

## IBM CLOUD DEPLOYMENT

Date	16 November 2022
Team ID	PNT2022TMID14644
Project Name	Efficient water quality analysis and prediction using Machine Learning

## TRAINING THE MODEL ON IBM AND DEPLOYMENT

The screenshot displays the IBM Cloud Pak for Data interface. The top navigation bar includes the IBM logo, a search bar, and user account information (Rashmi R's Account, Dallas). The main workspace shows a Jupyter Notebook with the following code:

```
In [ ]: import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.impute import SimpleImputer
from sklearn.neighbors import LocalOutlierFactor
from scipy.stats import probplot
from scipy.stats import zscore

In [ ]: !pip install ibm_watson_machine_learning
```

The output of the second cell shows the installation progress of the `ibm_watson_machine_learning` package, including requirements for `numpy`, `pandas`, `seaborn`, `matplotlib`, `scikit-learn`, `scipy`, and `ibm-cos-sdk`.

On the right side, the 'Data' panel is visible, showing a file named `water_dataX.csv` with an 'Insert to code' button.

dataplatform.cloud.ibm.com/analytic/notebooks/v2/c1bce73b-1982-4a57-a905-d935e84d712a?projectId=3e43c495-7192-46f5-a062-c694a8387339&context=cpdaas

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Notebook saved Not Trusted Python 3.9

```
Requirement already satisfied: docutils<0.16,>=0.10 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) (0.15.2)
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: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-packages (from requests->ibm_watson_machine_learning) (3.0.4)
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests->ibm_watson_machine_learning) (2.10)
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)

In [ ]: !pip install boto3

Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: boto3 in /usr/local/lib/python3.7/dist-packages (1.29.11)
Requirement already satisfied: jmespath<2.0.0,>=0.7.1 in /usr/local/lib/python3.7/dist-packages (from boto3) (0.10.0)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.7/dist-packages (from boto3) (2.8.2)
Requirement already satisfied: urllib3<1.27,>=1.25.4 in /usr/local/lib/python3.7/dist-packages (from boto3) (1.25.11)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/dist-packages (from python-dateutil<3.0.0,>=2.1->boto3) (1.15.0)
```

IBM\_DEPLOY.ipynb | sprint delivery pla...pdf | water\_data1.txt

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dataplatform.cloud.ibm.com/analytic/notebooks/v2/c1bce73b-1982-4a57-a905-d935e84d712a?projectId=3e43c495-7192-46f5-a062-c694a8387339&context=cpdaas

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Number of CV Scores used in Average: 5

```
In [ ]: import pickle
pickle.dump(y_pred, open('wqi.pkl', 'wb'))
model = pickle.load(open('wqi.pkl', 'rb'))

Training model on ibm

In [ ]: from ibm_watson_machine_learning import APIClient

In [ ]: wml_credentials = {
    "apikey": "E6yK5k6320eQVTU5q53p1G0S3eAKWeZu5ywrJQHajo-3",
    "url": "https://us-south.ml.cloud.ibm.com"
}

In [ ]: wml_client = APIClient(wml_credentials)
wml_client.spaces.list()

Python 3.7 and 3.8 frameworks are deprecated and will be removed in a future release. Use Python 3.9 framework instead.
Note: 'limit' is not provided. Only first 50 records will be displayed if the number of records exceed 50
```

IBM\_DEPLOY.ipynb | sprint delivery pla...pdf | water\_data1.txt

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dataplatform.cloud.ibm.com/analytics/notebooks/v2/c1bce73b-1982-4a57-a905-d935e84d7f2a?projectId=3e43c495-7192-46f5-a062-c694a8387339&context=cpdaas

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```
In [ ]: MODEL_NAME = 'Water-Quality'
        DEPLOYMENT_NAME = 'water-quality-prediction'
        DEPLOY_MODEL = regressor

In [ ]: software_spec_uid = wml_client.software_specifications.get_id_by_name('runtime-22.1-py3.9')

In [ ]: model_props = {
        wml_client.repository.ModelMetaNames.NAME: MODEL_NAME,
        wml_client.repository.ModelMetaNames.TYPE: 'scikit-learn-1.0',
        wml_client.repository.ModelMetaNames.SOFTWARE_SPEC_UID: software_spec_uid

In [ ]: model_details = wml_client.repository.store_model(
        model=DEPLOY_MODEL,
        meta_props=model_props,
        training_data=x_train,
        training_target=y_train
    )
```

water\_dataX.csv  
Insert to code

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dataplatform.cloud.ibm.com/analytics/notebooks/v2/c1bce73b-1982-4a57-a905-d935e84d7f2a?projectId=3e43c495-7192-46f5-a062-c694a8387339&context=cpdaas

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```
In [ ]: import os, types
import pandas as pd
from boto3.client import Config
import 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 = boto3.client(service_name='s3',
    _ibm_api_key_id='Egyk5k6320eqVTU5qS3p1GoS3eAK4oZu5ymrJQhajo-3',
    _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 = 'custommodeldeployment-donotdelete-pr-thtas59indgzc0'
object_key = 'water_dataX.csv'

body = cos_client.get_object(Bucket=bucket,Key=object_key)['Body']
# add missing __iter__ method, so pandas accepts body as file-like object
if not hasattr(body, "__iter__"): body.__iter__ = types.MethodType( __iter__, body )

df_data_1 = pd.read_csv(body)
df_data_1.head()

In [ ]: df.shape
```

water\_dataX.csv  
Insert to code

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