [==============================] - 0s 112ms/step**

**[[5.0968147e-06 3.2904151e-08 2.4547335e-08 3.8771137e-09 9.9999297e-01**

**2.1400561e-12 9.0379384e-09 1.9089430e-06 2.7502803e-10 2.1564152e-10**

**1.3407317e-11 2.5973085e-08]**

**[1.0000000e+00 2.0193573e-12 1.2437545e-10 3.0768805e-12 1.9168457e-14**

**6.3709477e-10 1.7837687e-10 2.4965596e-14 3.3803925e-13 1.5835364e-13**

**1.1105061e-16 9.6047545e-12]**

**[2.0305255e-05 1.8551295e-04 2.5913024e-03 1.0359057e-05 1.3580263e-04**

**2.6764979e-05 1.2820570e-02 6.5554171e-03 8.3878607e-02 8.9356083e-01**

**3.7450151e-05 1.7707223e-04]**

**[7.9626665e-07 2.8583373e-09 1.5453403e-09 3.7636035e-04 8.5368520e-06**

**9.6965458e-08 9.9961424e-01 1.3939068e-12 9.4559267e-09 9.6343879e-14**

**7.8885800e-18 1.2240818e-09]]**

**import numpy as np**

**print(np.argmax(prediction, axis=1))**

**print(y\_test1[:4])**

**[4 0 9 6]**

**[[0. 0. 0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]**

**[0. 0. 1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]**

**[0. 1. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]**

**[1. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]]**

**Save the model**

**model.save("digit.h5")**

**from tensorflow.keras.models import load\_model**

**model=load\_model("digit.h5")**

**model.summary()**

**Model: "sequential"**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Layer (type) Output Shape Param #**

**=================================================================**

**conv2d (Conv2D) (None, 26, 26, 64) 640**

**conv2d\_1 (Conv2D) (None, 24, 24, 32) 18464**

**flatten (Flatten) (None, 18432) 0**

**dense (Dense) (None, 12) 221196**

**=================================================================**

**Total params: 240,300**

**Trainable params: 240,300**

**Non-trainable params: 0**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**# Saving in tar**

**!tar -zcvf digit\_recognition.tgz digit.h5**

**digit.h5**

**!pip install watson-machine-learning-client**

**Looking in indexes:** [**https://pypi.org/simple**](https://pypi.org/simple)**,** [**https://us-python.pkg.dev/colab-wheels/public/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 4.4 MB/s**

**Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (0.8.10)**

**Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (4.64.1)**

**Collecting lomond**

**Downloading lomond-0.3.3-py2.py3-none-any.whl (35 kB)**

**Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (2.23.0)**

**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 3.5 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: certifi in /usr/local/lib/python3.7/dist-packages (from watson-machine-learning-client) (2022.9.24)**

**Collecting boto3**

**Downloading boto3-1.26.9-py3-none-any.whl (132 kB)**

**|████████████████████████████████| 132 kB 53.2 MB/s**

**Collecting s3transfer<0.7.0,>=0.6.0**

**Downloading s3transfer-0.6.0-py3-none-any.whl (79 kB)**

**|████████████████████████████████| 79 kB 6.4 MB/s**

**Collecting jmespath<2.0.0,>=0.7.1**

**Downloading jmespath-1.0.1-py3-none-any.whl (20 kB)**

**Collecting botocore<1.30.0,>=1.29.9**

**Downloading botocore-1.29.9-py3-none-any.whl (9.9 MB)**

**|████████████████████████████████| 9.9 MB 45.8 MB/s**

**Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.7/dist-packages (from botocore<1.30.0,>=1.29.9->boto3->watson-machine-learning-client) (2.8.2)**

**Collecting urllib3**

**Downloading urllib3-1.26.12-py2.py3-none-any.whl (140 kB)**

**|████████████████████████████████| 140 kB 45.8 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,>=1.29.9->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 55.8 MB/s**

**Collecting ibm-cos-sdk-s3transfer==2.12.0**

**Downloading ibm-cos-sdk-s3transfer-2.12.0.tar.gz (135 kB)**

**|████████████████████████████████| 135 kB 53.0 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 1.2 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: numpy>=1.17.3 in /usr/local/lib/python3.7/dist-packages (from pandas->watson-machine-learning-client) (1.21.6)**

**Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages (from pandas->watson-machine-learning-client) (2022.6)**

**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=828cd7ebe3989eb3f0f89d8aa8b2672fdfedbacff67110754e1186bc114462b3**

**Stored in directory: /root/.cache/pip/wheels/ec/94/29/2b57327cf00664b6614304f7958abd29d77ea0e5bbece2ea57**

**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=e3e83fbd43e20a5e9f729519f4f078ad1ddd5e749e91026173e51feee7d799e8**

**Stored in directory: /root/.cache/pip/wheels/64/56/fb/5cd6f4f40406c828a5289b95b2752a4d142a9afb359244ed8d**

**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=45c0dc69fa9821741f923f81f07af8872d68c74bf9cbc2ee0dd7a6237a07a3d2**

**Stored in directory: /root/.cache/pip/wheels/57/79/6a/ffe3370ed7ebc00604f9f76766e1e0348dcdcad2b2e32df9e1**

**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 boto3-1.26.9 botocore-1.29.9 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 install ibm\_watson\_machine\_learning**

**Looking in indexes:** [**https://pypi.org/simple**](https://pypi.org/simple)**,** [**https://us-python.pkg.dev/colab-wheels/public/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 4.3 MB/s**

**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)**

**Requirement already satisfied: packaging in /usr/local/lib/python3.7/dist-packages (from ibm\_watson\_machine\_learning) (21.3)**

**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)**

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

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

**|████████████████████████████████| 51 kB 630 kB/s**

**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: 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)**

**Collecting ibm-cos-sdk-core==2.7.0**

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

**|████████████████████████████████| 824 kB 46.8 MB/s**

**Collecting ibm-cos-sdk-s3transfer==2.7.0**

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

**|████████████████████████████████| 133 kB 39.6 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 54.5 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)**

**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: 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) ... done**

**Created wheel for ibm-cos-sdk: filename=ibm\_cos\_sdk-2.7.0-py2.py3-none-any.whl size=72563 sha256=659267c434e8e7c27acc7dda571c4454f1a639f6511dd150da1952a79c21e6cf**

**Stored in directory: /root/.cache/pip/wheels/47/22/bf/e1154ff0f5de93cc477acd0ca69abfbb8b799c5b28a66b44c2**

**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=4df31bb57b8cc5edbe1054ca45f259583c0bedd53a63f1bdffa5b6207432b6e9**

**Stored in directory: /root/.cache/pip/wheels/6c/a2/e4/c16d02f809a3ea998e17cfd02c13369281f3d232aaf5902c19**

**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=b0c77e9f333bbc5f59f67f5d8f87551684769077c751076e77c542812d38847e**

**Stored in directory: /root/.cache/pip/wheels/5f/b7/14/fbe02bc1ef1af890650c7e51743d1c83890852e598d164b9da**

**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**

**Cloud deployment**

**from ibm\_watson\_machine\_learning import APIClient**

**wml\_credentials = {**

**"url": "**[**https://us-south.ml.cloud.ibm.com**](https://us-south.ml.cloud.ibm.com)**", # example: "**[**https://eu-gb.ml.cloud.ibm.com**](https://eu-gb.ml.cloud.ibm.com)**"**

**"apikey":"Dt-EkyRgxXR--1mhO8JnCjRGR\_AvzoUpJQqbzFnWklU1"**

**}**

**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.**

**client.spaces.get\_details()**

**{'resources': [{'entity': {'compute': [{'crn': 'crn:v1:bluemix:public:pm-20:us-south:a/d74a81b5072a47ea932088f3c95b3d8d:ab0faf12-e097-475c-b555-79f9a13b440d::',**

**'guid': 'ab0faf12-e097-475c-b555-79f9a13b440d',**

**'name': 'Watson Machine Learning-lz',**

**'type': 'machine\_learning'}],**

**'description': '',**

**'name': 'digit\_deploy',**

**'scope': {'bss\_account\_id': 'd74a81b5072a47ea932088f3c95b3d8d'},**

**'stage': {'production': False},**

**'status': {'state': 'active'},**

**'storage': {'properties': {'bucket\_name': 'dede02b9-9740-4319-881c-f10ec6202dce',**

**'bucket\_region': 'us-south',**

**'credentials': {'admin': {'access\_key\_id': '9bfe67bd39f14cf5a8666e6188b02143',**

**'api\_key': '50PMGAm3eSnX\_G1VpNG6\_XJkwa-veWNCSyyru5ksZsWB',**

**'secret\_access\_key': 'b63dd4e1b1ecefdbdb32478174a66d411cd7a98519c8565b',**

**'service\_id': 'ServiceId-cf7956f9-5d6e-4fde-9bf9-c2d7d324d3d3'},**

**'editor': {'access\_key\_id': '9e76c7cc5b2c438396b834aaeda87df4',**

**'api\_key': 'EzZkGCey-46EuCVz3IztC8mnBFtuaD40Srufvm\_hFBUz',**

**'resource\_key\_crn': 'crn:v1:bluemix:public:cloud-object-storage:global:a/d74a81b5072a47ea932088f3c95b3d8d:b81cecb9-1689-4f8e-87d7-c70c72300b4e::',**

**'secret\_access\_key': '00cbee74cb48d75ca43d688108297703eea7ec26903a04cd',**

**'service\_id': 'ServiceId-725da56e-c4c0-4ecb-9d36-ea58872bbcf3'},**

**'viewer': {'access\_key\_id': '238ea99d20354b55b78c557fdb973972',**

**'api\_key': 'im-71co9LWBLEb295LCJlWx4AOejZgzJAxpq1SB9P5N9',**

**'resource\_key\_crn': 'crn:v1:bluemix:public:cloud-object-storage:global:a/d74a81b5072a47ea932088f3c95b3d8d:b81cecb9-1689-4f8e-87d7-c70c72300b4e::',**

**'secret\_access\_key': 'e3ca34240ce3757c166469ac364c6df4e20f464cbbad5d7a',**

**'service\_id': 'ServiceId-ca7069ff-0f0b-479e-af7f-4127e8cd1703'}},**

**'endpoint\_url': '**[**https://s3.us-south.cloud-object-storage.appdomain.cloud**](https://s3.us-south.cloud-object-storage.appdomain.cloud)**',**

**'guid': 'b81cecb9-1689-4f8e-87d7-c70c72300b4e',**

**'resource\_crn': 'crn:v1:bluemix:public:cloud-object-storage:global:a/d74a81b5072a47ea932088f3c95b3d8d:b81cecb9-1689-4f8e-87d7-c70c72300b4e::'},**

**'type': 'bmcos\_object\_storage'}},**

**'metadata': {'created\_at': '2022-11-13T07:31:19.376Z',**

**'creator\_id': 'IBMid-666002J5U4',**

**'id': '0d542d58-0e93-4b26-a2c6-156ce46c2f36',**

**'updated\_at': '2022-11-13T07:31:32.819Z',**

**'url': '/v2/spaces/0d542d58-0e93-4b26-a2c6-156ce46c2f36'}}]}**

**def guid\_space\_name(client,digit\_deploy):**

**space = client.spaces.get\_details()**

**return(next(item for item in space['resources'] if item['entity']['name']==digit\_deploy)['metadata']['id'])**

**space\_uid = guid\_space\_name(client,'digit\_deploy')**

**space\_uid**

**'0d542d58-0e93-4b26-a2c6-156ce46c2f36'**

**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'**

**model\_details = client.repository.store\_model(model='digit\_recognition.tgz',meta\_props={**

**client.repository.ModelMetaNames.NAME:"DigitRecognition Model",**

**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': '2022-11-15T06:32:10.093Z',**

**'id': '892f9dba-862a-4094-8701-f063b6fd66da',**

**'modified\_at': '2022-11-15T06:32:14.285Z',**

**'name': 'DigitRecognition Model',**

**'owner': 'IBMid-666002J5U4',**

**'resource\_key': '0961989d-65f0-4052-9429-70ed03c421fb',**

**'space\_id': '0d542d58-0e93-4b26-a2c6-156ce46c2f36'},**

**'system': {'warnings': []}}**

**model\_id = client.repository.get\_model\_id(model\_details)**

**model\_id**

**'892f9dba-862a-4094-8701-f063b6fd66da'**

**client.repository.download(model\_id,'Digit\_Recognition\_Model.tar.gb')**

**Successfully saved model content to file: 'Digit\_Recognition\_Model.tar.gb'**

**'/content/Digit\_Recognition\_Model.tar.gb'**

**\*\*-----------------THE END-----------------\*\***