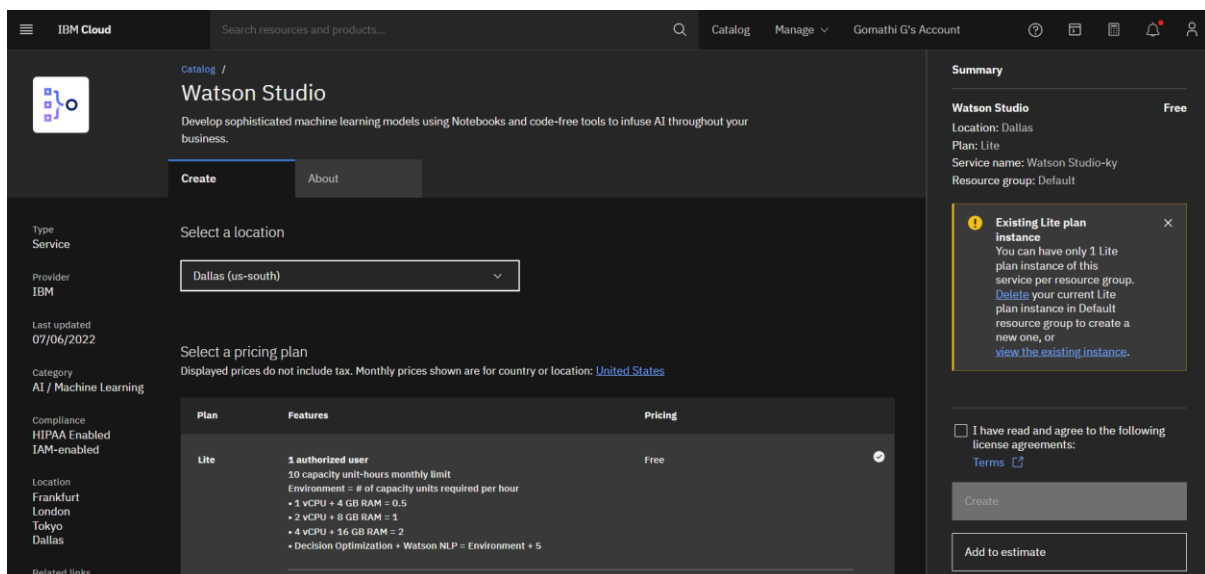
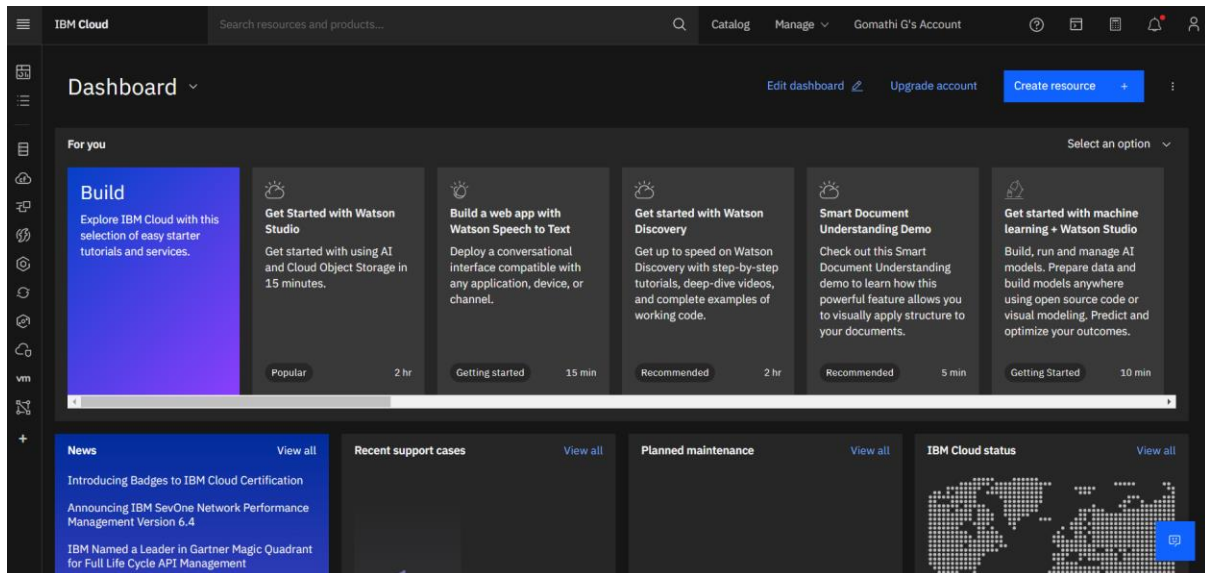


## Sprint 4

### Train Machine Learning Model on IBM Watson

Date	19 November 2022
Team ID	PNT2022TMID21492
Project Name	University Admit Eligibility Predictor

#### 1) Creating IBM account and setting up Watson Studio



IBM Cloud

Search resources and products...

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Catalog /

Watson Machine Learning

Deploy, manage and integrate machine learning models into your applications and services in as little as one click.

Create

About

Type

Service

Provider

Dallas (us-south)

Last updated

11/18/2022

Category

AI / Machine Learning

Compliance

HIPAA Enabled

IAM-enabled

Service Endpoint Supported

Location

Dallas

Frankfurt

Tokyo

Select a location

Dallas (us-south)

Select a pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or location: [United States](#)

Plan	Features	Pricing
Lite	<b>Service instance</b> 20 capacity unit-hours (CUH) included: Capacity Type: • 1 vCPU and 4 GB RAM = 0.5 capacity units required per hour • 2 vCPU and 8 GB RAM = 1 capacity units required per hour • 4 vCPU and 16 GB RAM = 2 capacity units required per hour • 8 vCPU and 32 GB RAM = 4 capacity units required per hour • 16 vCPU and 64 GB RAM = 8 capacity units required per hour Auto AI • 8 vCPU and 32 GB RAM = 20 capacity units required per hour	Free

Summary

Watson Machine Learning

Free

Location:

Dallas

Plan:

Lite

Service name:

Watson Machine Learning-oj

Resource group:

Default

☒ I have read and agree to the following license agreements:

[Terms](#)

Create

Add to estimate

IBM Cloud

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Resource list /

Watson Machine Learning-wp

Active

cpdaas

Details

Actions...

Manage

Plan

Connections

Watson Machine Learning in Cloud Pak for Data

Use Watson Machine Learning on Cloud Pak for Data to put AI models to work. Deploy, monitor, and update models to get the insights you need from your data modeling.

Launch in IBM Cloud Pak for Data

IBM Watson Machine Learning in Cloud Pak for Data

IBM Cloud Pak for Data Unifying platform

IBM Cloud Base cloud infrastructure

IBM Watson Machine Learning is part of IBM Cloud Pak for Data and serves as the data science capability of the data fabric architecture.

Helpful links

Documentation

Learn about the tools and capabilities you need to run, monitor, and update your AI assets.

Learning path

Check out sample projects, notebooks, and data sets to help you be productive.

Videos

Watch videos to learn about Watson Machine Learning and Cloud Pak for Data as a Service.

## 2)Creating a project for the deployment and importing assets

IBM Watson Studio

Search in your workspaces

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Dallas

New deployment space

Use a space to collect assets in one place to create, run, and manage deployments

Define details

Name

UniversityAdmitEligibilityPredictor.

Description (Optional)

Deployment space description

Deployment space tags (optional)

Add a tag

Select services

Select storage service

Cloud Object Storage-fk

Select machine learning service (optional)

Select a machine learning service

Upload space assets (optional)

Populate your space with assets exported from a project or space to a .zip file. You can add more assets after the space is created.

Drop .zip file here or browse your files to upload

Cancel

Create

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Deployments /

# UniversityAdmitEligibilityPredictor

OverviewAssetsDeploymentsJobsManage

Find assets

Import assets

1 asset

All assets

Asset types

Models

Models

Name	Type	Software specification	Last modified	
Model Model	scikit-learn_1.0	runtime-22.1-py3.9	3 hours ago Service	

Items per page: 201-1 of 1 items1 of 1 pages

Drop files here or browse for files to upload.

Stay on the page until upload completes. Incomplete uploads are cancelled.

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Projects / UniversityAdmitEligibilityPredictor / model\_training\_and\_best\_identi...

File Edit View Insert Cell Kernel Help

Run

Insert project token Trusted Python 3.9

```
In [ ]: IMPORTING LIBRARIES

In [1]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

In [ ]: IMPORTING THE DATASET

In [2]: import os, types
import pandas as pd
from botocore.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',
    aws_api_key_id='u56FVccq5gh7ky8Z29vRmsVU0ag4xw2JF4Nl0xec',
    aws_auth_endpoint='https://iam.cloud.ibm.com/oidc/token',
    config=Config(signature_version='s3v4'),
    endpoint_url='https://s3.private.us.cloud-object-storage.appdomain.cloud')

bucket = 'universityadmiteligibilitypredict-donotdelete-pr-nzybwah2v1iad'
object_key = 'Admission_Predict.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)

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

Out[2]:
```

Serial No.	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Chance of Admit	
0	1	337	118	4	4.5	4.5	9.65	1	0.92
1	2	324	107	4	4.0	4.5	8.87	1	0.76

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File Edit View Insert Cell Kernel Help

Run

Insert project token Trusted Python 3.9

```
Requirement already satisfied: tabulate in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (0.8.9)
Requirement already satisfied: urllib3 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (1.26.7)
Requirement already satisfied: pandas<1.5.0,>=0.24.2 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from ibm_watson_machine_learning) (1.3.4)
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==2.11.*->ibm_watson_machine_learning) (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==2.11.*->ibm_watson_machine_learning) (2.11.0)
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk==2.11.*->ibm_watson_machine_learning) (0.10.0)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk==2.11.*->ibm_watson_machine_learning) (2.8.2)
Requirement already satisfied: pytz<2017.3 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from pandas<1.5.0,>=0.24.2->ibm_watson_machine_learning) (2021.3)
Requirement already satisfied: numpy<1.17.3 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from pandas<1.5.0,>=0.24.2->ibm_watson_machine_learning) (1.20.3)
Requirement already satisfied: six<1.5 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from python-dateutil<3.0.0,>=2.1->ibm-cos-sdk==2.11.0->ibm_watson_machine_learning) (1.15.0)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from requests->ibm_watson_machine_learning) (3.3)
Requirement already satisfied: charset-normalizer<=2.0.0 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from requests->ibm_watson_machine_learning) (2.0.4)
Requirement already satisfied: czipper<0.5 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from importlib-metadata->ibm_watson_machine_learning) (3.6.0)
Requirement already satisfied: pyparsing<3.0.5,>=2.0.2 in /opt/conda/envs/python-3.9/lib/python3.9/site-packages (from packaging->ibm_watson_machine_learning) (3.0.4)

In [36]: from ibm_watson_machine_learning import APIClient
import json
import numpy as np

In [37]: wml_credentials = {
    "url": "https://us-south.ml.cloud.ibm.com",
    "apikey": "B_f8h9m1lY8bzpugn3rnUllK6lg75386L3VYXGHIKv"#changed
}
client = APIClient(wml_credentials)

In [38]: 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 [41]: space_uid = guid_from_space_name(client, 'UniversityAdmitEligibilityPredictor')
print("Space UID = " + space_uid)

Space UID = b0d8b159-074f-4b29-a2d2-666a91f3dc338

In [42]: client.set_default_space(space_uid)

Out[43]: 'success'
```

### 3)Deployment:

#### Create a deployment

Associated asset  
Model

Deployment type

**Online**  
Run the model on data in real-time, as data is received by a web service.

**Batch**  
Run the model against data as a batch process.

Name

Serving name ⓘ

CancelCreate

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### Model

DEPLOYMENT TYPES

1 Online Deployment(s)

	Name	Status	Last modified
Online (1)	university	Deployed	Nov 19, 2022, 2:34 PM
Batch (0)			

New deployment

Model

Created  
Nov 19, 2022, 2:08 PM

Type  
scikit-learn\_1.0

Model ID  
d410e0b5-8fba-48bb-9930-ddc0f...

Software specification  
runtime-22.1-py3.9

Description  
No description provided.

Tags  
Add tags to make assets easier to find.

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university

Deployed Online

API reference

Test

Direct link

Endpoint

Bearer <token> ⓘ

Code snippets

cURL

Java

JavaScript

Python

Scala

```
import requests

# NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud account.
API_KEY = '<your API key>'
token_response = requests.post('https://iam.cloud.ibm.com/identity/token', data={'apikey':
API_KEY, 'grant_type': 'urn:ibm:params:oauth:grant-type:apikey'})
mltoken = token_response.json()['access_token']

header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' + mltoken}

# NOTE: manually define and pass the array(s) of values to be scored in the next line
payload_scoring = {'input_data': [{'fields': [array_of_input_fields], 'values': [array_of_values_to_be_scored, another_array_of_values_to_be_scored]}]}

response_scoring = requests.post('https://us-south.ml.cloud.ibm.com/ml/v4/deployments/96e5fbad-9de7-442c-86ae-7ddfe2f1b21d/predictions?version=2022-11-19
headers={'Authorization': 'Bearer ' + mltoken})
```

university

Created  
Nov 19, 2022, 2:34 PM

Updated  
Nov 19, 2022, 2:34 PM

Deployment ID  
96e5fbad-9de7-442c-86ae-7d...

Software specification  
runtime-22.1-py3.9

Copies  
1

Serving name  
No serving name.

Description  
No description provided.

Tags  
Add tags to make assets easier to find.

Associated asset  
Model  
d410e0b5-8fba-48bb-9930-dd...

Model ID  
d410e0b5-8fba-48bb-9930-dd...

