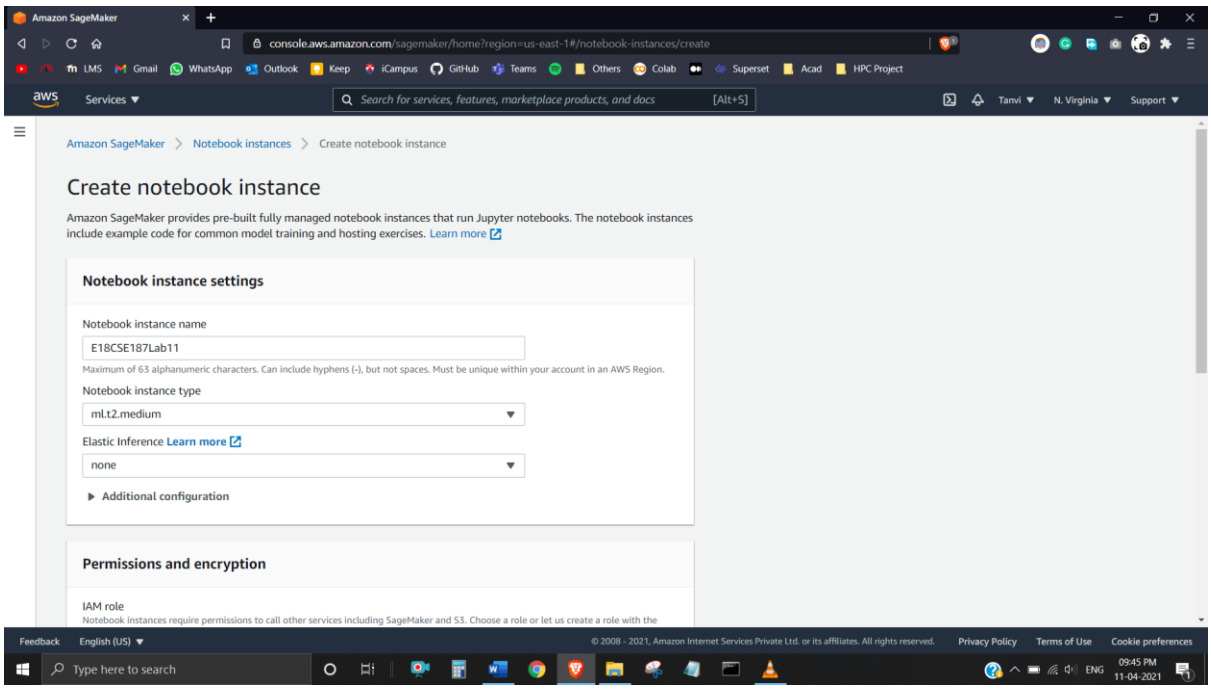
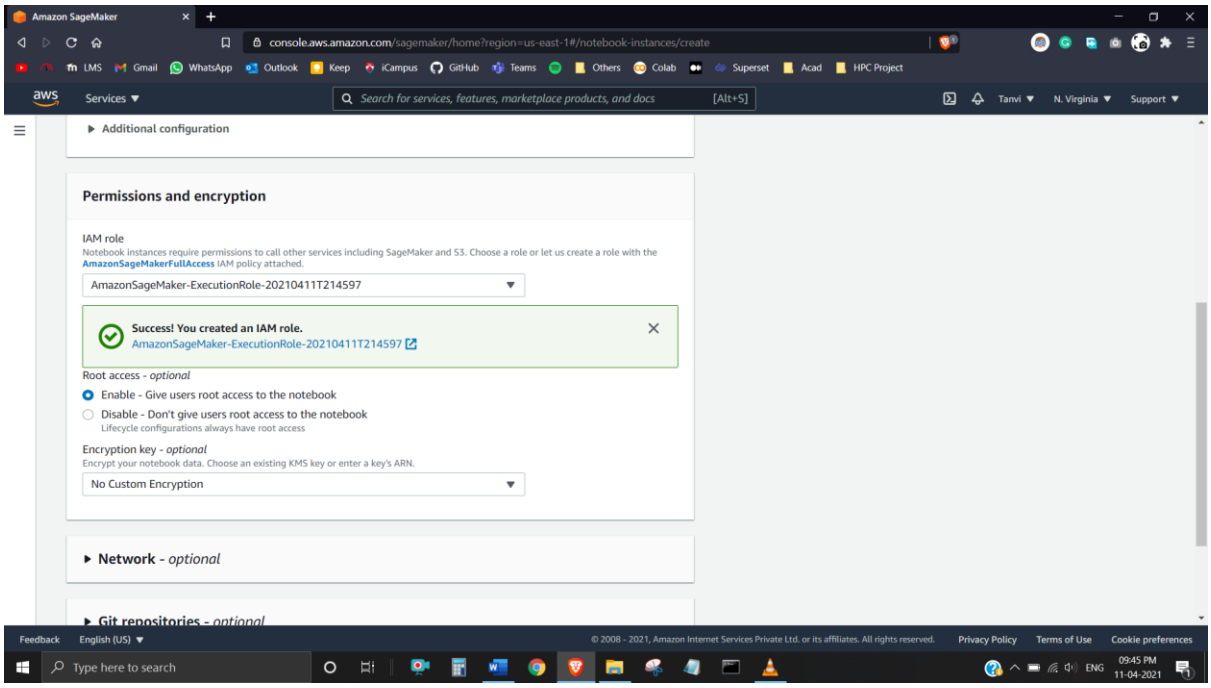
Lab Assignment-11

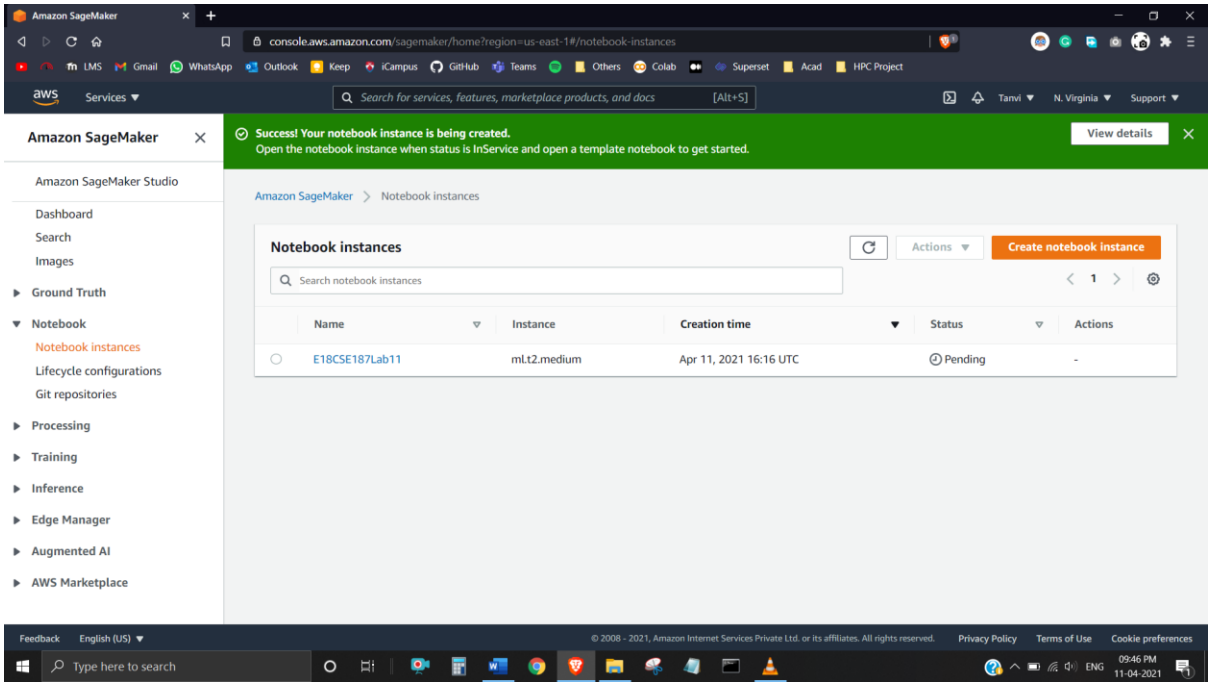
ECSE304L: Cloud Computing

Name: Tanvi Penumudy
Enroll no: E18CSE187
Batch: EB02

Lab Implementation (Step-by-Step):



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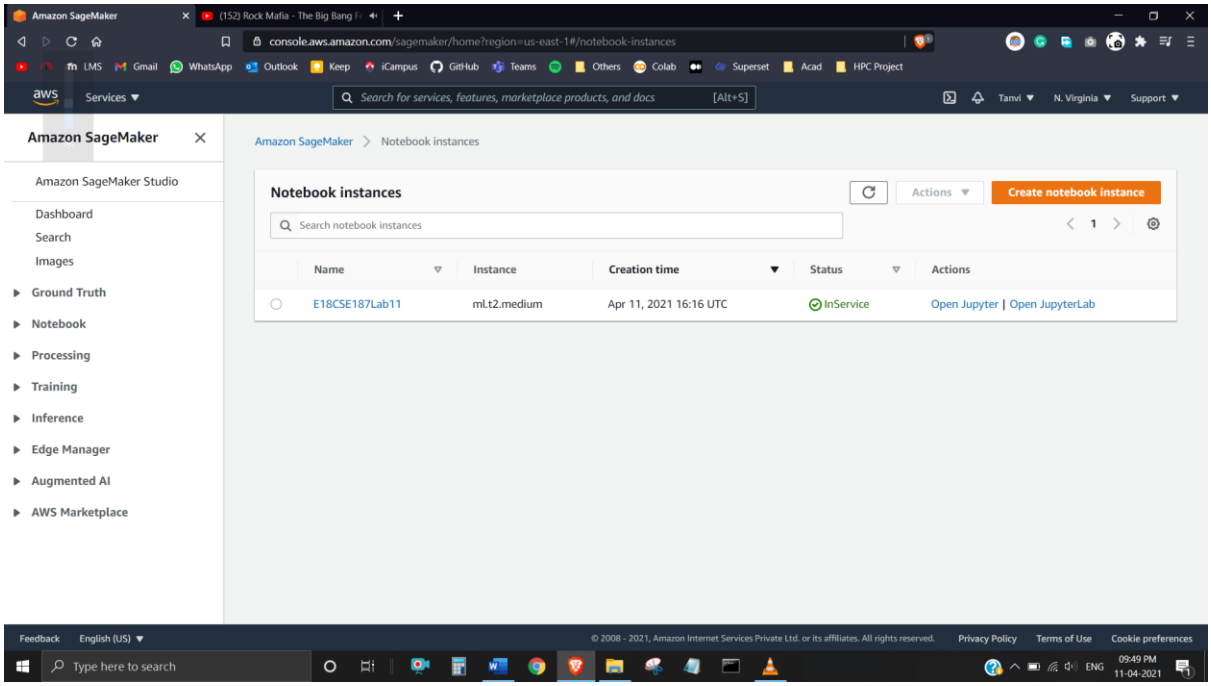
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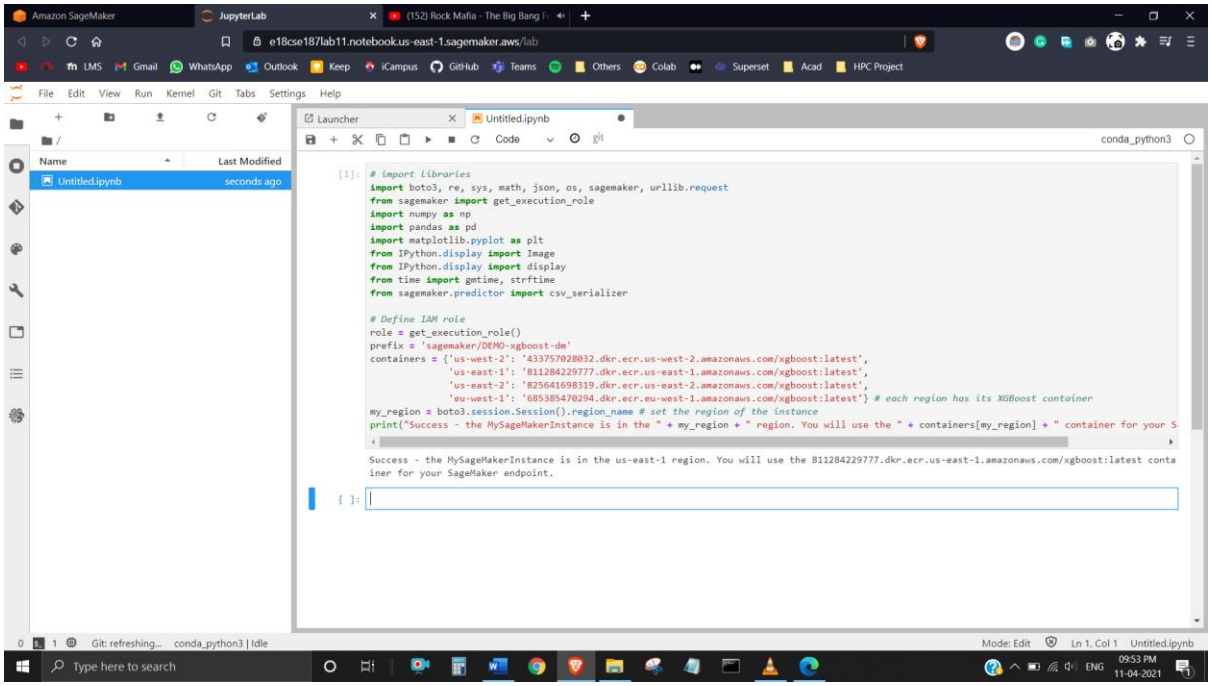
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Code
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[1]:
# import libraries
import boto3, re, sys, math, json, os, sagemaker, urllib.request
from sagemaker import get_execution_role
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from IPython.display import Image
from IPython.display import display
from time import gmtime, strftime
from sagemaker.predictor import csv_serializer
# Define IAM role
role = get_execution_role()
prefix = 'sagemaker/DEMO-xgboost-dm'
containers = {'us-west-2': '433757028032.dkr.ecr.us-west-2.amazonaws.com/xgboost:latest',
'us-east-1': '811284229777.dkr.ecr.us-east-1.amazonaws.com/xgboost:latest',
'us-east-2': '825641698319.dkr.ecr.us-east-2.amazonaws.com/xgboost:latest',
'eu-west-1': '685385470294.dkr.ecr.eu-west-1.amazonaws.com/xgboost:latest'} # each region has its XGBoost container
my_region = boto3.session.Session().region_name # set the region of the instance
print("Success - the MySageMakerInstance is in the " + my_region + " region. You will use the " + containers[my_region] + " container for your S
Success - the MySageMakerInstance is in the us-east-1 region. You will use the 811284229777.dkr.ecr.us-east-1.amazonaws.com/xgboost:latest conta
iner for your SageMaker endpoint.
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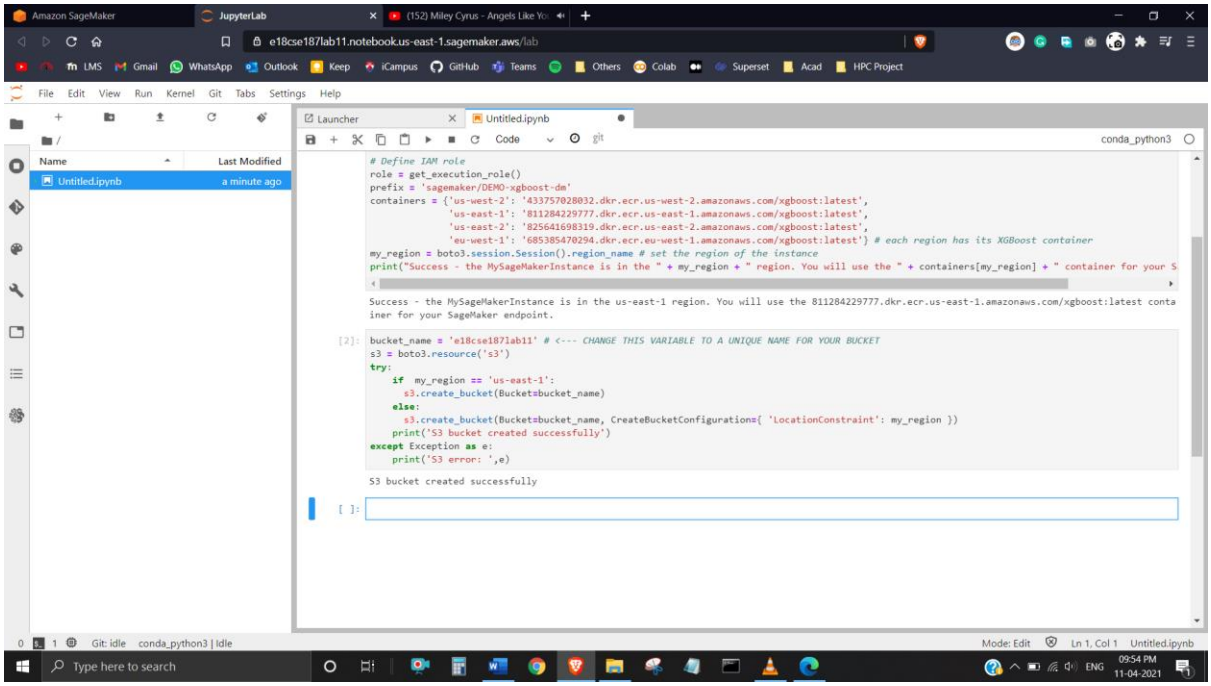
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'us-east-2': '825641698319.dkr.ecr.us-east-2.amazonaws.com/xgboost:latest',
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iner for your SageMaker endpoint.
[2]:
bucket_name = 'e18cse187lab11' # <--- CHANGE THIS VARIABLE TO A UNIQUE NAME FOR YOUR BUCKET
s3 = boto3.resource('s3')
try:
if my_region == 'us-east-1':
s3.create_bucket(Bucket=bucket_name)
else:
s3.create_bucket(Bucket=bucket_name, CreateBucketConfiguration={ 'LocationConstraint': my_region })
print('S3 bucket created successfully')
except Exception as e:
print('S3 error: ',e)
S3 bucket created successfully
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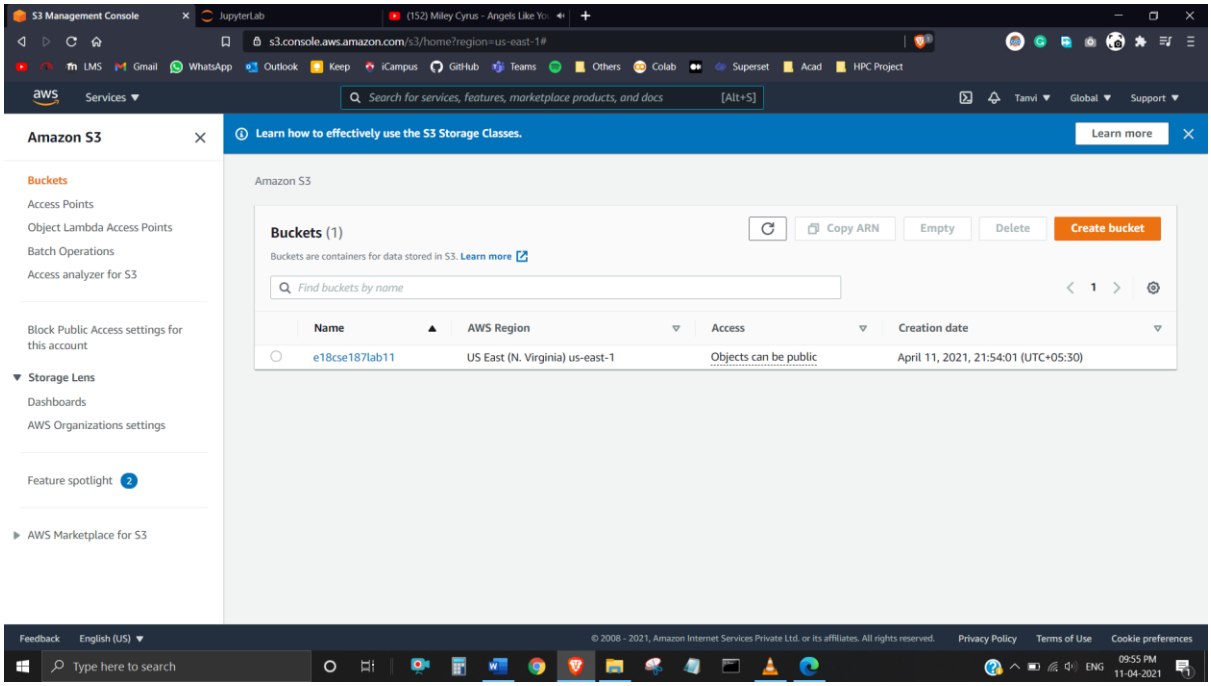
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Services
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Amazon S3
Buckets (1)
Copy ARN
Empty
Delete
Create bucket
Buckets are containers for data stored in S3. Learn more
Find buckets by name
Name
AWS Region
Access
Creation date
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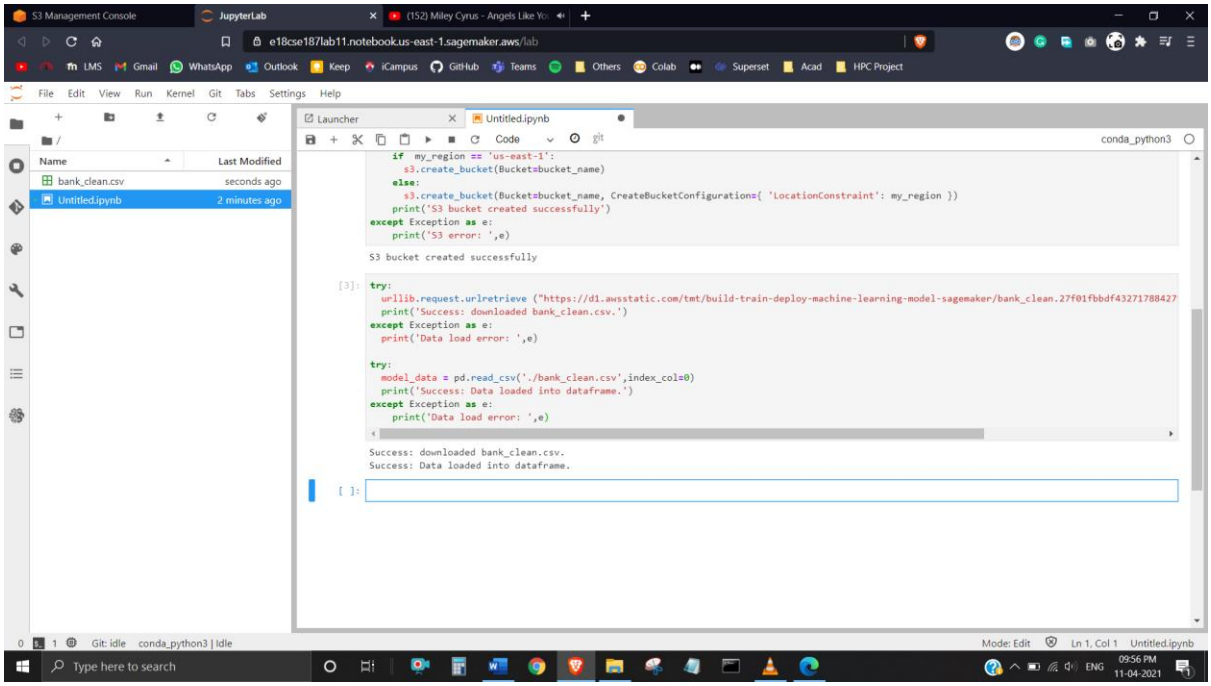
S3 Management Console
JupyterLab
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bank_clean.csv
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if my_region == 'us-east-1':
s3.create_bucket(Bucket=bucket_name)
else:
s3.create_bucket(Bucket=bucket_name, CreateBucketConfiguration={ 'LocationConstraint': my_region })
print('S3 bucket created successfully')
except Exception as e:
print('S3 error: ',e)
S3 bucket created successfully
[3]:
try:
urllib.request.urlretrieve ("https://d1.awsstatic.com/tmt/build-train-deploy-machine-learning-model-sagemaker/bank_clean.27f01fbbdf43271788427
print('Success: downloaded bank_clean.csv.')
except Exception as e:
print('Data load error: ',e)
try:
model_data = pd.read_csv('./bank_clean.csv',index_col=0)
print('Success: Data loaded into dataframe.')
except Exception as e:
print('Data load error: ',e)
Success: downloaded bank_clean.csv.
Success: Data loaded into dataframe.
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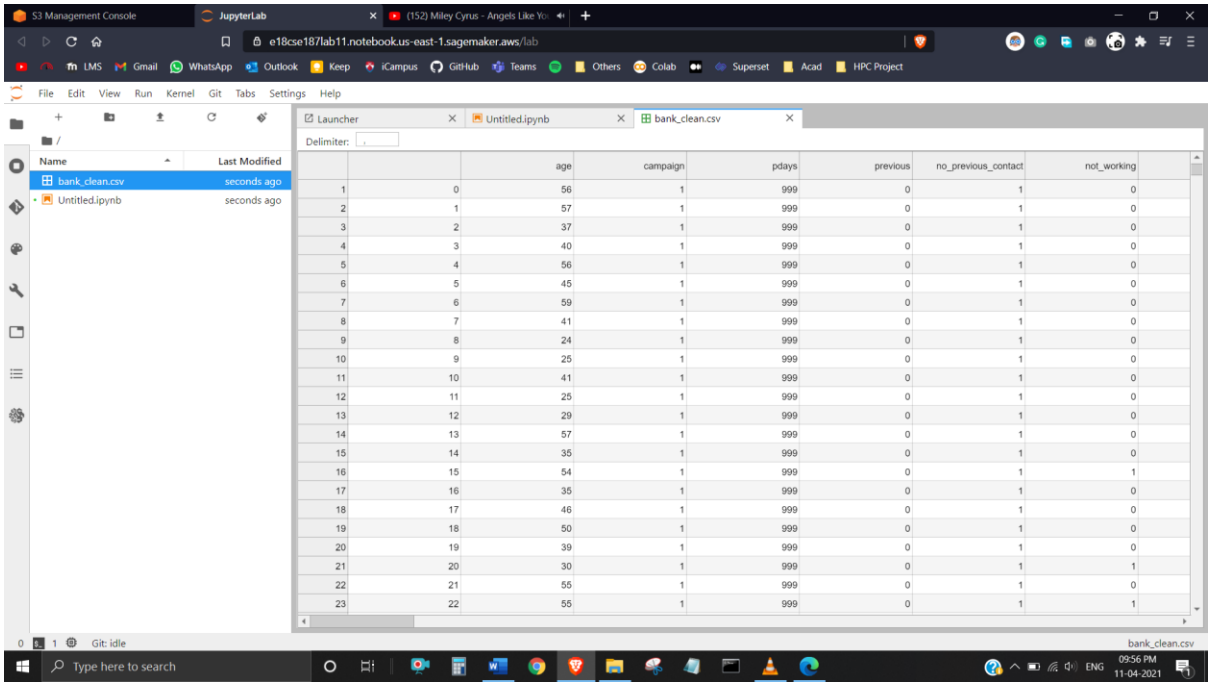

		age	campaign	pdays	previous	no_previous_contact	not_working
1	0	56	1	999	0	1	0
2	1	57	1	999	0	1	0
3	2	37	1	999	0	1	0
4	3	40	1	999	0	1	0
5	4	56	1	999	0	1	0
6	5	45	1	999	0	1	0
7	6	59	1	999	0	1	0
8	7	41	1	999	0	1	0
9	8	24	1	999	0	1	0
10	9	25	1	999	0	1	0
11	10	41	1	999	0	1	0
12	11	25	1	999	0	1	0
13	12	29	1	999	0	1	0
14	13	57	1	999	0	1	0
15	14	35	1	999	0	1	0
16	15	54	1	999	0	1	1
17	16	35	1	999	0	1	0
18	17	46	1	999	0	1	0
19	18	50	1	999	0	1	0
20	19	39	1	999	0	1	0
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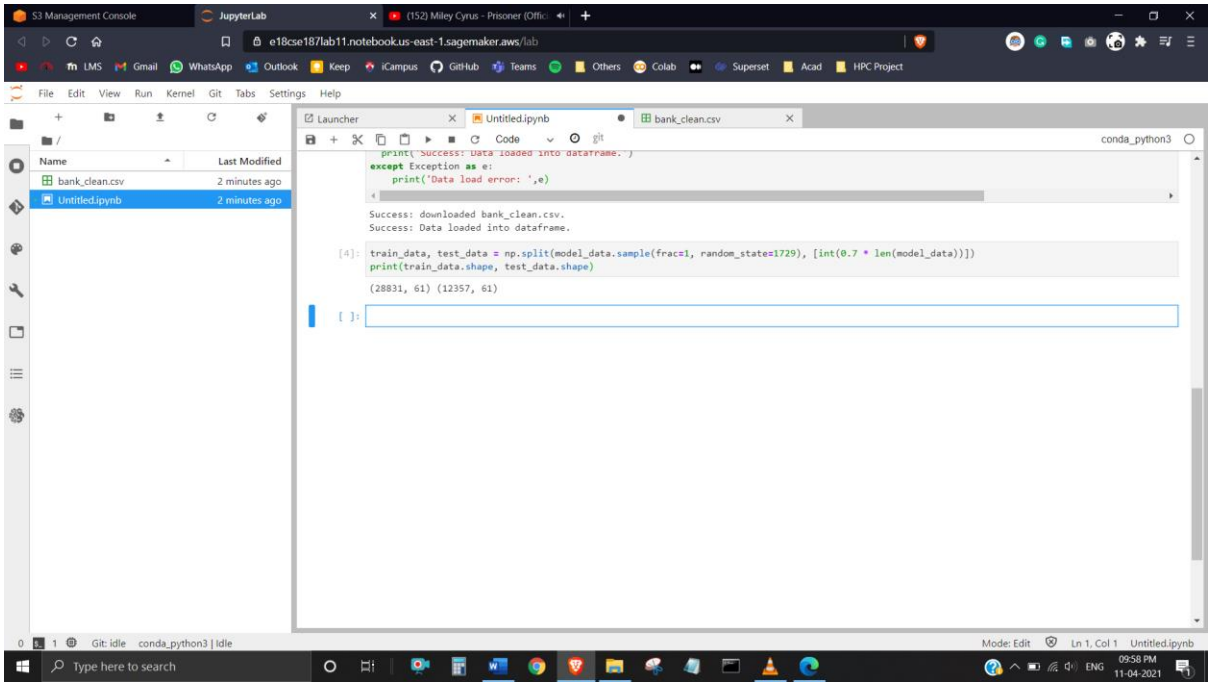
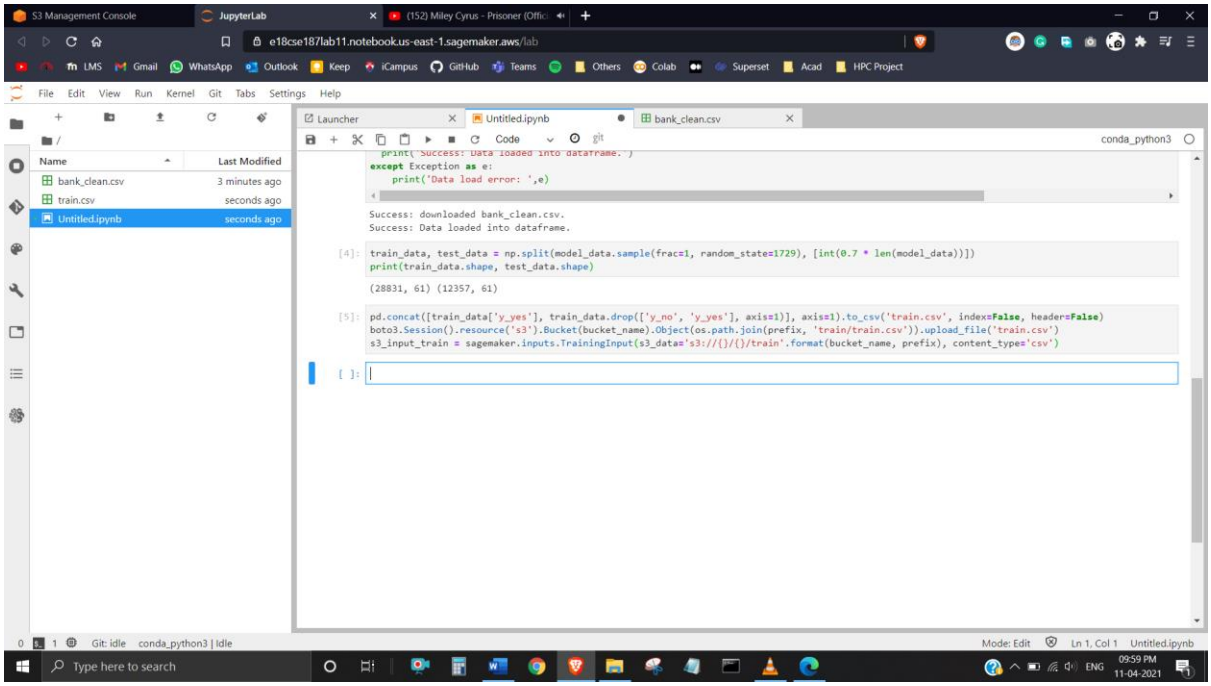
22	21	55	1	999	0	1	0
23	22	55	1	999	0	1	1

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Launcher
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bank_clean.csv
Code
conda_python3
Name
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bank_clean.csv 3 minutes ago
train.csv seconds ago
Untitled.ipynb seconds ago
except Exception as e:
print('Data load error: ',e)
Success: downloaded bank_clean.csv.
Success: Data loaded into dataframe.
[4]: train_data, test_data = np.split(model_data.sample(frac=1, random_state=1729), [int(0.7 * len(model_data))])
print(train_data.shape, test_data.shape)
(28831, 61) (12357, 61)
[5]: pd.concat([train_data['y_yes'], train_data.drop(['y_no', 'y_yes'], axis=1)], axis=1).to_csv('train.csv', index=False, header=False)
boto3.Session().resource('s3').Bucket(bucket_name).Object(os.path.join(prefix, 'train/train.csv')).upload_file('train.csv')
s3_input_train = sagemaker.inputs.TrainingInput(s3_data='s3://{}/{}/train'.format(bucket_name, prefix), content_type='csv')
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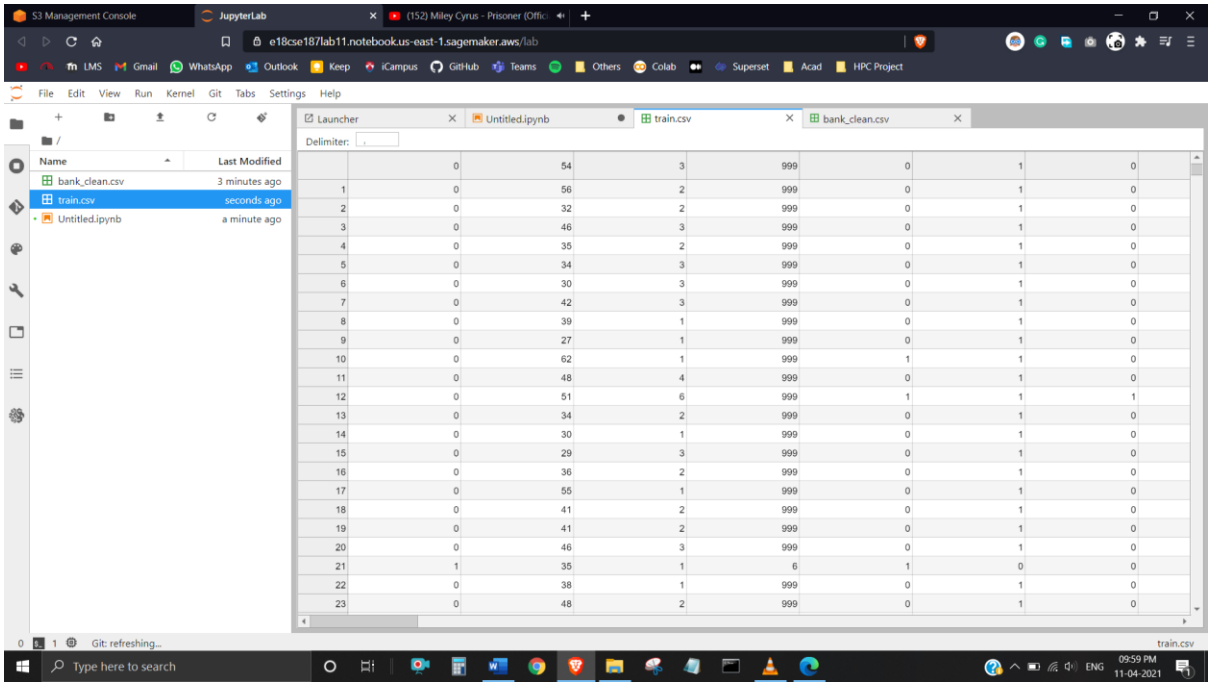
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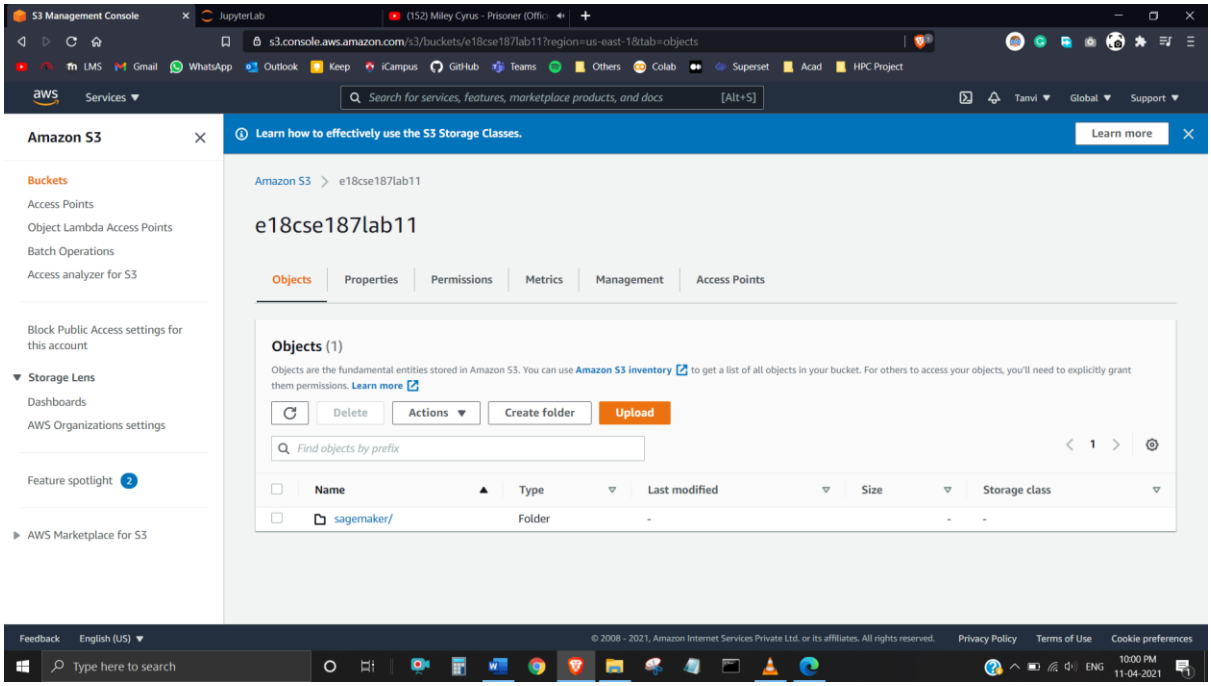
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Objects
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Permissions
Metrics
Management
Access Points
Objects (1)
Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more
Delete
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Create folder
Upload
Find objects by prefix
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Last modified
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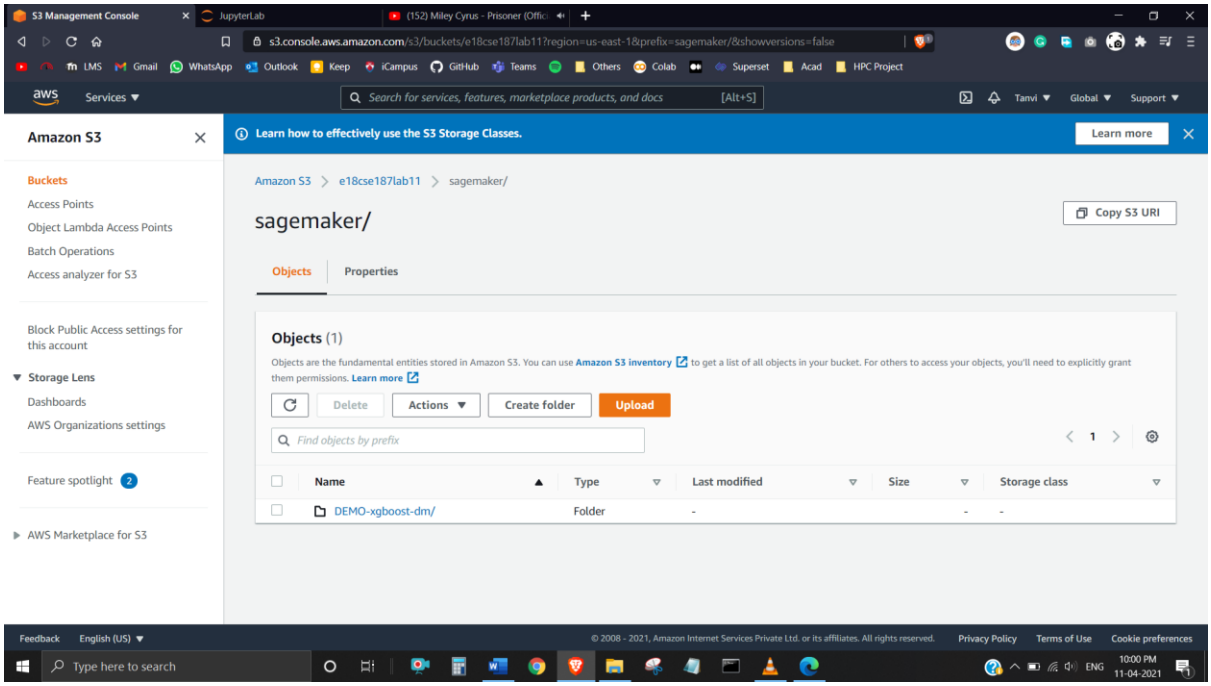
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Objects
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Objects (1)
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Delete
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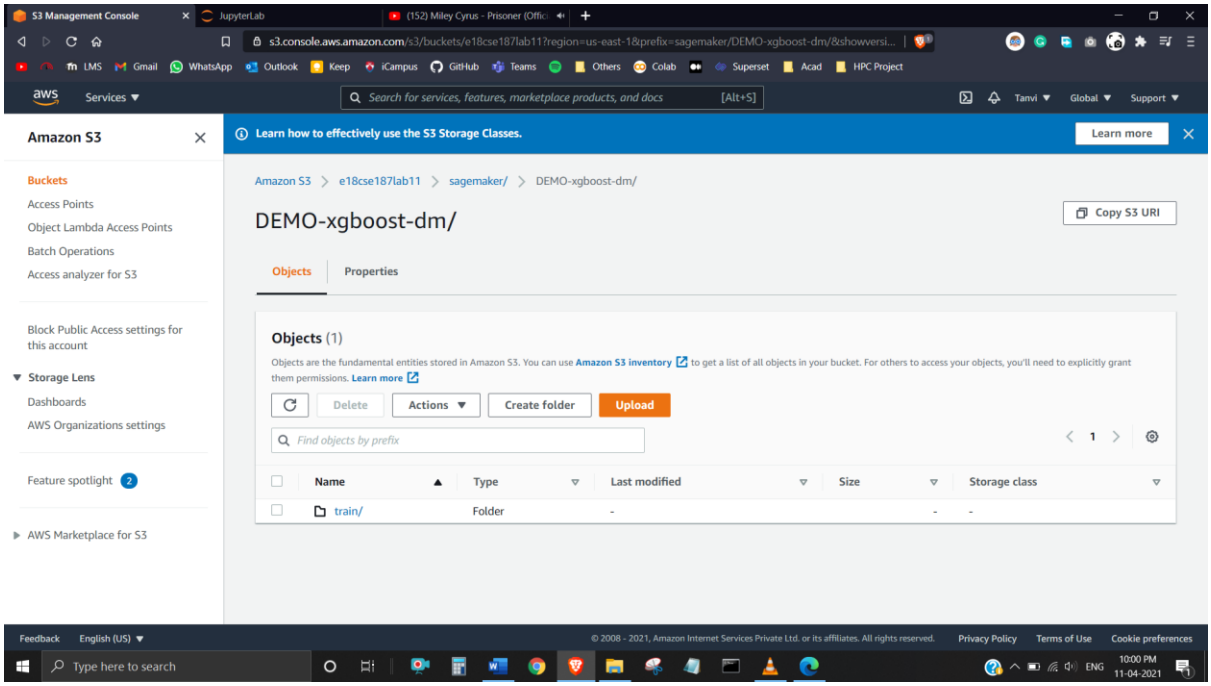
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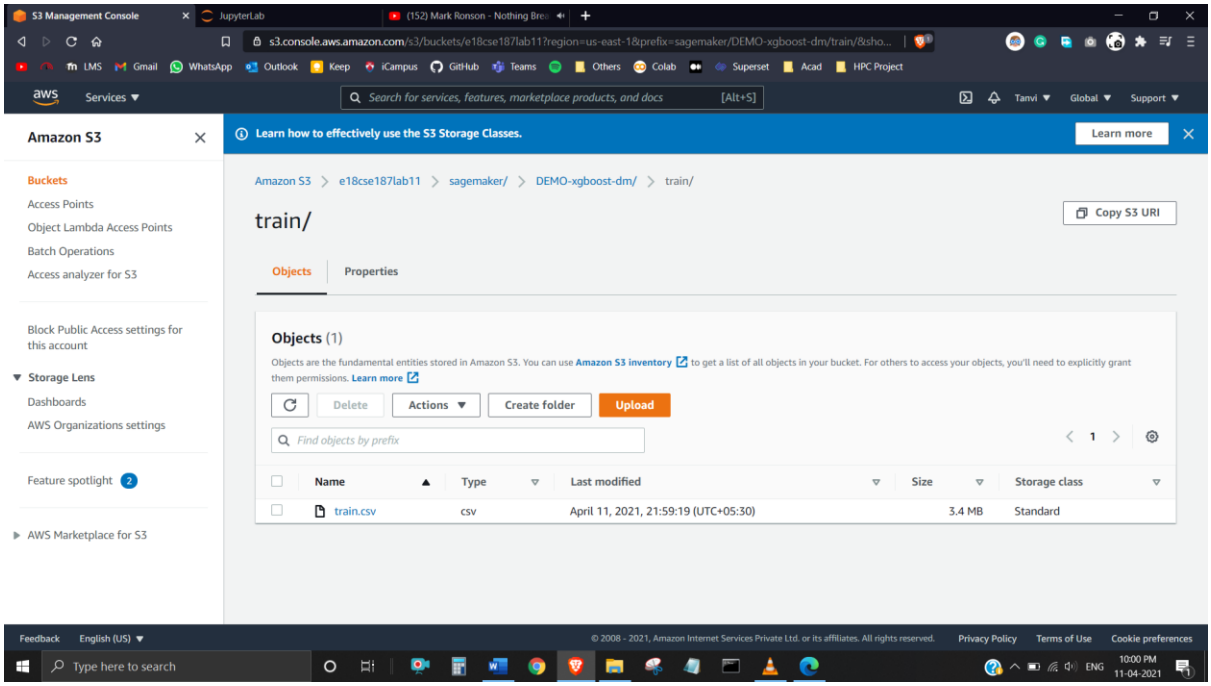
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Create folder
Upload
Find objects by prefix
Name
Type
Last modified
Size
Storage class
train.csv
csv
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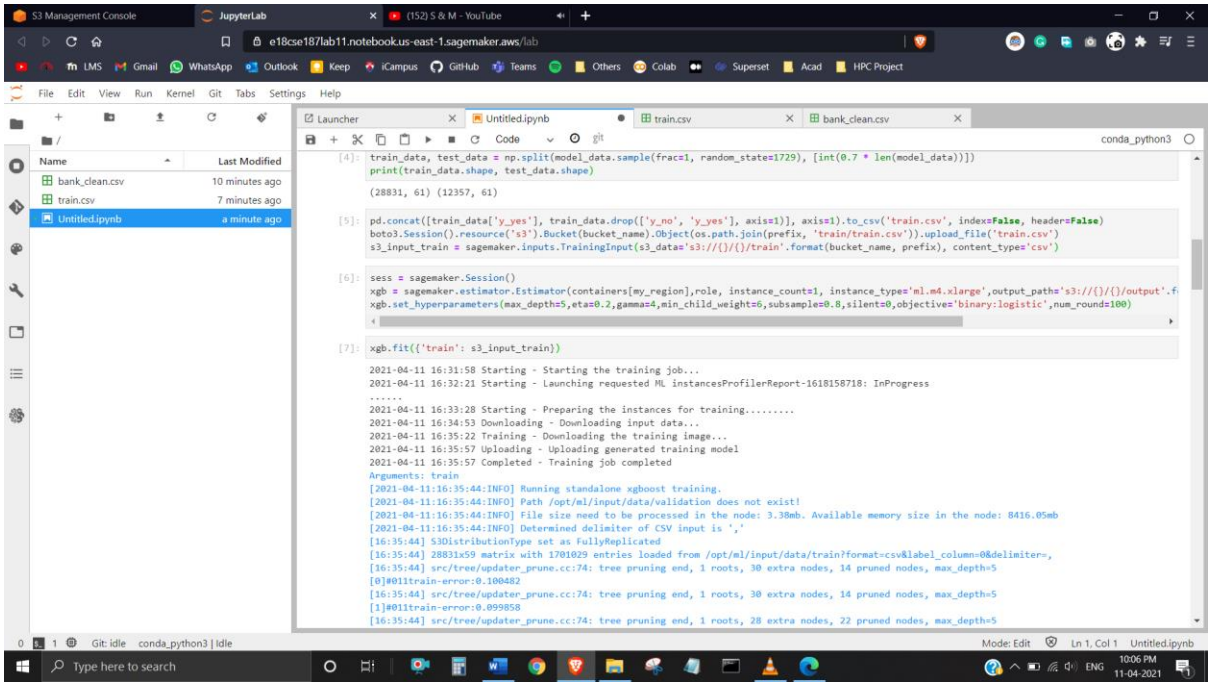
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File Edit View Run Kernel Git Tabs Settings Help
Launcher
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train.csv
bank_clean.csv
Code
conda_python3
Name
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bank_clean.csv 10 minutes ago
train.csv 7 minutes ago
Untitled.ipynb a minute ago
[4]: train_data, test_data = np.split(model_data.sample(frac=1, random_state=1729), [int(0.7 * len(model_data))])
print(train_data.shape, test_data.shape)
(28831, 61) (12357, 61)
[5]: pd.concat([train_data['y_yes'], train_data.drop(['y_no', 'y_yes'], axis=1)], axis=1).to_csv('train.csv', index=False, header=False)
boto3.Session().resource('s3').Bucket(bucket_name).Object(os.path.join(prefix, 'train/train.csv')).upload_file('train.csv')
s3_input_train = sagemaker.inputs.TrainingInput(s3_data='s3://{}/{}/train'.format(bucket_name, prefix), content_type='csv')
[6]: sess = sagemaker.Session()
xgb = sagemaker.estimator.Estimator(containers[my_region],role, instance_count=1, instance_type='ml.m4.xlarge',output_path='s3://{}/{}/output'.f
xgb.set_hyperparameters(max_depth=5,eta=0.2,gamma=4,min_child_weight=6,subsample=0.8,silent=0,objective='binary:logistic',num_round=100)
[7]: xgb.fit({'train': s3_input_train})
2021-04-11 16:31:58 Starting - Starting the training job...
2021-04-11 16:32:21 Starting - Launching requested ML instancesProfilerReport-1618158718: InProgress
.....
2021-04-11 16:33:28 Starting - Preparing the instances for training.....
2021-04-11 16:34:53 Downloading - Downloading input data...
2021-04-11 16:35:22 Training - Downloading the training image...
2021-04-11 16:35:57 Uploading - Uploading generated training model
2021-04-11 16:35:57 Completed - Training job completed
Arguments: train
[2021-04-11:16:35:44:INFO] Running standalone xgboost training.
[2021-04-11:16:35:44:INFO] Path /opt/ml/input/data/validation does not exist!
[2021-04-11:16:35:44:INFO] File size need to be processed in the node: 3.38mb. Available memory size in the node: 8416.05mb
[2021-04-11:16:35:44:INFO] Determined delimiter of CSV input is ','
[16:35:44] S3DistributionType set as FullyReplicated
[16:35:44] 28831x59 matrix with 1701029 entries loaded from /opt/ml/input/data/train?format=csv&label_column=0&delimiter=,
[16:35:44] src/tree/updater_prune.cc:74: tree pruning end, 1 roots, 30 extra nodes, 14 pruned nodes, max_depth=5
[0]#011train-error:0.100482
[16:35:44] src/tree/updater_prune.cc:74: tree pruning end, 1 roots, 30 extra nodes, 14 pruned nodes, max_depth=5
[1]#011train-error:0.099858
[16:35:44] src/tree/updater_prune.cc:74: tree pruning end, 1 roots, 28 extra nodes, 22 pruned nodes, max_depth=5
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Mode: Edit Ln 1, Col 1 Untitled.ipynb
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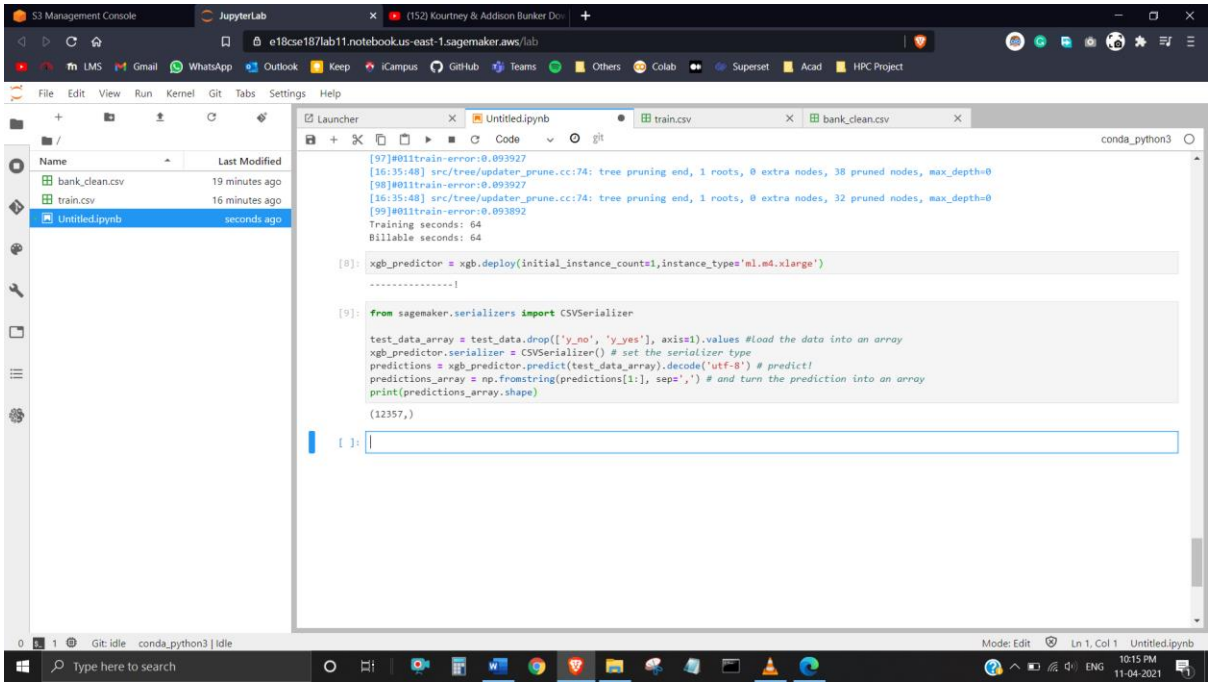
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Launcher
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train.csv
bank_clean.csv
Code
conda_python3
Name
Last Modified
bank_clean.csv 19 minutes ago
train.csv 16 minutes ago
Untitled.ipynb seconds ago
[97]#011train-error:0.093927
[16:35:48] src/tree/updater_prune.cc:74: tree pruning end, 1 roots, 0 extra nodes, 38 pruned nodes, max_depth=0
[98]#011train-error:0.093927
[16:35:48] src/tree/updater_prune.cc:74: tree pruning end, 1 roots, 0 extra nodes, 32 pruned nodes, max_depth=0
[99]#011train-error:0.093892
Training seconds: 64
Billable seconds: 64
[8]: xgb_predictor = xgb.deploy(initial_instance_count=1,instance_type='ml.m4.xlarge')
----------!
[9]: from sagemaker.serializers import CSVSerializer
test_data_array = test_data.drop(['y_no', 'y_yes'], axis=1).values #load the data into an array
xgb_predictor.serializer = CSVSerializer() # set the serializer type
predictions = xgb_predictor.predict(test_data_array).decode('utf-8') # predict!
predictions_array = np.fromstring(predictions[1:], sep=',') # and turn the prediction into an array
print(predictions_array.shape)
(12357,)
[ ]:
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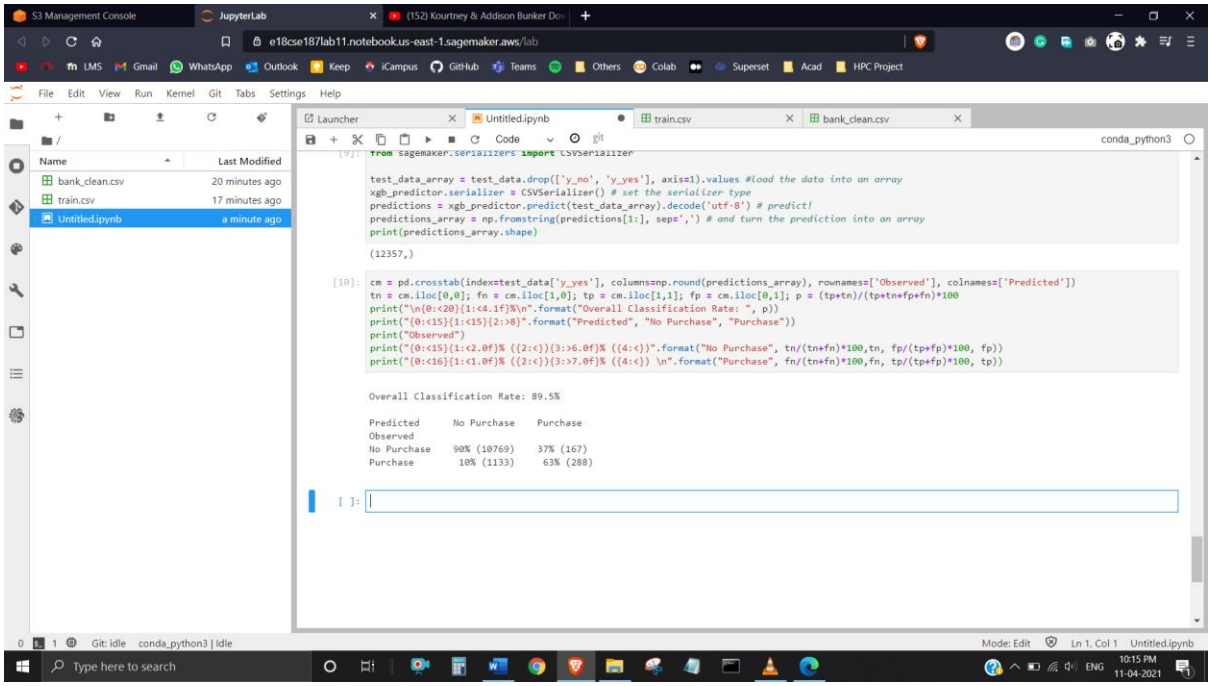
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train.csv
bank_clean.csv
Name
Last Modified
bank_clean.csv 20 minutes ago
train.csv 17 minutes ago
Untitled.ipynb a minute ago
Code
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from sagemaker.serializers import CSVSerializer
test_data_array = test_data.drop(['y_no', 'y_yes'], axis=1).values #load the data into an array
xgb_predictor.serializer = CSVSerializer() # set the serializer type
predictions = xgb_predictor.predict(test_data_array).decode('utf-8') # predict!
predictions_array = np.fromstring(predictions[1:], sep=',') # and turn the prediction into an array
print(predictions_array.shape)
(12357,)
cm = pd.crosstab(index=test_data['y_yes'], columns=np.round(predictions_array), rownames=['Observed'], colnames=['Predicted'])
tn = cm.iloc[0,0]; fn = cm.iloc[1,0]; tp = cm.iloc[1,1]; fp = cm.iloc[0,1]; p = (tp+tn)/(tp+tn+fp+fn)*100
print("\n{0:<20}{1:<4.1f}%\n".format("Overall Classification Rate: ", p))
print("{0:<15}{1:<15}{2:>8}".format("Predicted", "No Purchase", "Purchase"))
print("Observed")
print("{0:<15}{1:<2.0f}% ({2:<}){3:>6.0f}% ({4:<})".format("No Purchase", tn/(tn+fn)*100,tn, fp/(tp+fp)*100, fp))
print("{0:<16}{1:<1.0f}% ({2:<}){3:>7.0f}% ({4:<}) \n".format("Purchase", fn/(tn+fn)*100,fn, tp/(tp+fp)*100, tp))
Overall Classification Rate: 89.5%
Predicted No Purchase Purchase
Observed
No Purchase 90% (10769) 37% (167)
Purchase 10% (1133) 63% (288)
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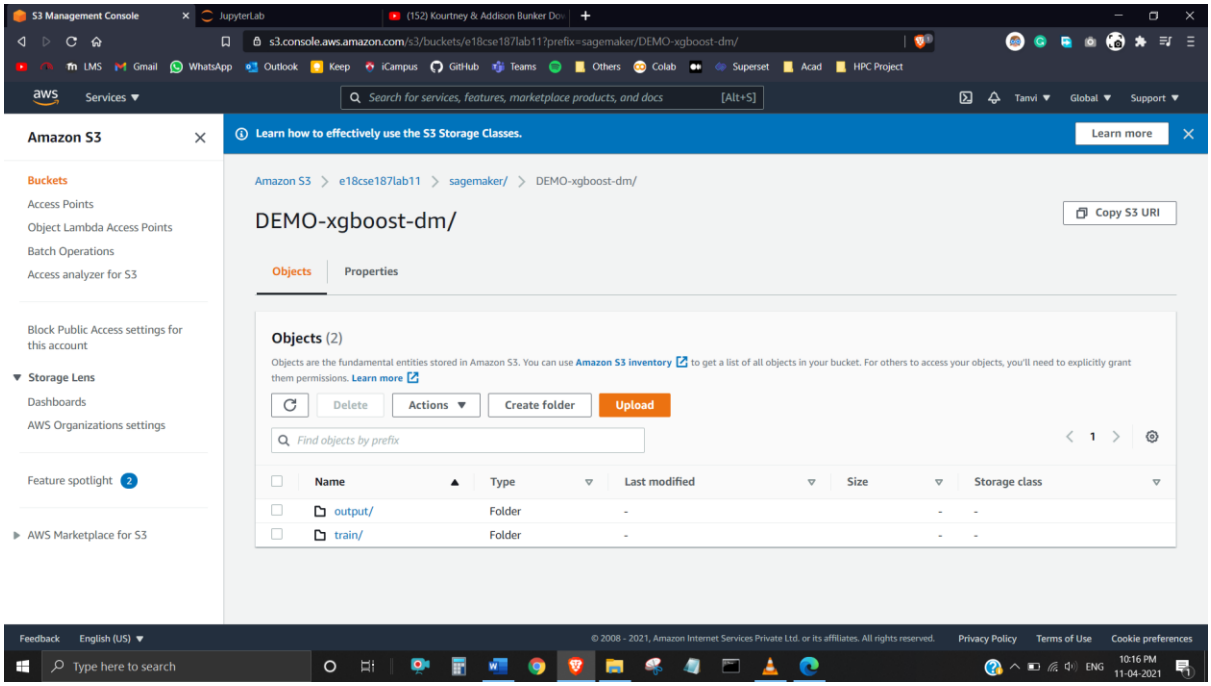
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Feature spotlight 2
AWS Marketplace for S3
Amazon S3 > e18cse187lab11 > sagemaker/ > DEMO-xgboost-dm/
DEMO-xgboost-dm/
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Objects
Properties
Objects (2)
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Delete
Actions
Create folder
Upload
Find objects by prefix
Name
Type
Last modified
Size
Storage class
output/ Folder - - -
train/ Folder - - -
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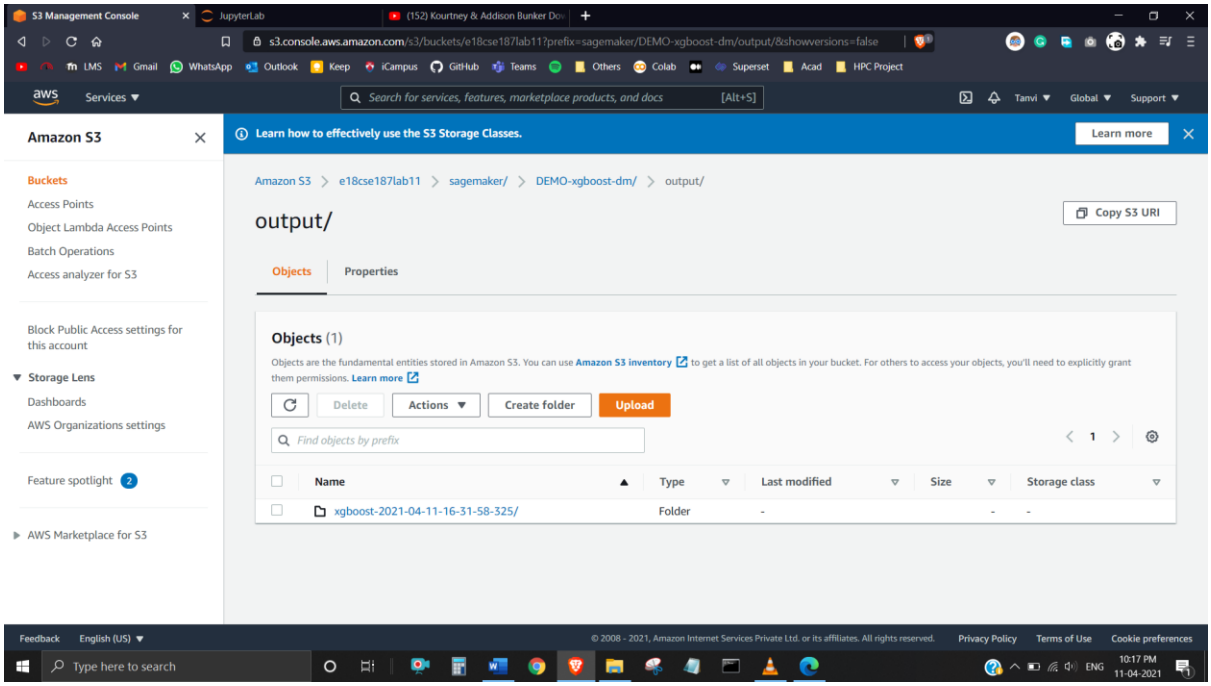
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s3.console.aws.amazon.com/s3/buckets/e18cse187lab11?prefix=sagemaker/DEMO-xgboost-dm/output/&showversions=false
LMS
Gmail
WhatsApp
Outlook
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iCampus
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2
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Amazon S3 > e18cse187lab11 > sagemaker/ > DEMO-xgboost-dm/ > output/
output/
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Properties
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Delete
Actions
Create folder
Upload
Find objects by prefix
1
Name
Type
Last modified
Size
Storage class
xgboost-2021-04-11-16-31-58-325/
Folder
-
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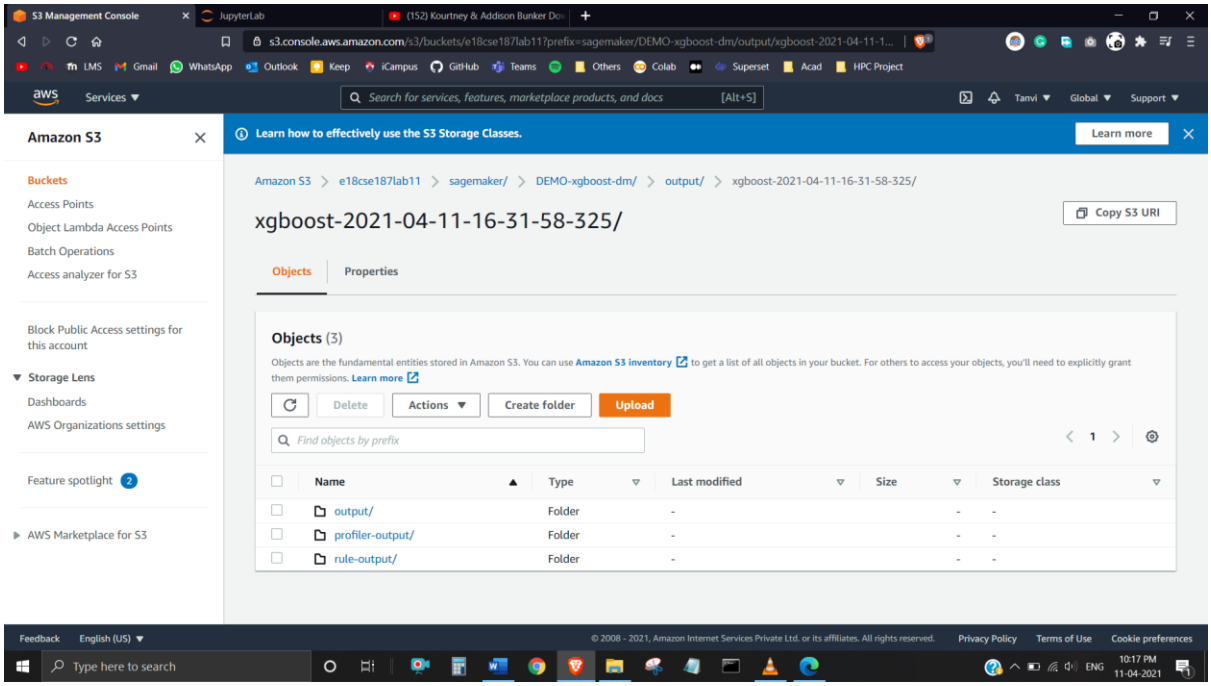
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s3.console.aws.amazon.com/s3/buckets/e18cse187lab11?prefix=sagemaker/DEMO-xgboost-dm/output/xgboost-2021-04-11-1...
LMS
Gmail
WhatsApp
Outlook
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Feature spotlight
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xgboost-2021-04-11-16-31-58-325/
Copy S3 URI
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Delete
Actions
Create folder
Upload
Find objects by prefix
1
Name
Type
Last modified
Size
Storage class
output/
Folder
-
profiler-output/
Folder
-
rule-output/
Folder
-
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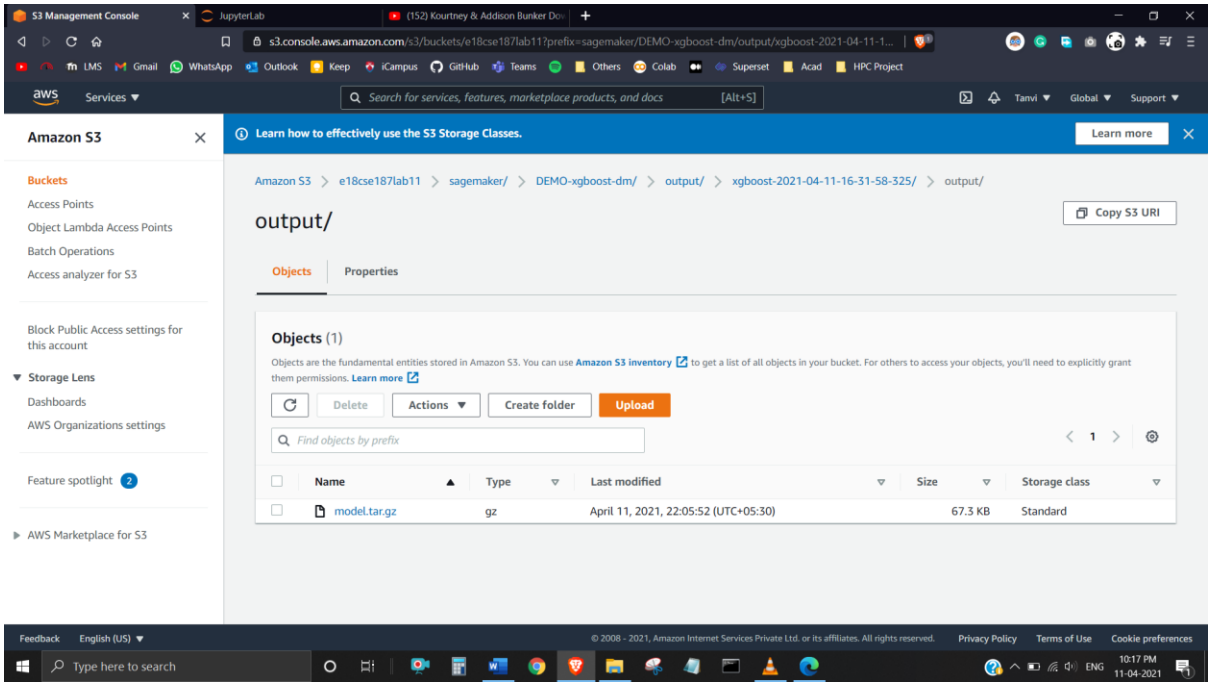
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s3.console.aws.amazon.com/s3/buckets/e18cse187lab11?prefix=sagemaker/DEMO-xgboost-dm/output/xgboost-2021-04-11-1...
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Amazon S3 > e18cse187lab11 > sagemaker/ > DEMO-xgboost-dm/ > output/ > xgboost-2021-04-11-16-31-58-325/ > output/
output/
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Delete
Actions
Create folder
Upload
Find objects by prefix
Name
Type
Last modified
Size
Storage class
model.tar.gz
gz
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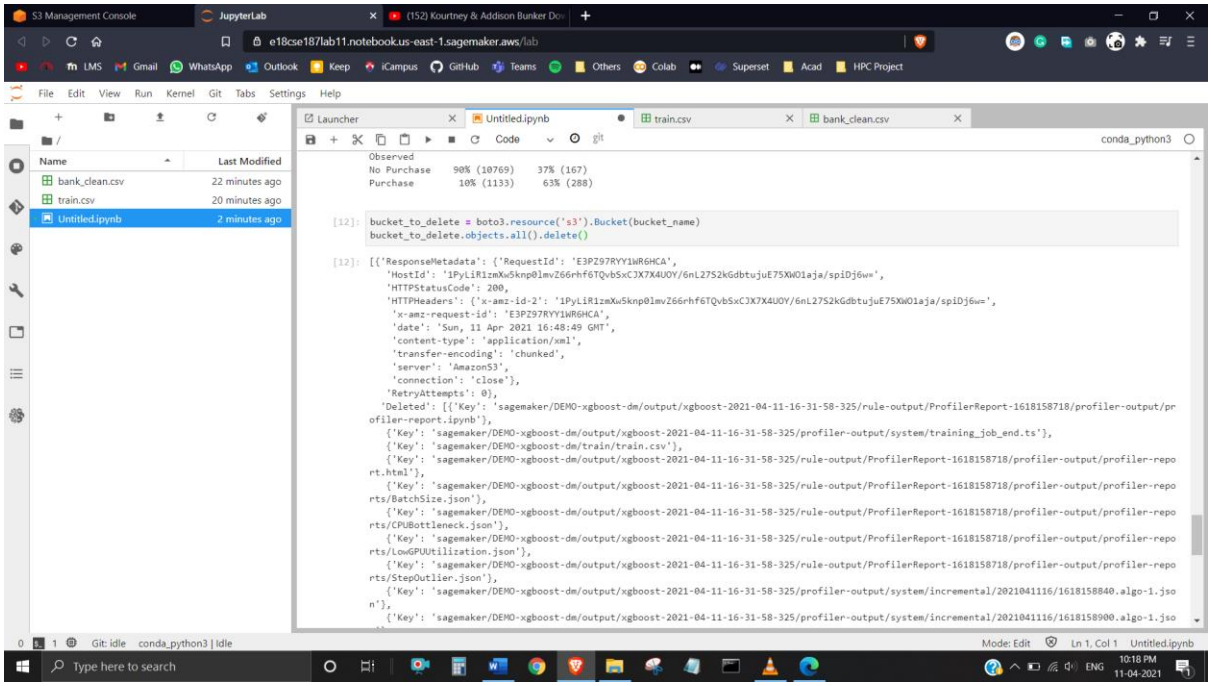
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Launcher
Untitled.ipynb
train.csv
bank_clean.csv
Code
conda_python3
Name
Last Modified
bank_clean.csv 22 minutes ago
train.csv 20 minutes ago
Untitled.ipynb 2 minutes ago
Observed
No Purchase 90% (10769) 37% (167)
Purchase 10% (1133) 63% (288)
[12]:
bucket_to_delete = boto3.resource('s3').Bucket(bucket_name)
bucket_to_delete.objects.all().delete()
[12]:
[{'ResponseMetadata': {'RequestId': 'E3PZ97RYY1WR6HCA',
'HostId': '1PyLiRIzmXw5knp0lmvZ66rhf6TQvbSxCJX7X4UOY/6nL27S2kGdbtujuE75XWO1aja/spiDj6w=',
'HTTPStatusCode': 200,
'HTTPHeaders': {'x-amz-id-2': '1PyLiRIzmXw5knp0lmvZ66rhf6TQvbSxCJX7X4UOY/6nL27S2kGdbtujuE75XWO1aja/spiDj6w=',
'x-amz-request-id': 'E3PZ97RYY1WR6HCA',
'date': 'Sun, 11 Apr 2021 16:48:49 GMT',
'content-type': 'application/xml',
'transfer-encoding': 'chunked',
'server': 'AmazonS3',
'connection': 'close'},
'RetryAttempts': 0},
'Deleted': [{'Key': 'sagemaker/DEMO-xgboost-dm/output/xgboost-2021-04-11-16-31-58-325/rule-output/ProfilerReport-1618158718/profiler-output/profiler-report.ipynb'},
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{'Key': 'sagemaker/DEMO-xgboost-dm/train/train.csv'},
{'Key': 'sagemaker/DEMO-xgboost-dm/output/xgboost-2021-04-11-16-31-58-325/rule-output/ProfilerReport-1618158718/profiler-output/profiler-report.html'},
{'Key': 'sagemaker/DEMO-xgboost-dm/output/xgboost-2021-04-11-16-31-58-325/rule-output/ProfilerReport-1618158718/profiler-output/profiler-reports/BatchSize.json'},
{'Key': 'sagemaker/DEMO-xgboost-dm/output/xgboost-2021-04-11-16-31-58-325/rule-output/ProfilerReport-1618158718/profiler-output/profiler-reports/CPUBottleneck.json'},
{'Key': 'sagemaker/DEMO-xgboost-dm/output/xgboost-2021-04-11-16-31-58-325/rule-output/ProfilerReport-1618158718/profiler-output/profiler-reports/LowGPUUtilization.json'},
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{'Key': 'sagemaker/DEMO-xgboost-dm/output/xgboost-2021-04-11-16-31-58-325/profiler-output/system/incremental/2021041116/1618158840.algo-1.json'},
{'Key': 'sagemaker/DEMO-xgboost-dm/output/xgboost-2021-04-11-16-31-58-325/profiler-output/system/incremental/2021041116/1618158900.algo-1.jso
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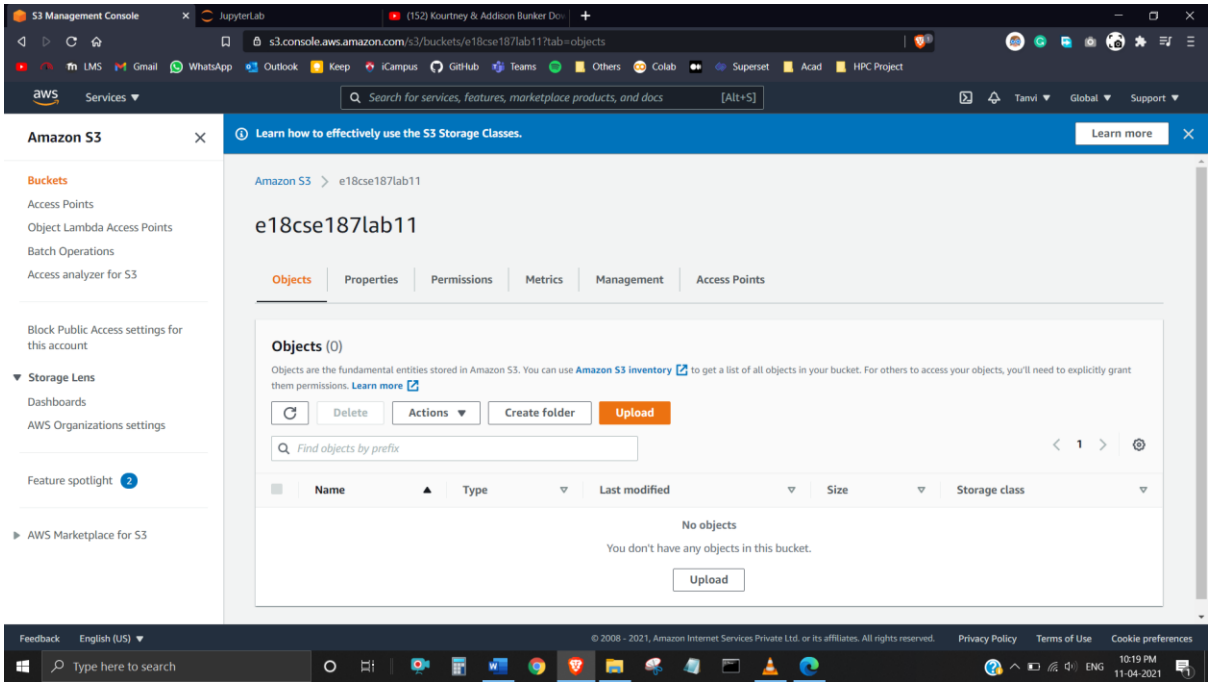
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WhatsApp
Outlook
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Others
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Batch Operations
Access analyzer for S3
Block Public Access settings for this account
Storage Lens
Dashboards
AWS Organizations settings
Feature spotlight
2
AWS Marketplace for S3
Amazon S3 > e18cse187lab11
e18cse187lab11
Objects
Properties
Permissions
Metrics
Management
Access Points
Objects (0)
Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more
Delete
Actions
Create folder
Upload
Find objects by prefix
1
Name
Type
Last modified
Size
Storage class
No objects
You don't have any objects in this bucket.
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