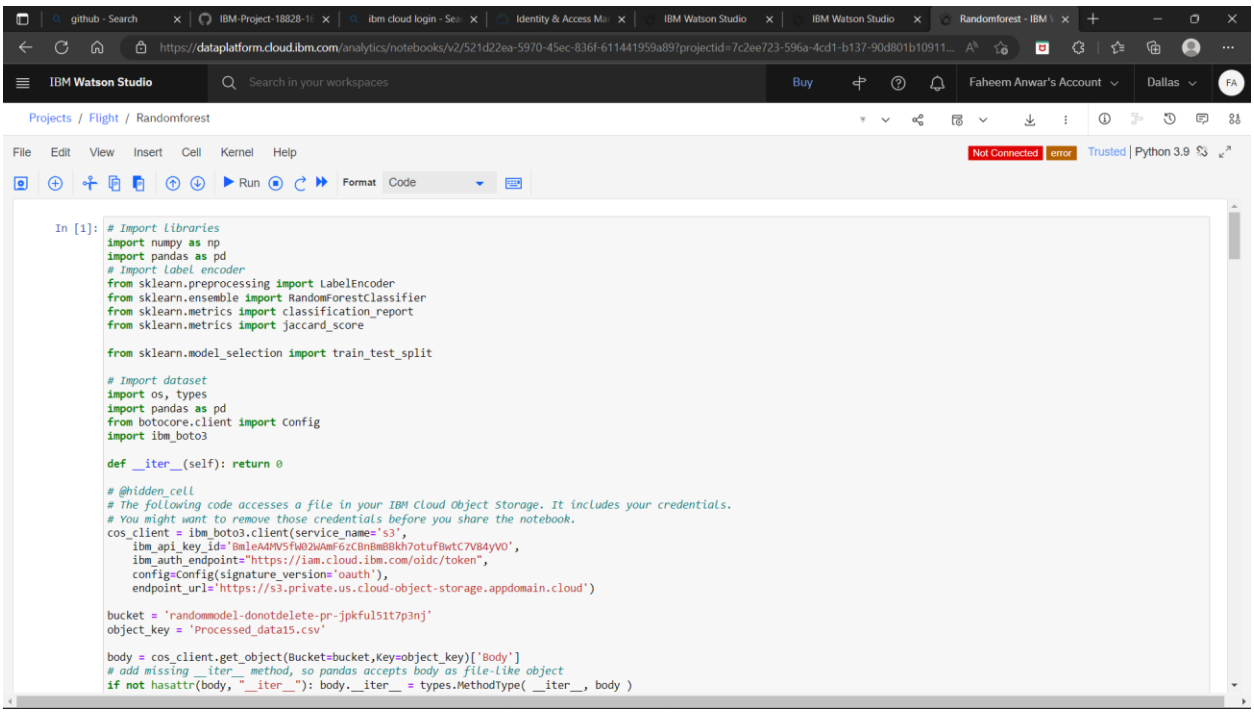
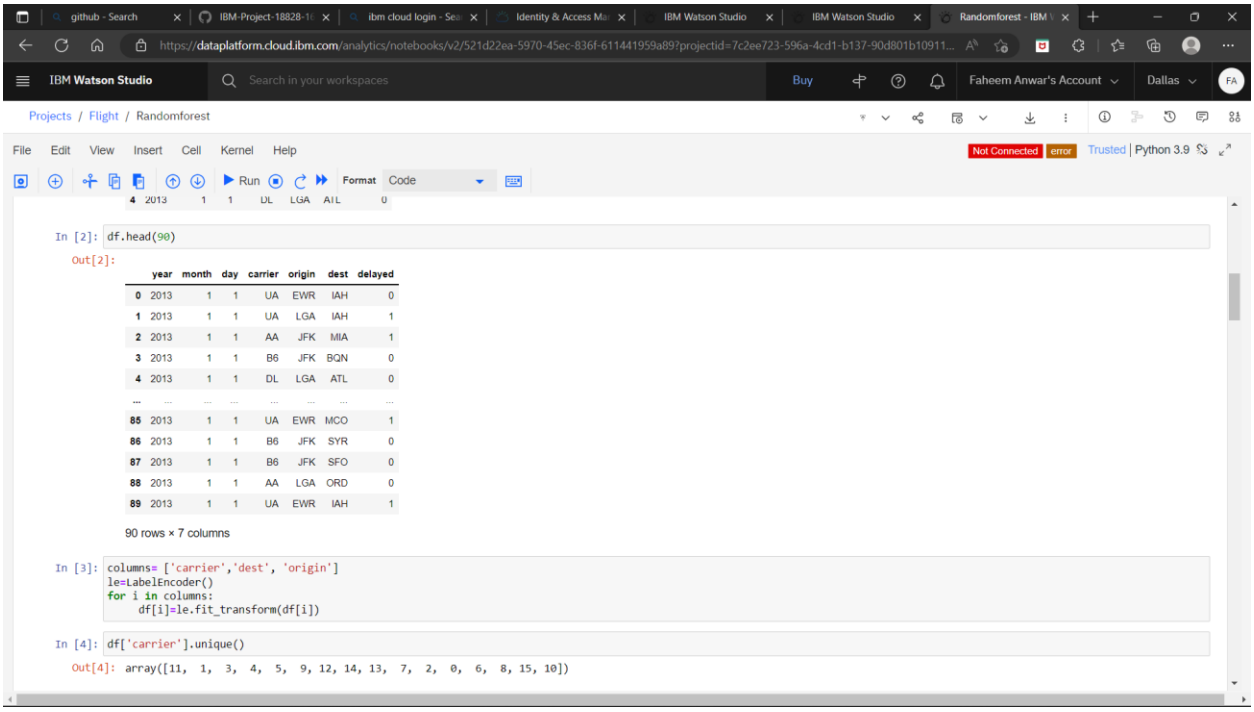
PROJECT DEVELOPMENT PHASE
Sprint 1

Date	18-Nov-22
Team ID	PNTIBM2022TMID52214
Project Name	Developing a Flight Delay Prediction Model Using Machine Learning
Maximum Marks	8 marks

Test cases:

IBM CLOUD DEPLOYMENT:

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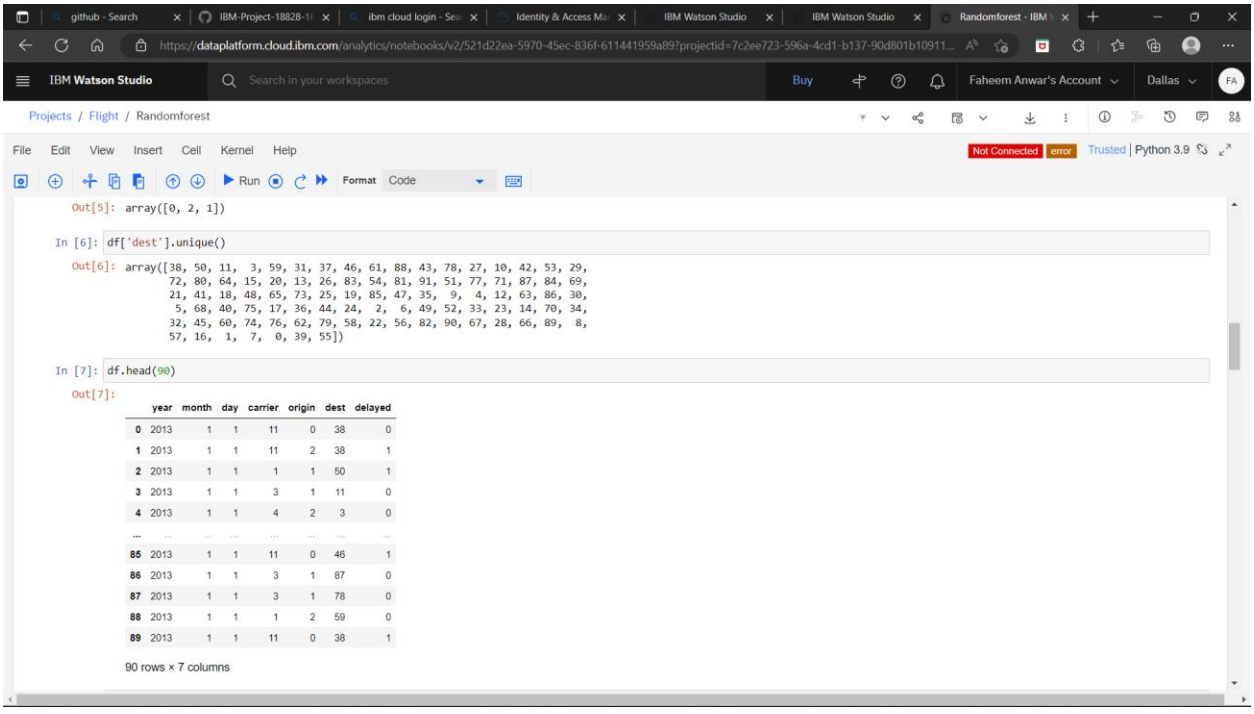
Run Format Code
4 2013 1 1 DL LGA ATL 0
In [2]: df.head(90)
Out[2]:
year month day carrier origin dest delayed
0 2013 1 1 UA EWR IAH 0
1 2013 1 1 UA LGA IAH 1
2 2013 1 1 AA JFK MIA 1
3 2013 1 1 B6 JFK BQN 0
4 2013 1 1 DL LGA ATL 0
85 2013 1 1 UA EWR MCO 1
86 2013 1 1 B6 JFK SYR 0
87 2013 1 1 B6 JFK SFO 0
88 2013 1 1 AA LGA ORD 0
89 2013 1 1 UA EWR IAH 1
90 rows × 7 columns
In [3]: columns= ['carrier','dest', 'origin']
le=LabelEncoder()
for i in columns:
df[i]=le.fit_transform(df[i])
In [4]: df['carrier'].unique()
Out[4]: array([11, 1, 3, 4, 5, 9, 12, 14, 13, 7, 2, 0, 6, 8, 15, 10])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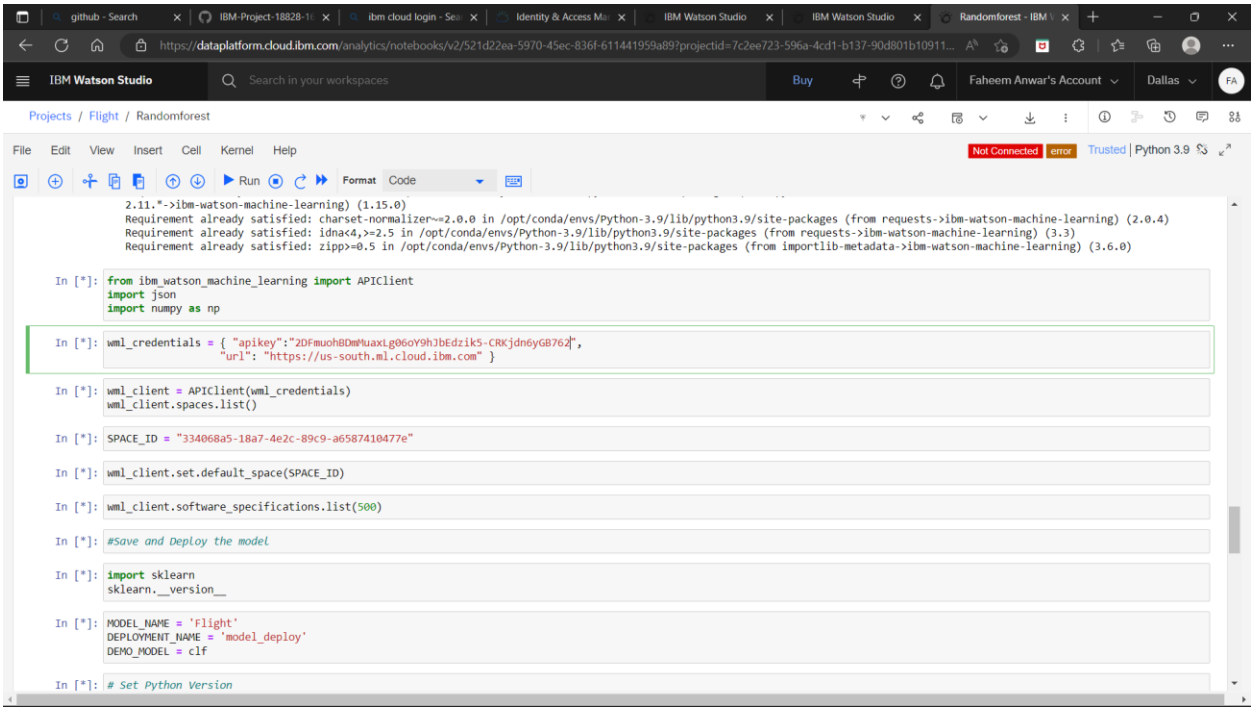
Run Format Code
Out[5]: array([0, 2, 1])
In [6]: df['dest'].unique()
Out[6]: array([38, 50, 11, 3, 59, 31, 37, 46, 61, 88, 43, 78, 27, 10, 42, 53, 29,
72, 80, 64, 15, 20, 13, 26, 83, 54, 81, 91, 51, 77, 71, 87, 84, 69,
21, 41, 18, 48, 65, 73, 25, 19, 85, 47, 35, 9, 4, 12, 63, 86, 30,
5, 68, 40, 75, 17, 36, 44, 24, 2, 6, 49, 52, 33, 23, 14, 70, 34,
32, 45, 60, 74, 76, 62, 79, 58, 22, 56, 82, 90, 67, 28, 66, 89, 8,
57, 16, 1, 7, 0, 39, 55])
In [7]: df.head(90)
Out[7]:
year month day carrier origin dest delayed
0 2013 1 1 11 0 38 0
1 2013 1 1 11 2 38 1
2 2013 1 1 1 1 50 1
3 2013 1 1 3 1 11 0
4 2013 1 1 4 2 3 0
85 2013 1 1 11 0 46 1
86 2013 1 1 3 1 87 0
87 2013 1 1 3 1 78 0
88 2013 1 1 1 2 59 0
89 2013 1 1 11 0 38 1
90 rows × 7 columns



```
2.11.*->ibm-watson-machine-learning) (1.15.0)
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: 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: zipp>=0.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from importlib-metadata->ibm-watson-machine-learning) (3.6.0)
```

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

In [*]:
```
wml_credentials = { "apikey":"2DFmuohBDmMuaxLg06oY9hJbEdzik5-CRKjdn6yGB762",
                    "url": "https://us-south.ml.cloud.ibm.com" }
```

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

In [*]:
```
SPACE_ID = "334068a5-18a7-4e2c-89c9-a6587410477e"
```

In [*]:
```
wml_client.set.default_space(SPACE_ID)
```

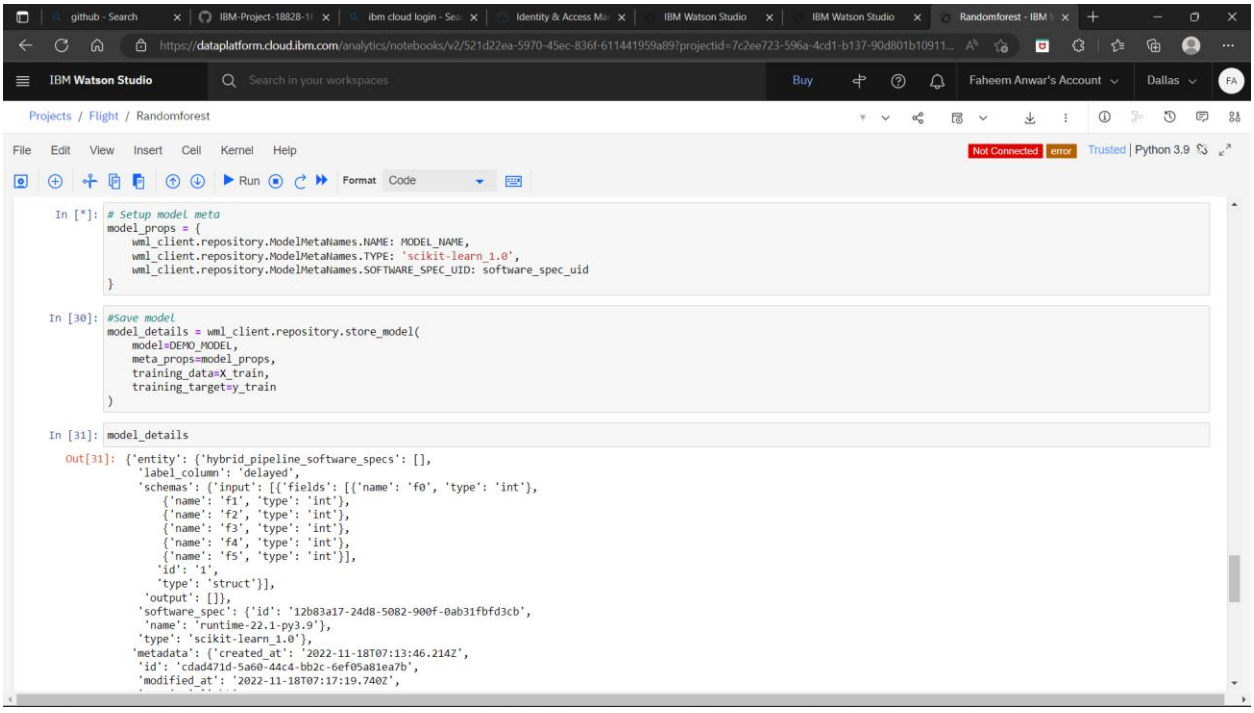
In [*]:
```
wml_client.software_specifications.list(500)
```

In [*]:
```
#Save and Deploy the model
```

In [*]:
```
import sklearn
sklearn.__version__
```

In [*]:
```
MODEL_NAME = 'Flight'
DEPLOYMENT_NAME = 'model_deploy'
DEMO_MODEL = clf
```

In [*]:
```
# Set Python Version
```

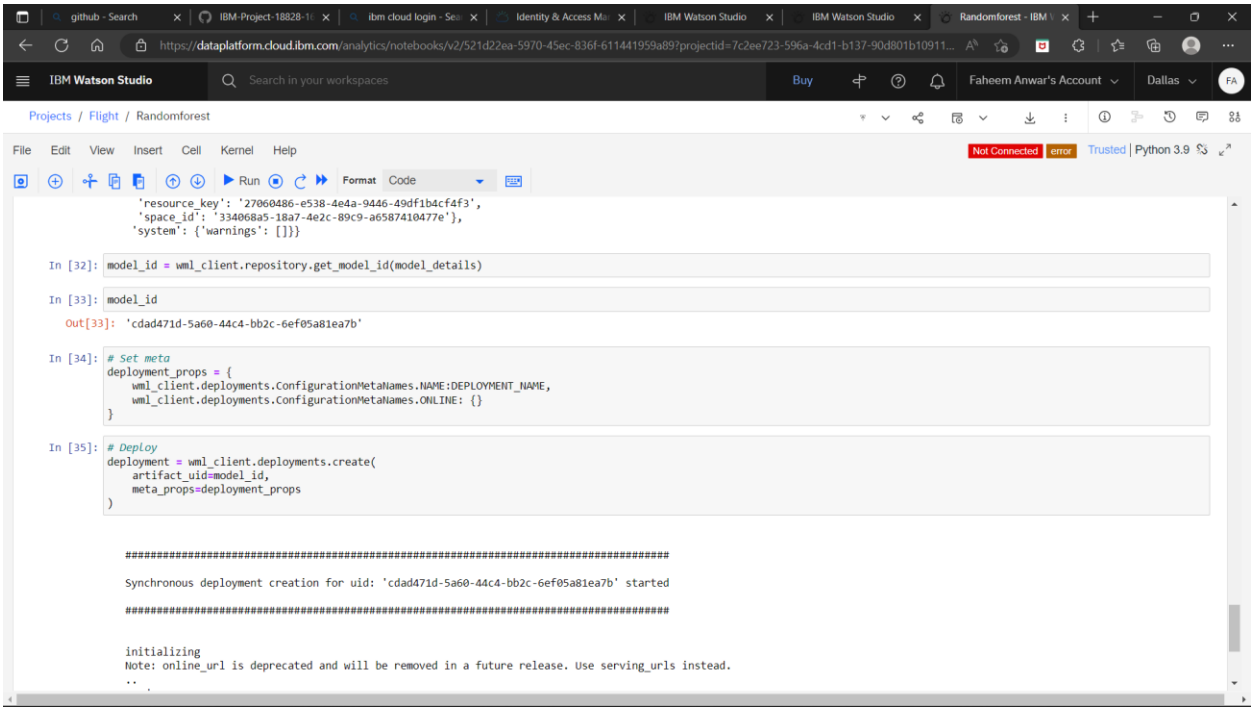


In [*]:
```
# Setup model meta
model_props = {
    wml_client.repository.ModelMetaNames.NAME: MODEL_NAME,
    wml_client.repository.ModelMetaNames.TYPE: 'scikit-learn_1.0',
    wml_client.repository.ModelMetaNames.SOFTWARE_SPEC_UID: software_spec_uid
}
```

In [30]:
```
#Save model
model_details = wml_client.repository.store_model(
    model=DEMO_MODEL,
    meta_props=model_props,
    training_data=X_train,
    training_target=y_train
)
```

In [31]:
```
model_details
```

Out[31]:
```
{'entity': {'hybrid_pipeline_software_specs': [],
  'label_column': 'delayed',
  'schemas': {'input': [{'fields': [{'name': 'f0', 'type': 'int'},
      {'name': 'f1', 'type': 'int'},
      {'name': 'f2', 'type': 'int'},
      {'name': 'f3', 'type': 'int'},
      {'name': 'f4', 'type': 'int'},
      {'name': 'f5', 'type': 'int'}],
     'id': '1',
     'type': 'struct'}],
   'output': []},
  'software_spec': {'id': '12b83a17-24d8-5082-900f-0ab31fbfd3cb',
   'name': 'runtime-22.1-py3.9'},
  'type': 'scikit-learn_1.0'},
 'metadata': {'created_at': '2022-11-18T07:13:46.214Z',
  'id': 'cdad471d-5a60-44c4-bb2c-6ef05a81ea7b',
  'modified_at': '2022-11-18T07:17:19.740Z',
```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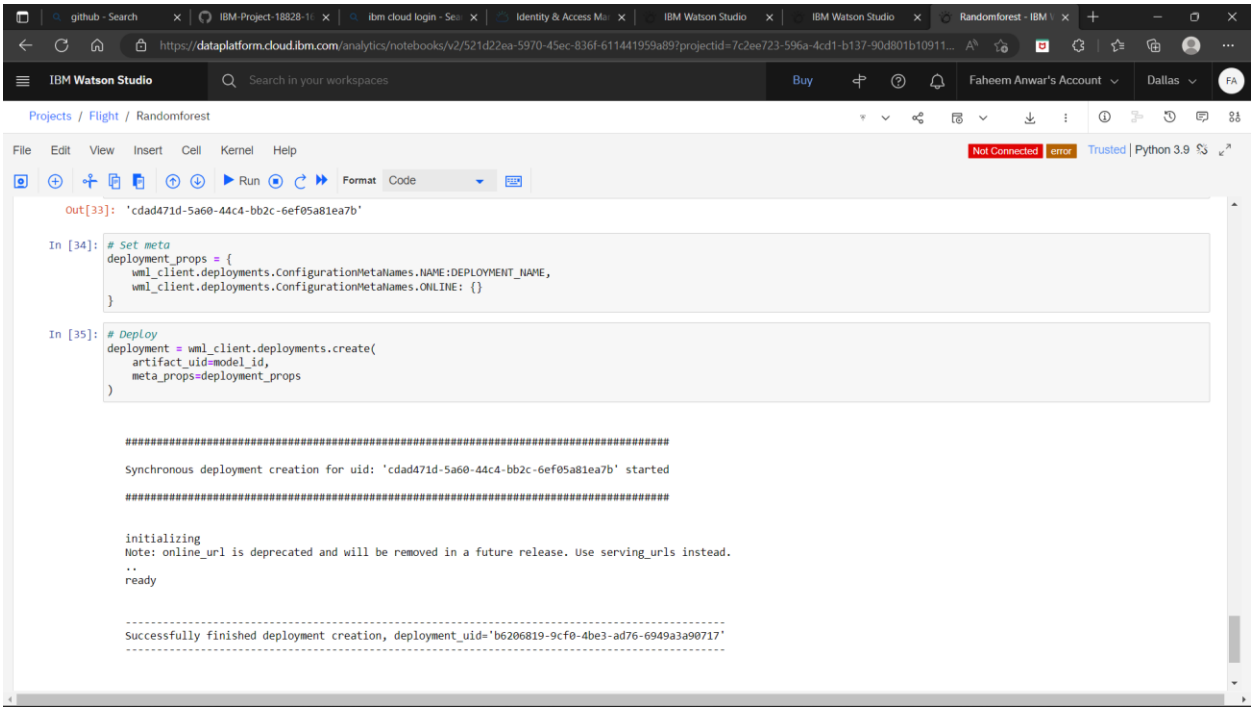
'resource_key': '27060486-e538-4e4a-9446-49df1b4cf4f3',
'space_id': '334068a5-18a7-4e2c-89c9-a6587410477e'},
'system': {'warnings': []}}
In [32]: model_id = wml_client.repository.get_model_id(model_details)
In [33]: model_id
Out[33]: 'cdad471d-5a60-44c4-bb2c-6ef05a81ea7b'
In [34]: # Set meta
deployment_props = {
wml_client.deployments.ConfigurationMetaNames.NAME:DEPLOYMENT_NAME,
wml_client.deployments.ConfigurationMetaNames.ONLINE: {}
}
In [35]: # Deploy
deployment = wml_client.deployments.create(
artifact_uid=model_id,
meta_props=deployment_props
)
Synchronous deployment creation for uid: 'cdad471d-5a60-44c4-bb2c-6ef05a81ea7b' started
initializing
Note: online_url is deprecated and will be removed in a future release. Use serving_urls instead.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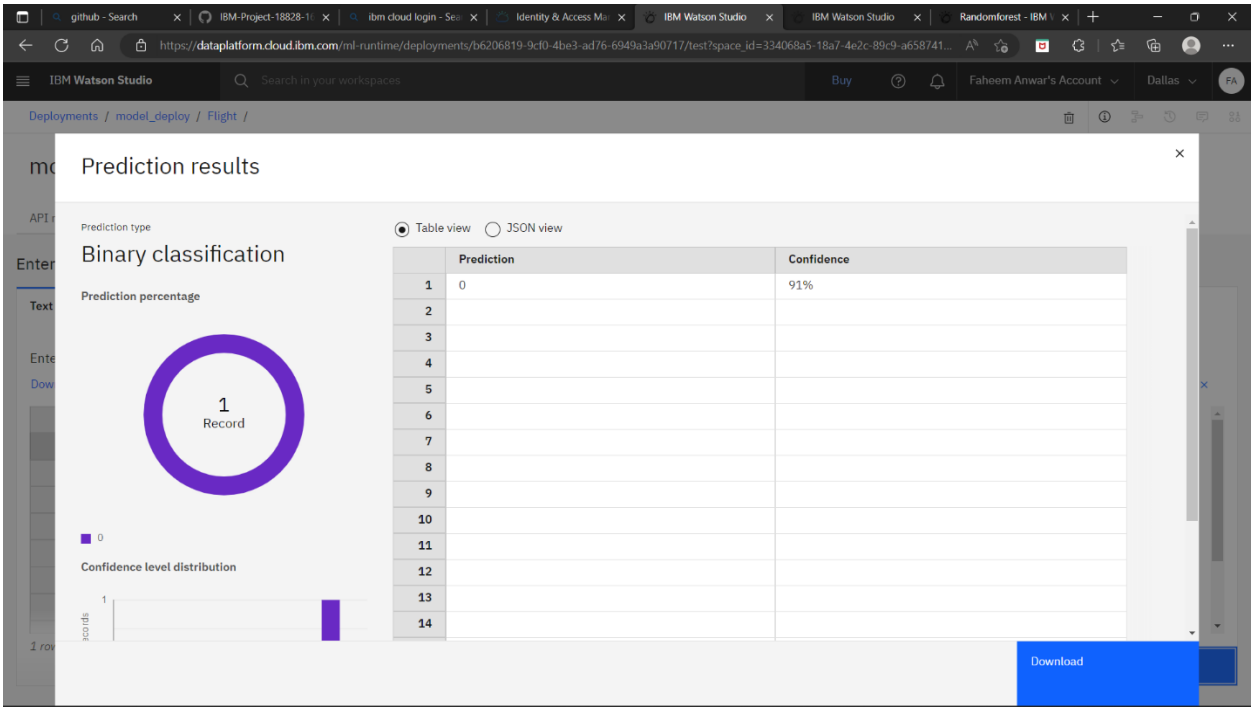
Trusted | Python 3.9
Run Format Code
Out[33]: 'cdad471d-5a60-44c4-bb2c-6ef05a81ea7b'
In [34]: # Set meta
deployment_props = {
wml_client.deployments.ConfigurationMetaNames.NAME:DEPLOYMENT_NAME,
wml_client.deployments.ConfigurationMetaNames.ONLINE: {}
}
In [35]: # Deploy
deployment = wml_client.deployments.create(
artifact_uid=model_id,
meta_props=deployment_props
)
Synchronous deployment creation for uid: 'cdad471d-5a60-44c4-bb2c-6ef05a81ea7b' started
initializing
Note: online_url is deprecated and will be removed in a future release. Use serving_urls instead.
ready
Successfully finished deployment creation, deployment_uid='b6206819-9cf0-4be3-ad76-6949a3a90717'


Prediction results
Prediction type
Binary classification
Prediction percentage
1
Record
0
Confidence level distribution
Table view
JSON view
Prediction
Confidence
1
0
91%
2
3
4
5
6
7
8
9
10
11
12
13
14
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