

# CS 461

## Lab Assignment 10

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### Q. Working with AWS and Google Collab Architectures

**NOTE:** No major changes done in provided ipynb file except updating the ARN role, the bucket name and installing s3fs through pip.

### Steps Followed:

#### 1. Create a Domain in SageMaker

The screenshot shows the Amazon SageMaker Domains console. The breadcrumb navigation is "Amazon SageMaker > Domains > Domain: QuickSetupDomain-20241116T171386". The main heading is "QuickSetupDomain-20241116T171386" followed by "Domain details". Below this is a sub-heading "Configure and manage the domain." and a series of tabs: "Domain settings", "User profiles", "Space management", "App Configurations", "Environment", and "Resources". The "Domain settings" tab is selected. Under "General settings", there is a table with three columns: "Name", "Status", and "Domain ID". The "Name" is "QuickSetupDomain-20241116T171386", the "Status" is "Ready" with a green checkmark icon, and the "Domain ID" is "d-vz8jfm2jdcqe".

Name	Status	Domain ID
QuickSetupDomain-20241116T171386	Ready	d-vz8jfm2jdcqe

#### 2. Create an IAM User Role and give AmazonSageMakerFullAccess permission and attach AmazonS3FullAccess policy for data access

The screenshot shows the AWS IAM console. The breadcrumb navigation is "IAM > Roles > SageMaker\_role". The role name is "SageMaker\_role" and it has a description: "Allows SageMaker notebook instances, training jobs, and models to access S3, ECR, and CloudWatch on your behalf." There are "Delete" and "Edit" buttons. Below this is a "Summary" section with a table showing "Creation date" (November 16, 2024, 17:22 (UTC+05:30)), "Last activity" (-), "ARN" (arn:aws:iam::277707115010:role/SageMaker\_role), and "Maximum session duration" (1 hour). Below the summary is a "Permissions" section with tabs: "Permissions", "Trust relationships", "Tags", "Last Accessed", and "Revoke sessions". The "Permissions" tab is selected. It shows "Permissions policies (2)" and a list of policies. The policies are "AmazonS3FullAccess" and "AmazonSageMakerFullAccess", both of which are "AWS managed". The "Attached entities" column shows "1" for "AmazonS3FullAccess" and "4" for "AmazonSageMakerFullAccess".

Policy name	Type	Attached entities
AmazonS3FullAccess	AWS managed	1
AmazonSageMakerFullAccess	AWS managed	4

### 3. Create an S3 Bucket and Upload the Dataset i.e. mob\_price\_classification\_train.csv

The screenshot shows the Amazon S3 console for a bucket named 'mob12'. The 'Objects' tab is selected, displaying a list of two objects. The first object is 'mob\_price\_classification\_train.csv', a CSV file, 119.5 KB in size, uploaded on November 16, 2024, at 17:27:37 (UTC+05:30), with a 'Standard' storage class. The second object is 'sagemaker/', a folder. The console includes a search bar, a table of objects, and various action buttons like 'Copy S3 URI', 'Copy URL', 'Download', 'Open', 'Delete', 'Create folder', and 'Upload'.

Name	Type	Last modified	Size	Storage class
<a href="#">mob_price_classification_train.csv</a>	csv	November 16, 2024, 17:27:37 (UTC+05:30)	119.5 KB	Standard
<a href="#">sagemaker/</a>	Folder	-	-	-

### 4. Create a new user profile in the created domain of SageMaker console:

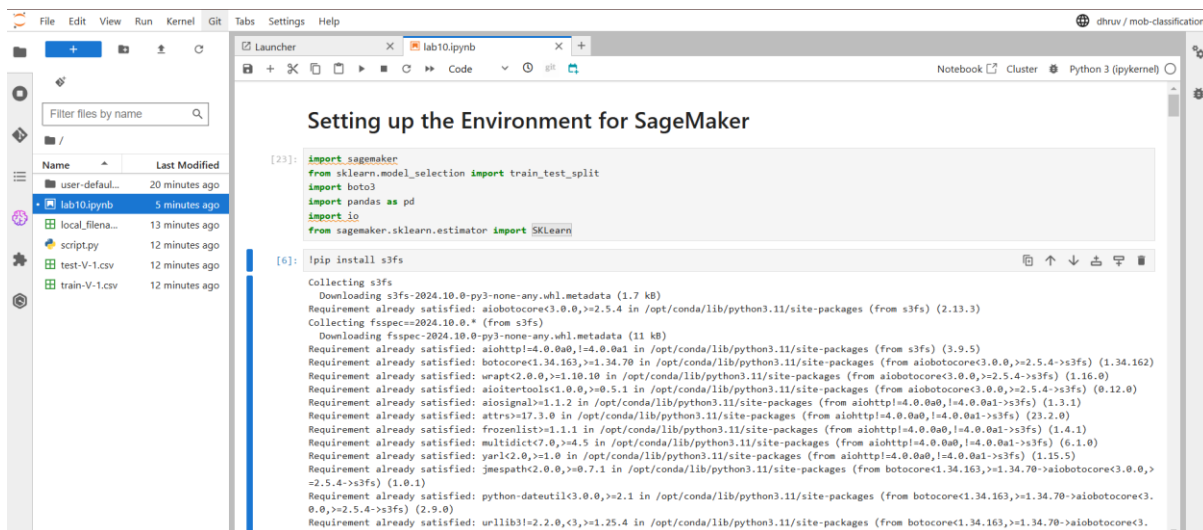
The screenshot shows the Amazon SageMaker console for a domain named 'QuickSetupDomain-20241116T171873'. The 'Domain details' page is open, with the 'User profiles' tab selected. It shows a list of user profiles. One user profile is listed: 'dhruv', created on Nov 16, 2024 12:00 UTC. The page includes a search bar, a table of user profiles, and a 'Launch' button for the listed user.

Name	Modified on	Created on
dhruv	Nov 16, 2024 12:00 UTC	Nov 16, 2024 12:00 UTC

### 5. Launch Studio from the SageMaker console.

The screenshot shows the SageMaker Studio console. The 'Home' page is displayed, featuring an 'Onboarding plan' overlay. The overlay includes sections for 'Take the tour', 'Access your EFS data in JupyterLab and CodeEditor', and 'Access your Studio Classic apps'. The 'Take the tour' section has a 'Take the tour >' link. The 'Access your EFS data' section has a 'Try JupyterLab' link. The 'Access your Studio Classic apps' section has a 'View Studio Classic' link. The 'Onboarding plan' overlay also includes a link to 'Learn more' for reverting to the Studio Classic experience.

## 6. In Studio, select Jupyter Lab and upload the .ipynb file.



## 7. Update the bucket name, ARN role or any other dependencies and run it.

### Final Output:

```
building tree 92 of 100
building tree 93 of 100
building tree 94 of 100
building tree 95 of 100building tree 96 of 100
building tree 97 of 100
building tree 98 of 100
building tree 99 of 100
building tree 100 of 100
[Parallel(n_jobs=1)]: Done 100 out of 100 | elapsed:    0.3s finished
Model persisted at /opt/ml/model/model.joblib
[Parallel(n_jobs=2)]: Using backend ThreadingBackend with 2 concurrent workers.
[Parallel(n_jobs=2)]: Done 28 tasks      | elapsed:    0.0s
[Parallel(n_jobs=2)]: Done 100 out of 100 | elapsed:    0.0s finished
---- METRICS RESULTS FOR TESTING DATA ----
Total Rows are: 300
[TESTING] Model Accuracy is:  0.8833333333333333
[TESTING] Testing Report:
      precision    recall  f1-score   support
0         0.95      1.00      0.97         69
1         0.85      0.80      0.83         66
2         0.80      0.77      0.79         74
3         0.91      0.95      0.93         91
 accuracy          0.88         300
 macro avg          0.88         300
weighted avg          0.88         300
2024-11-16 12:19:26,817 sagemaker-containers INFO      Reporting training SUCCESS

2024-11-16 12:19:31 Training - Training image download completed. Training in progress.
2024-11-16 12:19:31 Uploading - Uploading generated training model
2024-11-16 12:19:44 Completed - Training job completed
Training seconds: 84
Billable seconds: 30
Managed Spot Training savings: 64.3%
```

**Successfully trained and attained accuracy of 88%.**

**Conclusion:** Successfully able to utilize Amazon SageMaker to run and train machine learning model and S3 for storage.