

CS 524 Introduction to Cloud Computing

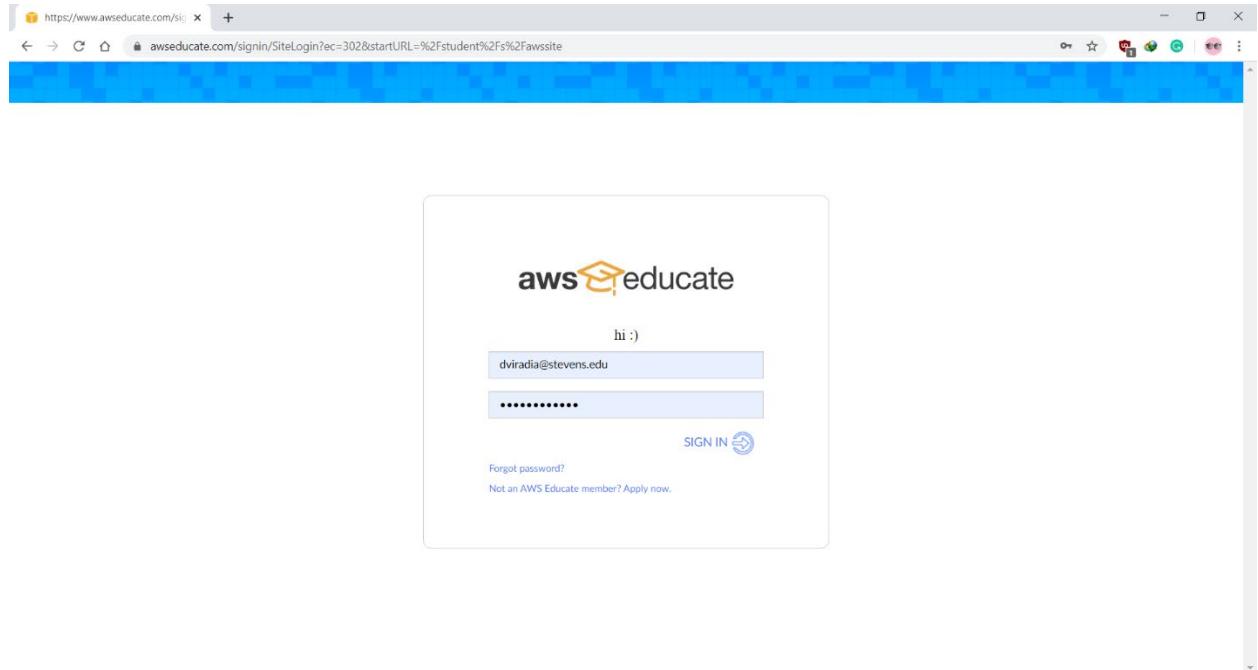
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Lab Assignment 4

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Step for Creating a CloudFormation

- First login into your AWS account



- Upload Data Files to S3 Bucket and give Public Access

I have used already created bucket from previous Lab

A screenshot of the AWS S3 Management Console. The URL in the address bar is s3.console.aws.amazon.com/s3/buckets/dviradia/?region=us-east-1. The page shows a list of files in the "dviradia" bucket. At the top, there are tabs for "Overview", "Properties", "Permissions", "Management", and "Access points", with "Properties" being the active tab. Below the tabs is a search bar with the placeholder "Type a prefix and press Enter to search. Press ESC to clear.". Underneath is a toolbar with "Upload", "+ Create folder", "Download", and "Actions" dropdown. To the right, the region is set to "US East (N. Virginia)". The main area displays a table of files with columns for Name, Last modified, Size, and Storage class. The files listed are: "Load Balancer Templates" (last modified Apr 25, 2020, size 308.5 KB, Standard), "04-18-2020.csv" (last modified Apr 25, 2020, size 50.3 KB, Standard), "coronavirus-covid-19-visualization-prediction.ipynb" (last modified Apr 25, 2020, size 73.2 KB, Standard), "time_series_covid19_confirmed_global.csv" (last modified Apr 25, 2020, size 57.9 KB, Standard), "time_series_covid19_deaths_global.csv" (last modified Apr 25, 2020, size 61.4 KB, Standard), and "time_series_covid19_recovered_global.csv" (last modified Apr 25, 2020, size 308.5 KB, Standard). At the bottom, there are status indicators for Operations (0 In progress, 2 Success, 0 Error) and links for Feedback, English (US), Privacy Policy, and Terms of Use.

- On AWS Dashboard go to Amazon SageMaker Services

The screenshot shows the AWS Amazon SageMaker Services landing page. The left sidebar has a navigation menu with the following items:

- Amazon SageMaker Studio
- Dashboard
- Search
- Ground Truth
 - Labeling jobs
 - Labeling datasets
 - Labeling workforces
- Notebook
 - Notebook instances
 - Lifecycle configurations
 - Git repositories
- Training
 - Algorithms
 - Training jobs
 - Hyperparameter tuning jobs
- Inference
 - Compilation jobs
 - Model packages
- Models

The main content area features a large heading "Amazon SageMaker" with the subtext "Build, train, and deploy machine learning models at scale". Below this, there is a "Get started" section with a "Preview Amazon SageMaker Studio" button and a "Pricing (US)" section with a "Learn more" link.

- Now, Select Dashboard on left side menu

The screenshot shows the AWS CloudFormation - Stack creation wizard. The left sidebar shows the following steps:

- Step 1 Specify template
- Step 2 Specify stack details
- Step 3 Configure stack options
- Step 4 Review

The main content area shows the "Create stack" step. Under "Prerequisite - Prepare template", it says "Prepare template Every stack is based on a template. A template is a JSON or YAML file that contains configuration information about the AWS resources you want to include in the stack." There are three radio buttons: "Template is ready" (selected), "Use a sample template", and "Create template in Designer". Under "Specify template", it says "A template is a JSON or YAML file that describes your stack's resources and properties." There are two radio buttons: "Amazon S3 URL" (selected) and "Upload a template file". Below this, there is an "Amazon S3 URL" input field containing the URL "https://dviradia.s3.amazonaws.com/AutoScalingKeepAtNSample.template". There is also an "Amazon S3 template URL" input field and a "View in Designer" button. At the bottom right, there are "Cancel" and "Next" buttons.

- On Dashboard Select Notebook Instance

The screenshot shows the Amazon SageMaker Dashboard. On the left, there is a navigation sidebar with the following categories:

- Amazon SageMaker** (selected)
- Amazon SageMaker Studio
- Dashboard** (selected)
- Search
- Ground Truth
 - Labeling jobs
 - Labeling datasets
 - Labeling workforces
- Notebook
 - Notebook instances
 - Lifecycle configurations
 - Git repositories
- Training
 - Algorithms
 - Training jobs
 - Hyperparameter tuning jobs
- Inference
 - Compilation jobs
 - Model packages
 - Models

The main content area displays the **Amazon Elastic Inference** announcement and the **Overview** section. The Overview section includes five icons representing different services:

- Ground Truth**: Set up and manage labeling jobs for highly accurate training datasets using active learning and human labeling.
- Notebook**: Availability of AWS and SageMaker SDKs and sample notebooks to create training Jobs and deploy models.
- Training**: Train and tune models at any scale. Leverage high performance AWS algorithms or bring your own.
- Inference**: Create models from training jobs or import external models for hosting to run inferences on new data.
- AWS Marketplace**: Find, buy, and deploy ready to use model packages, algorithms, and data products in AWS Marketplace.

Below each icon are buttons for **Labeling jobs**, **Notebook instances**, **Training jobs**, **Hyperparameter tuning jobs**, **Models**, **Endpoints**, and **Batch transform jobs**.

- Now Create notebook instance

The screenshot shows the **Notebook instances** page under the **Amazon SageMaker** service. The left sidebar is identical to the one in the previous screenshot. The main content area shows a table titled "Notebook instances" with the following columns:

Name	Instance	Creation time	Status	Actions
There are currently no resources.				

At the top right of the table, there is a **Create notebook instance** button.

- Give Notebook Instance Name and select Instance type as ml.t2.medium

Create notebook instance

Amazon SageMaker provides pre-built fully managed notebook instances that run Jupyter notebooks. The notebook instances include example code for common model training and hosting exercises. [Learn more](#)

Notebook instance settings

Notebook instance name: covid-19-visualization-prediction

Notebook instance type: ml.t2.medium

Elastic Inference [Learn more](#): none

[Additional configuration](#)

Permissions and encryption

IAM role: Notebook Instances require permissions to call other services including SageMaker and S3. Choose a role or let us create a role with the [AmazonSageMakerFullAccess](#) IAM policy.

- Create new IAM Role and give access to your bucket

Create an IAM role

Please provide a valid Arn.

Root access - optional

Enable - Give users root access to the instance

Disable - Don't give users root access
Lifecycle configurations always have root access

Encryption key - optional

No Custom Encryption

User: arn:aws:sts::498314746912 authorized to perform: kms:ListAliases
Code: 400; Error Code: AccessDenied

Create an IAM role

Passing an IAM role gives Amazon SageMaker permission to perform actions in other AWS services on your behalf. Creating a role here will grant permissions described by the [AmazonSageMakerFullAccess](#) IAM policy to the role you create.

The IAM role you create will provide access to:

S3 buckets you specify - optional

Any S3 bucket
Allow users that have access to your notebook instance access to any bucket and its contents in your account.

Specific S3 buckets

dviradia

Comma delimited. ARNs, "*" and "/" are not supported.

None

Any S3 bucket with "sagemaker" in the name

Any S3 object with "sagemaker" in the name

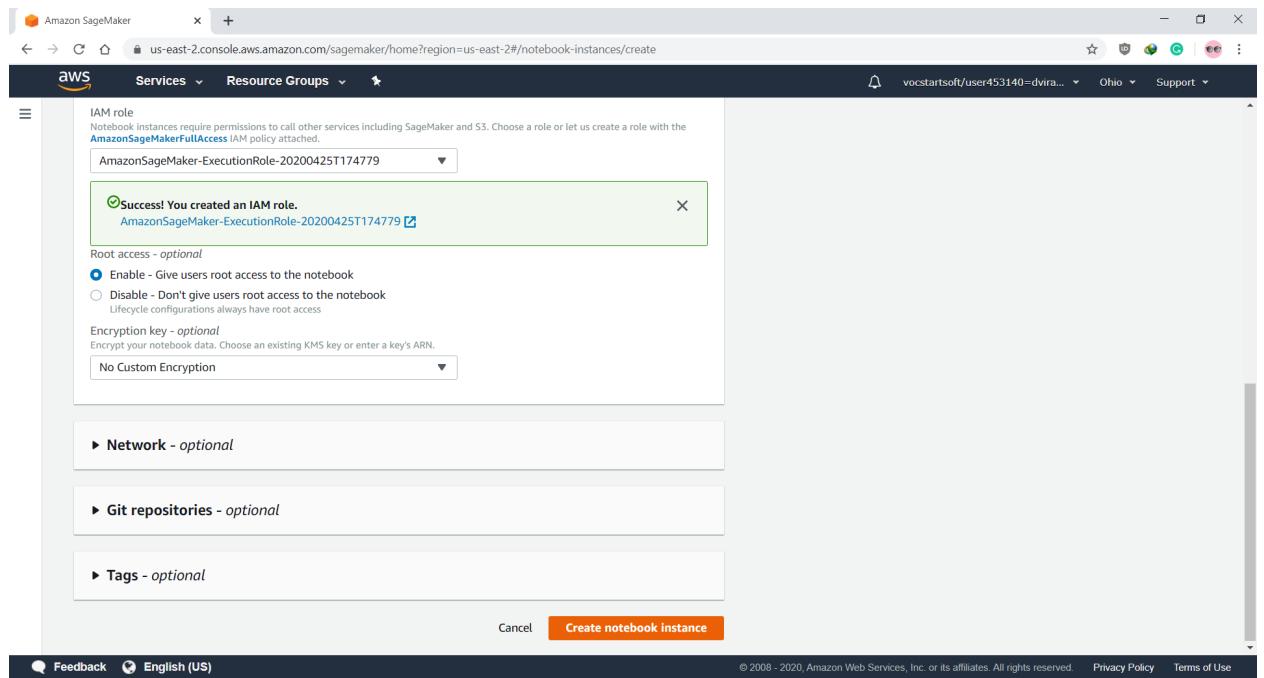
Any S3 object with the tag "sagemaker" and value "true"

S3 bucket with a Bucket Policy allowing access to SageMaker

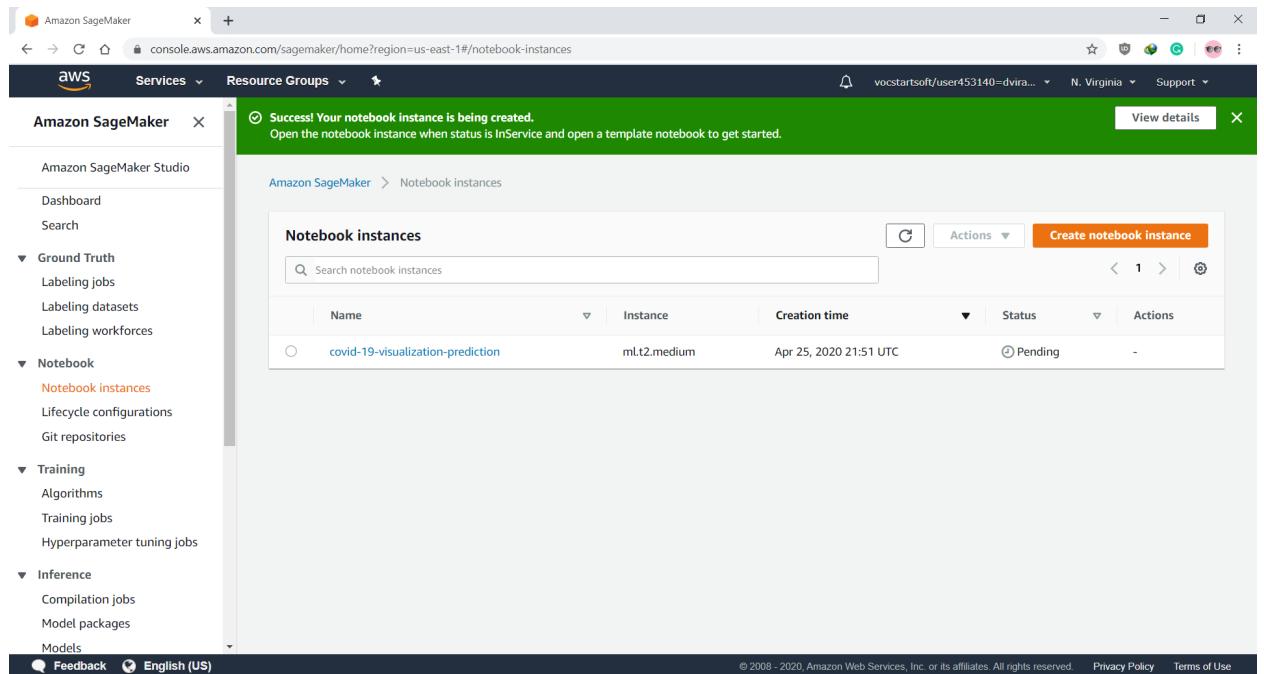
[See Object tagging](#) [See S3 bucket policies](#)

[Cancel](#) [Create role](#)

- After Creating new IAM Role, leave other setting as default and Create notebook instances



- Notebook Instance is created successfully



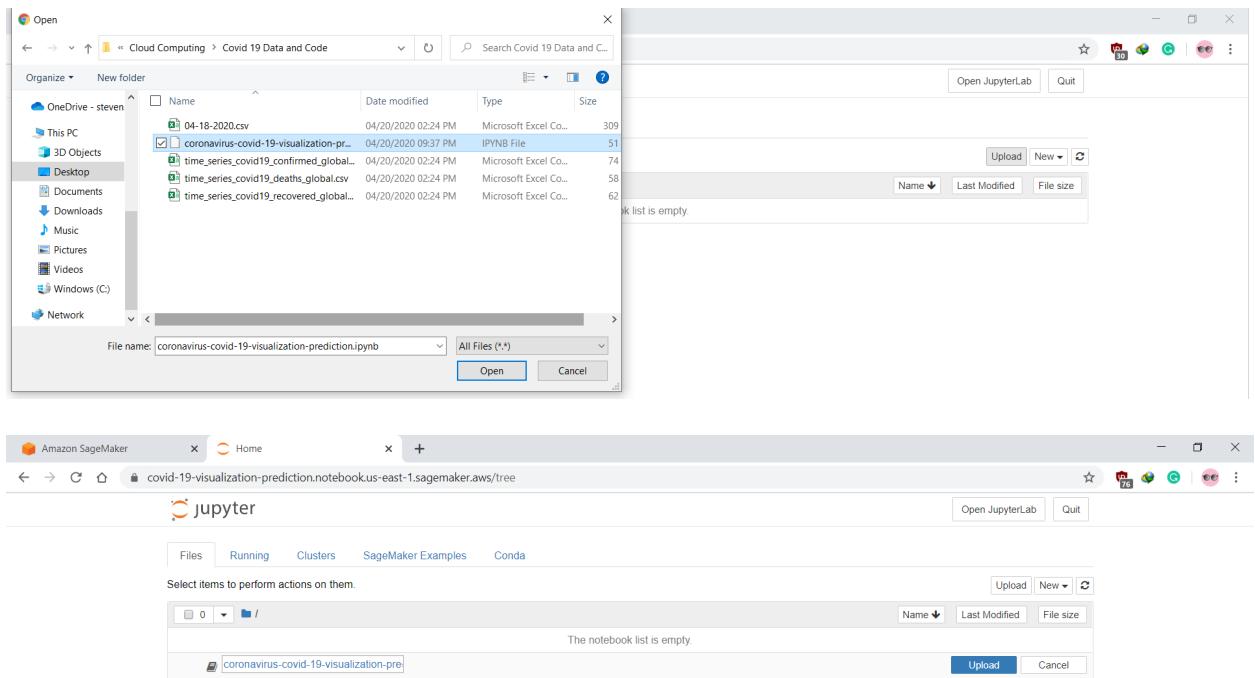
- After Status of Notebook changes to InService, Open Jupyter Notebook

The screenshot shows the Amazon SageMaker console interface. The main title is "covid-19-visualization-prediction". Under "Notebook instance settings", the status is listed as "InService". Other details include ARN, creation time (Apr 25, 2020 21:51 UTC), last updated (Apr 25, 2020 21:54 UTC), and lifecycle configuration. Under "Git repositories", it says "There are currently no resources.".

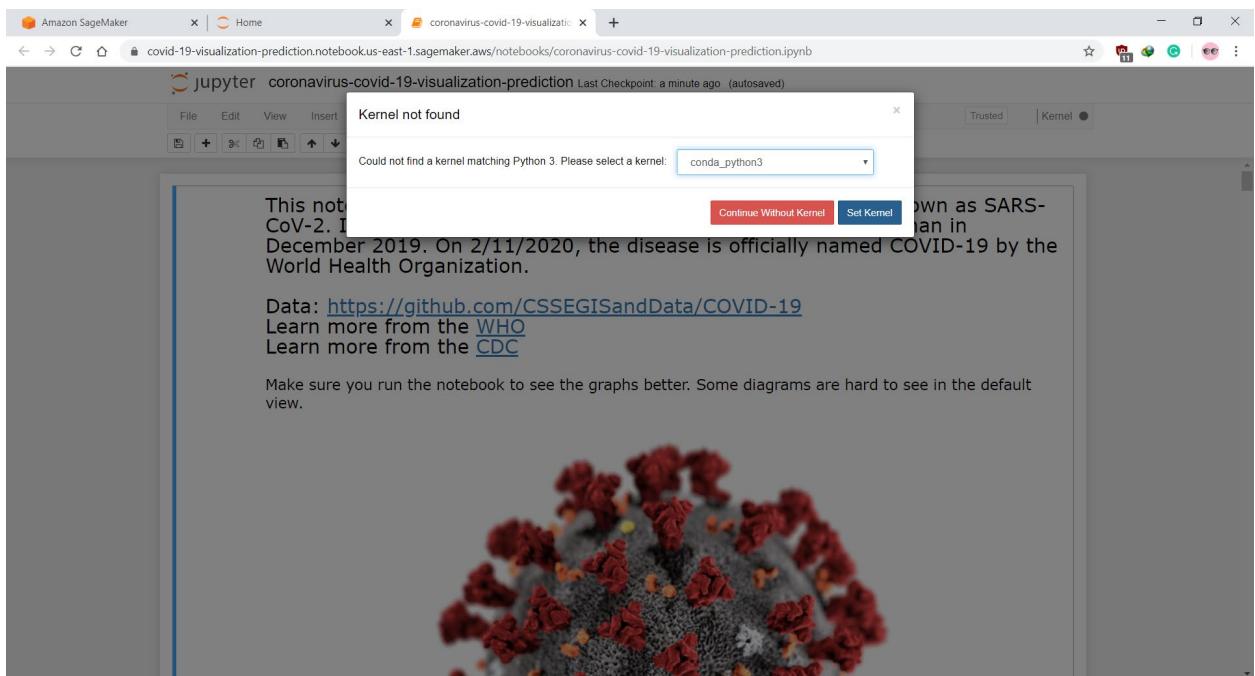
- After Opening Jupyter Notebook Upload the Code File

The screenshot shows the Jupyter Notebook interface within the Amazon SageMaker console. The title bar indicates the notebook's location: "covid-19-visualization-prediction.notebook.us-east-1.sagemaker.aws/tree". The interface features a top navigation bar with tabs for "Files", "Running", "Clusters", "SageMaker Examples", and "Conda". Below the navigation is a search bar and a message: "Select items to perform actions on them.". A file browser shows a single folder named "/" with a count of "0" files. At the bottom, there are buttons for "Upload", "New", and "Copy", along with sorting and filtering options for "Name", "Last Modified", and "File size". A message at the bottom states: "The notebook list is empty."

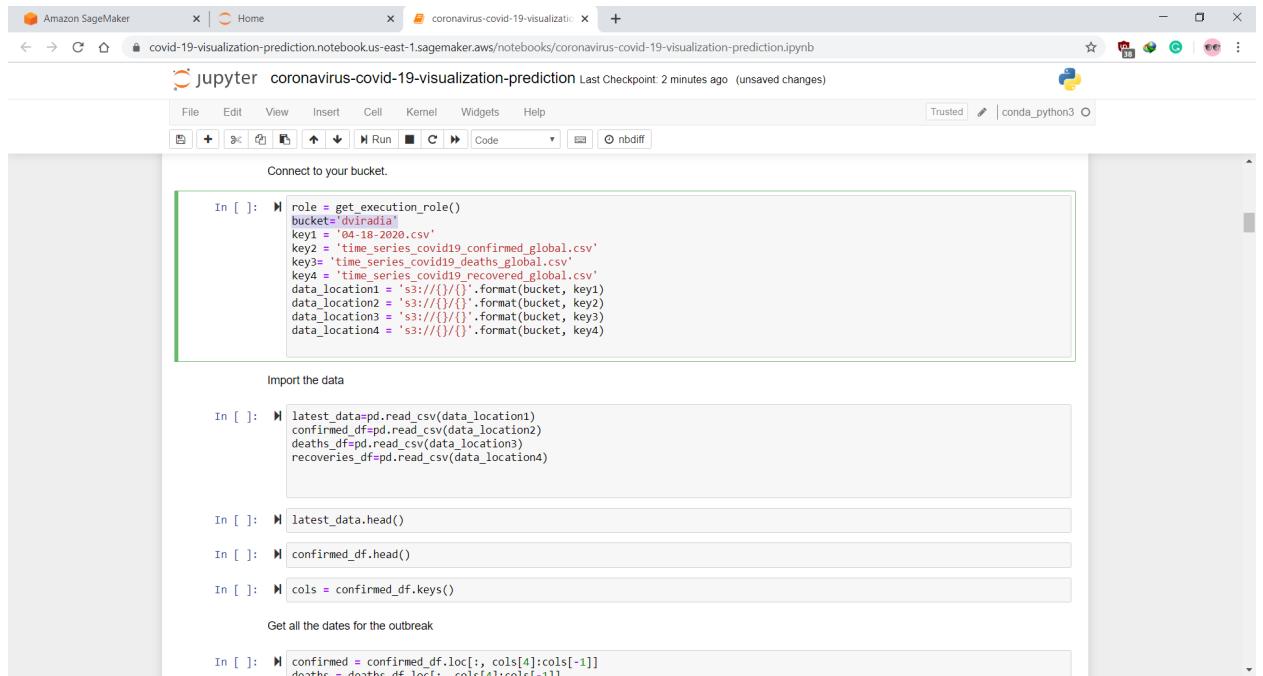
- Select the code file from Local Directory and Upload the File



- Open the Code File, it would open in Jupyter Notebook and set Kernel to conda_python3



- Replace “<bucket>” with your S3 bucket name



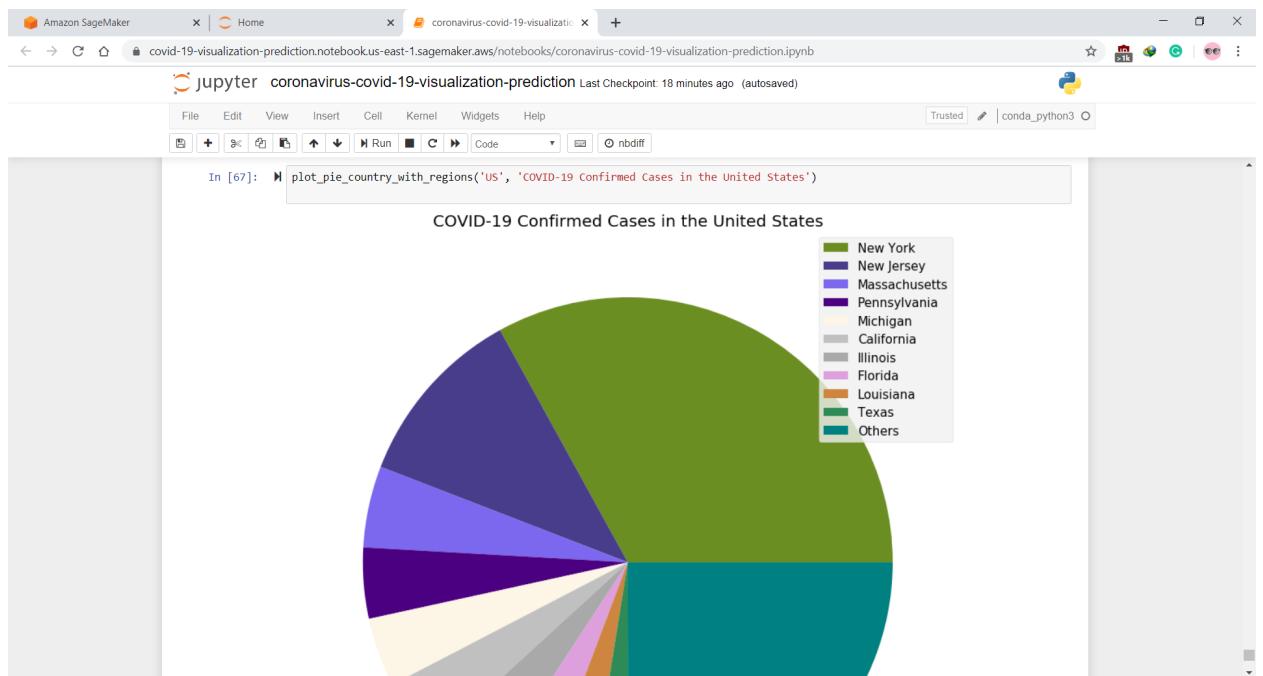
The screenshot shows a Jupyter Notebook interface in a browser window titled "coronavirus-covid-19-visualization". The notebook has a single cell containing Python code:

```
In [ ]: role = get_execution_role()
bucket='dviradia'
key1 = '04-18-2020.csv'
key2 = 'time_series_covid19_confirmed_global.csv'
key3 = 'time_series_covid19_deaths_global.csv'
key4 = 'time_series_covid19_recovered_global.csv'
data_location1 = 's3://{}{}'.format(bucket, key1)
data_location2 = 's3://{}{}'.format(bucket, key2)
data_location3 = 's3://{}{}'.format(bucket, key3)
data_location4 = 's3://{}{}'.format(bucket, key4)
```

Below the code, the notebook displays several more cells:

- "Import the data"
- "latest_data.head()"
- "confirmed_df.head()"
- "cols = confirmed_df.keys()"
- "Get all the dates for the outbreak"
- "confirmed = confirmed_df.loc[:, cols[4]:cols[-1]]"

- Run the code on each cells of the notebook



- Outputs Generated are stored in Output Folder in S3 bucket

S3 Management Console

Services > Resource Groups > dviradia

dviradia

Overview Properties Permissions Management Access points

Type a prefix and press Enter to search. Press ESC to clear.

Upload + Create folder Download Actions

US East (N. Virginia)

Name	Last modified	Size	Storage class
Load Balancer Templates	--	--	--
Output	--	--	--
04-18-2020.csv	Apr 25, 2020 5:36:37 PM GMT-0400	308.5 KB	Standard
coronavirus-covid-19-visualization-prediction.ipynb	Apr 25, 2020 5:36:37 PM GMT-0400	50.3 KB	Standard
time_series_covid19_confirmed_global.csv	Apr 25, 2020 5:36:37 PM GMT-0400	73.2 KB	Standard
time_series_covid19_deaths_global.csv	Apr 25, 2020 5:36:37 PM GMT-0400	57.9 KB	Standard
time_series_covid19_recovered_global.csv	Apr 25, 2020 5:36:37 PM GMT-0400	61.4 KB	Standard

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S3 Management Console

Services > Resource Groups > dviradia > Output

dviradia

Overview

Type a prefix and press Enter to search. Press ESC to clear.

Upload + Create folder Download Actions

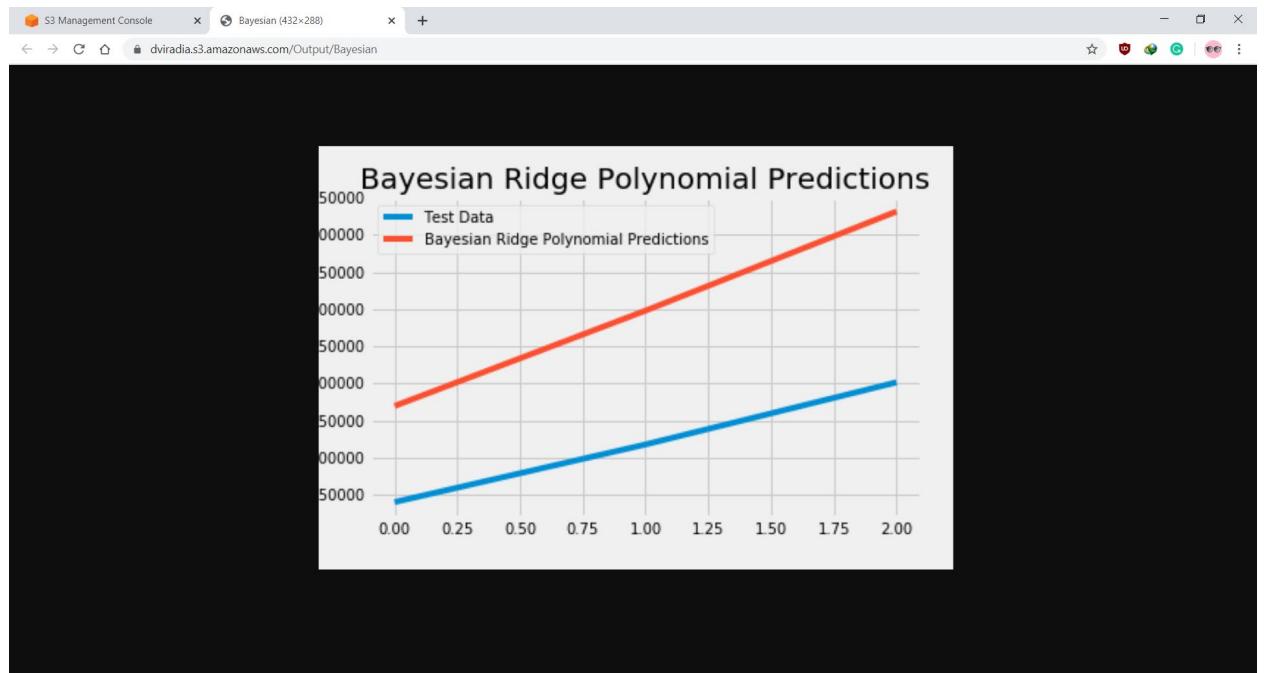
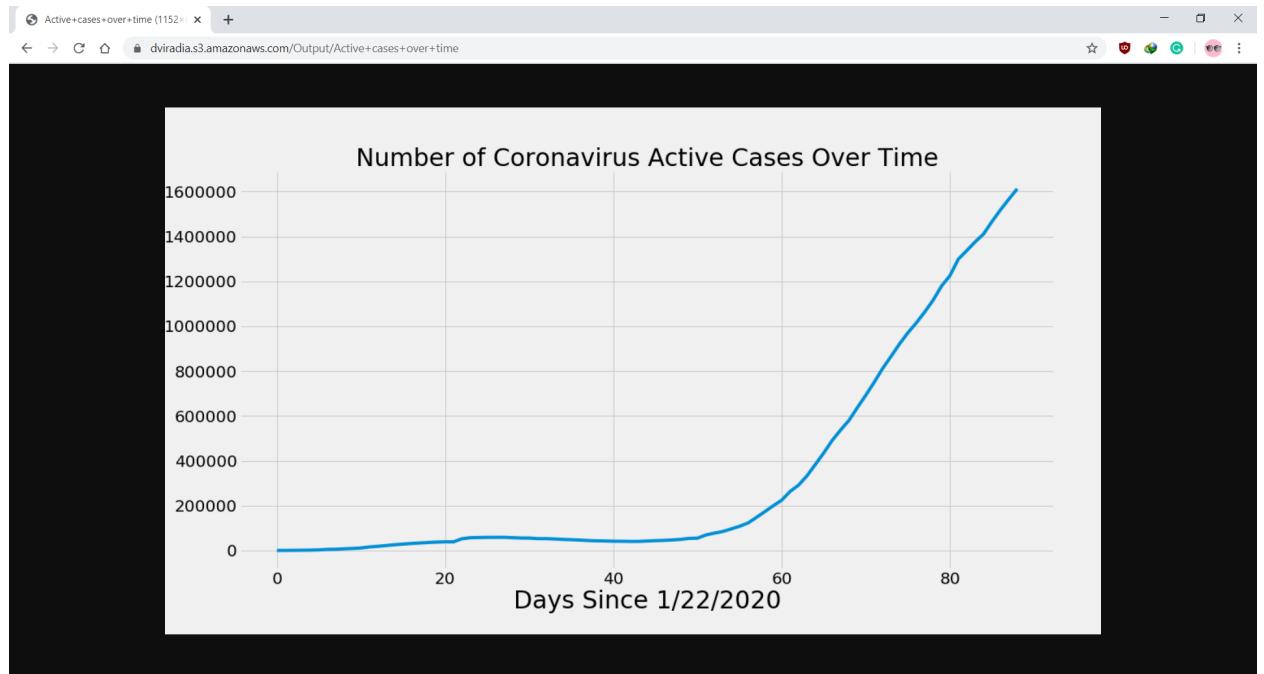
US East (N. Virginia)

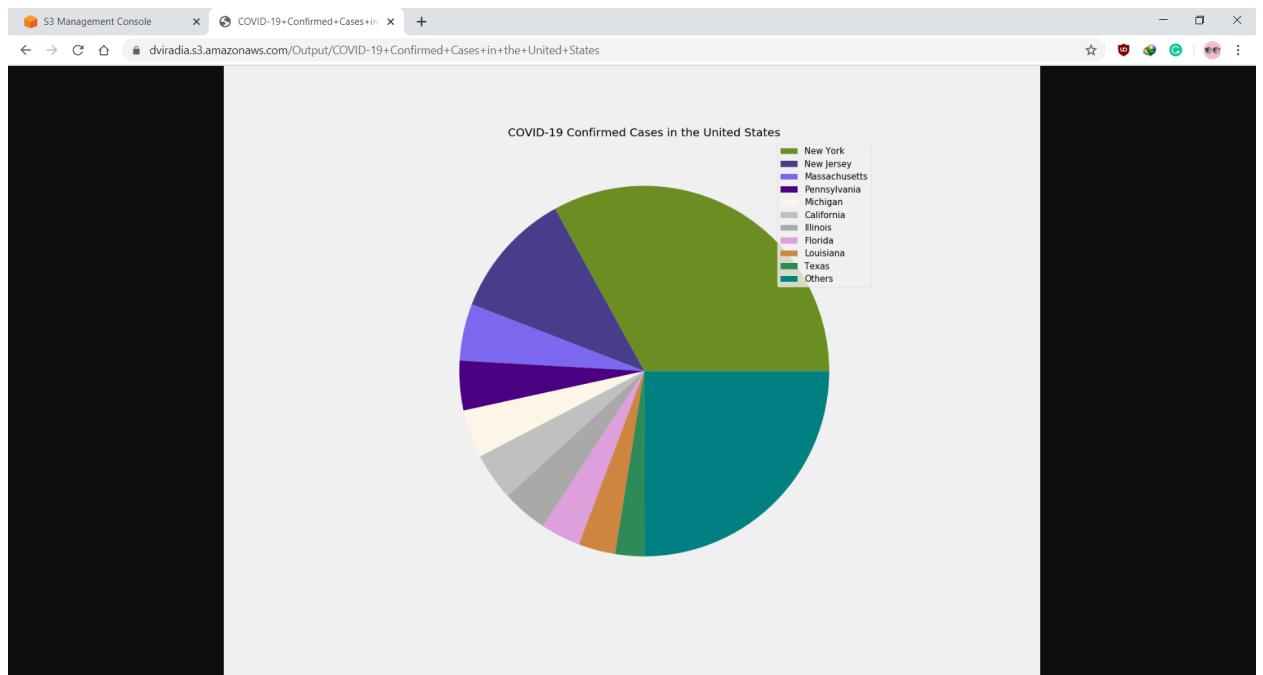
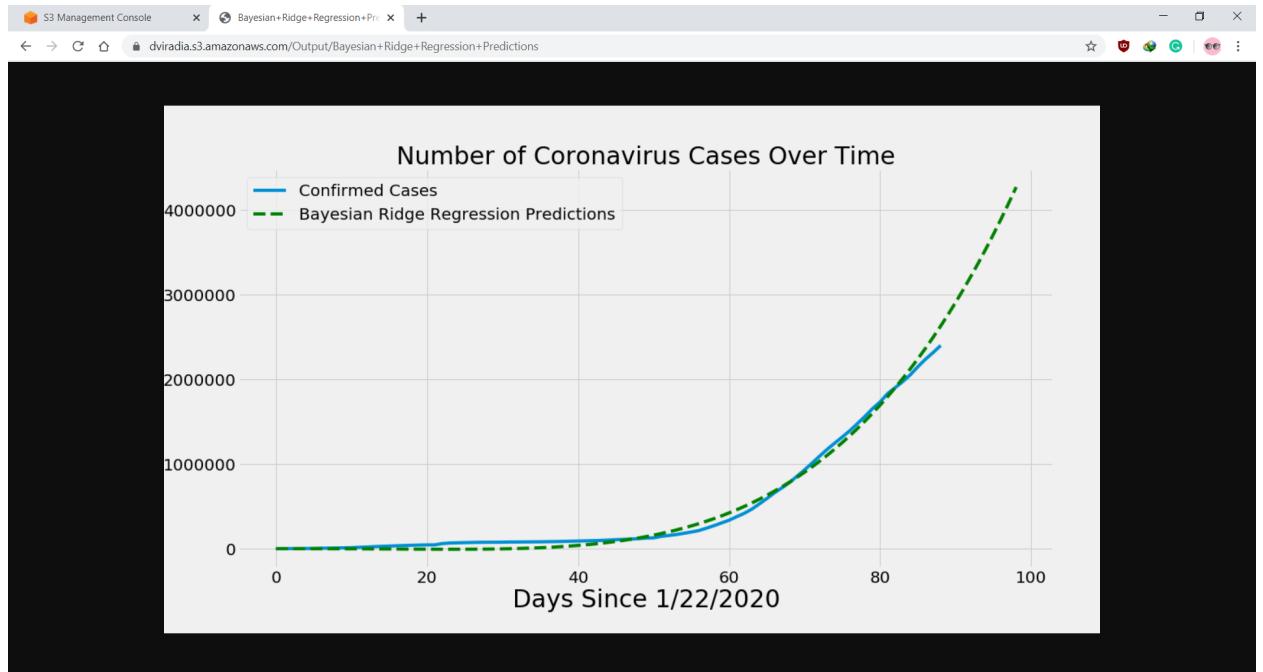
Name	Last modified	Size	Storage class
Active cases over time	Apr 25, 2020 6:14:33 PM GMT-0400	57.5 KB	Standard
Bayesian	Apr 25, 2020 6:14:31 PM GMT-0400	25.3 KB	Standard
Bayesian Ridge Regression Predictions	Apr 25, 2020 6:14:51 PM GMT-0400	65.3 KB	Standard
COVID-19 Confirmed Cases in the United States	Apr 25, 2020 6:15:03 PM GMT-0400	68.4 KB	Standard
Corona_Cases_World	Apr 25, 2020 6:14:47 PM GMT-0400	72.8 KB	Standard
Corona_Death_World	Apr 25, 2020 6:14:47 PM GMT-0400	79.9 KB	Standard

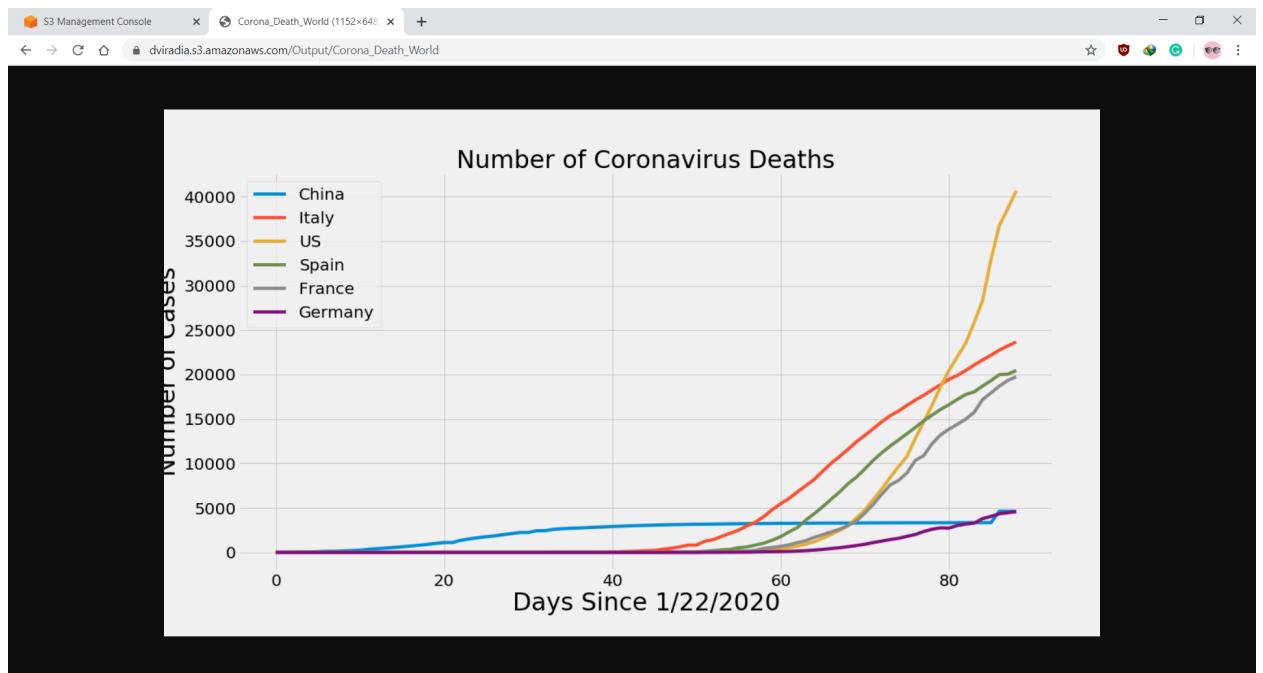
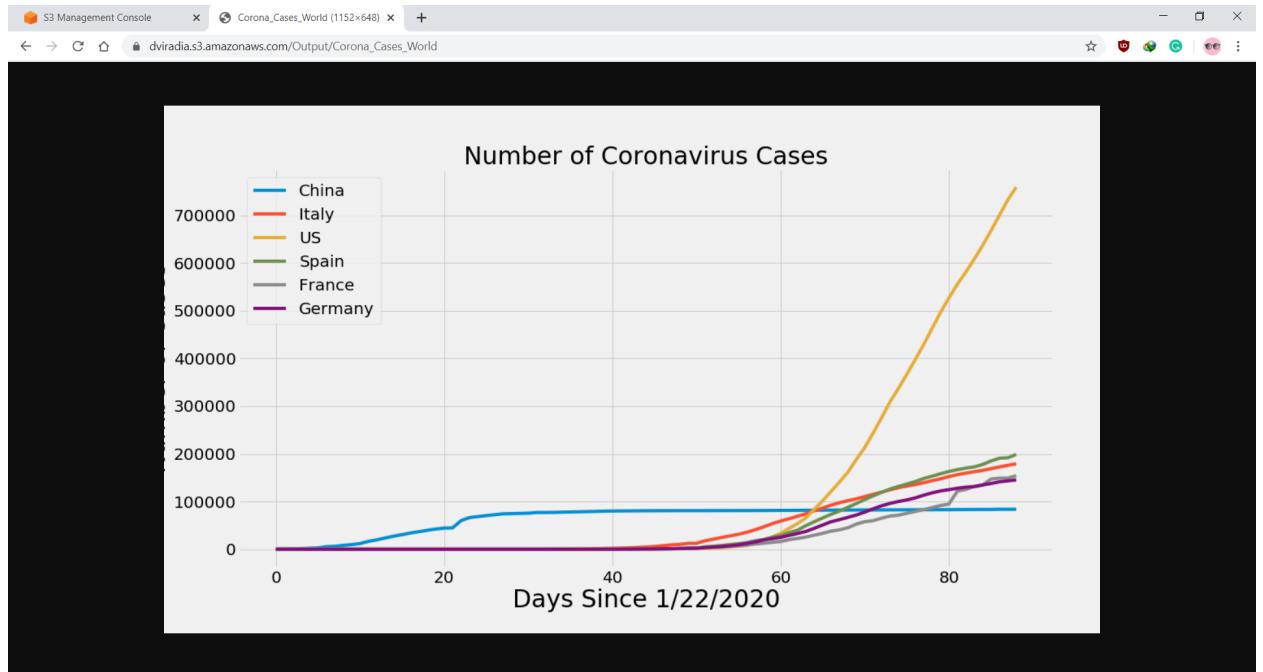
Operations 0 In progress 1 Success 0 Error

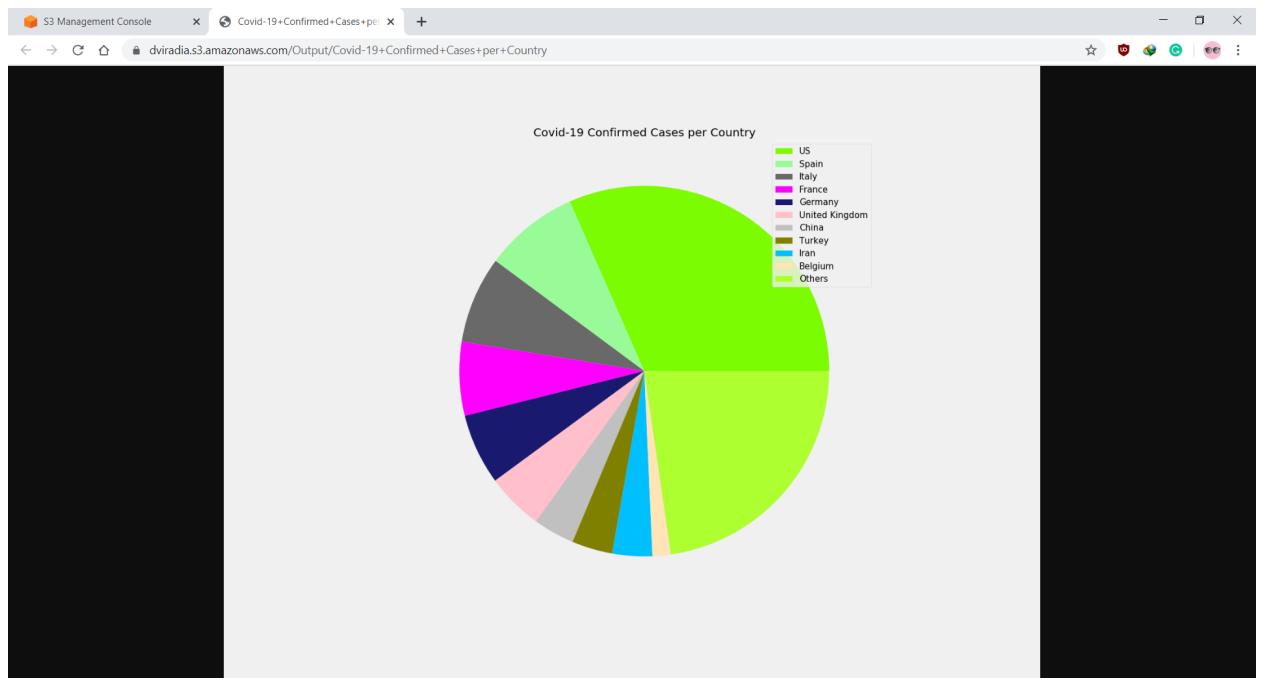
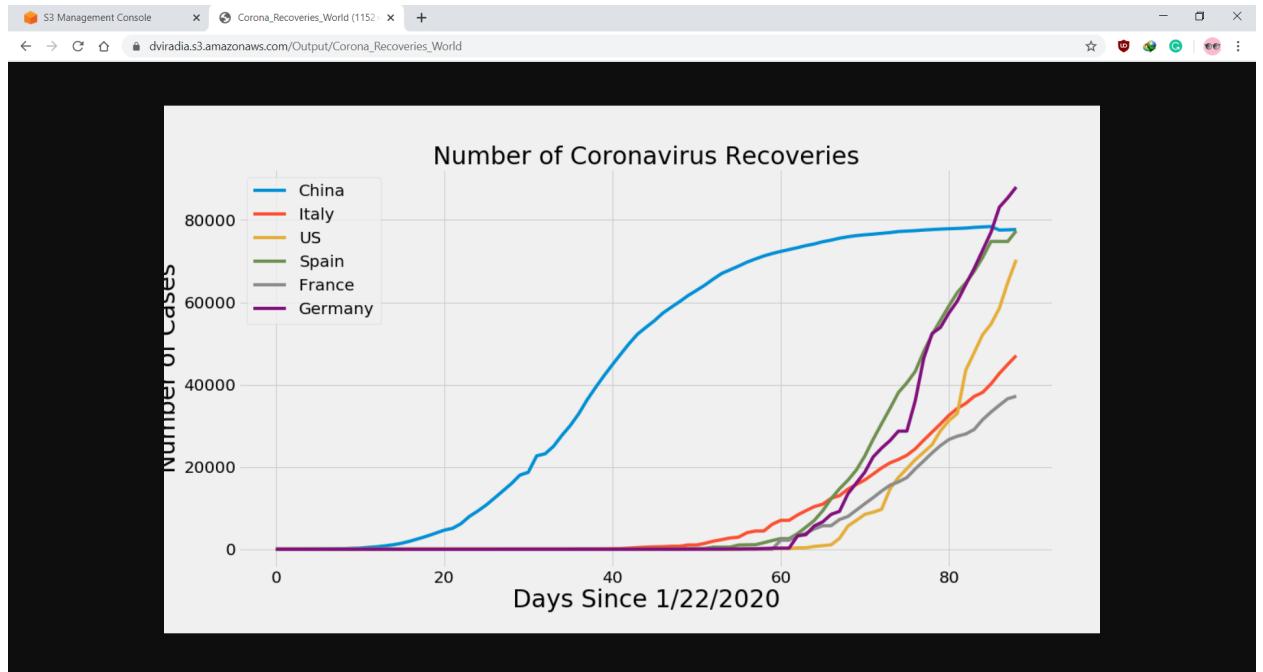
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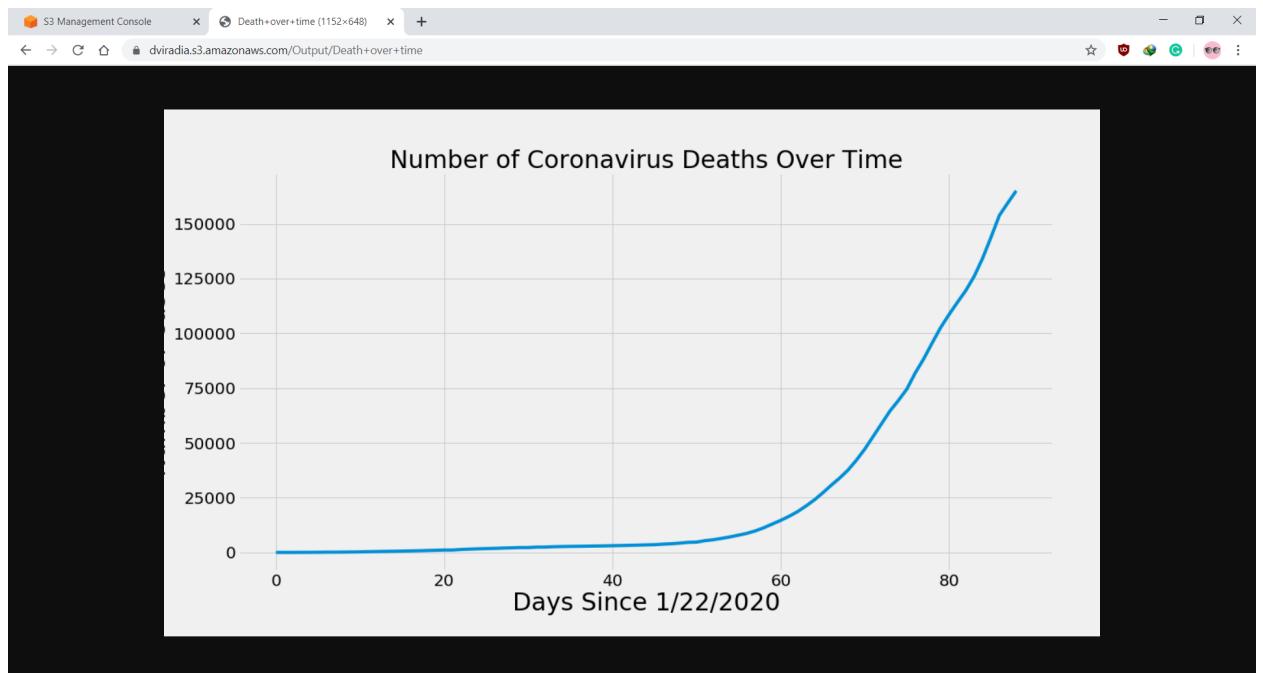
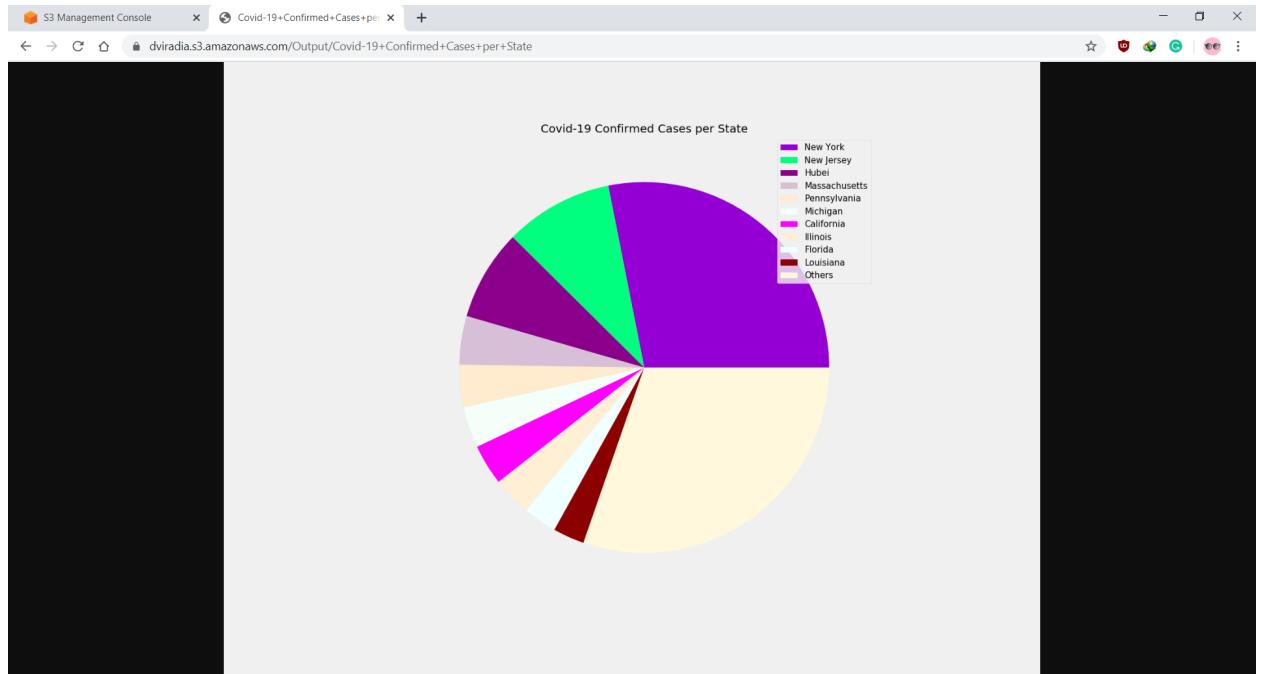
- Output Graphs

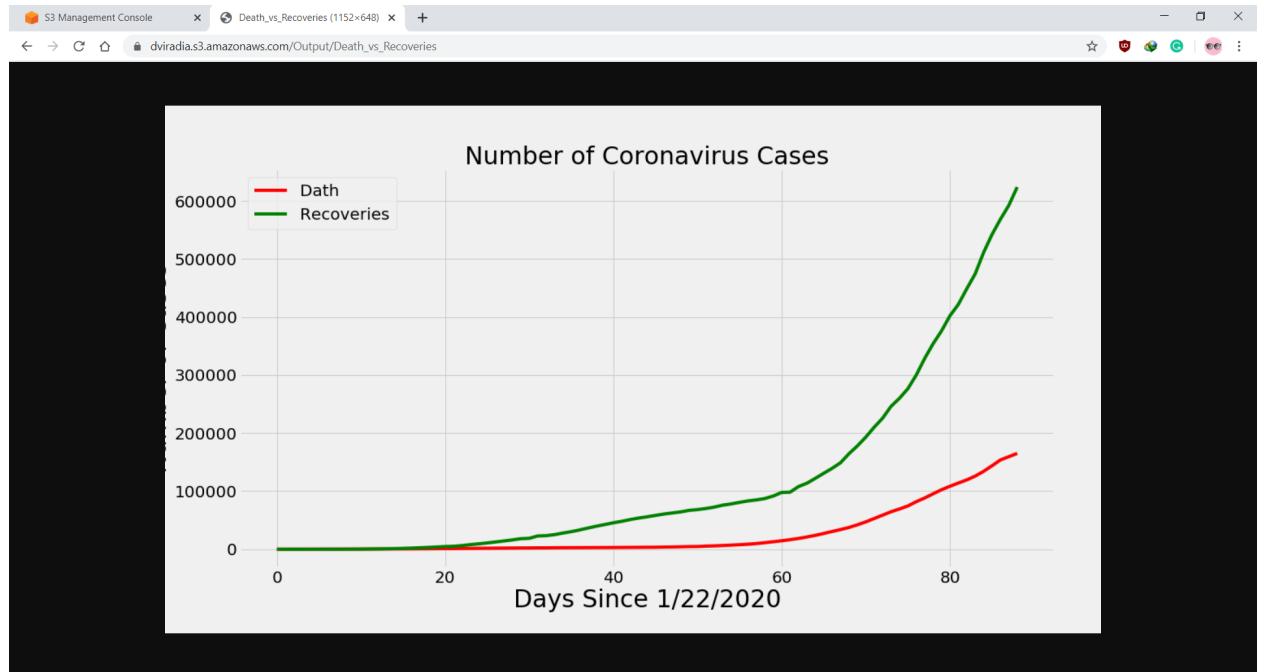


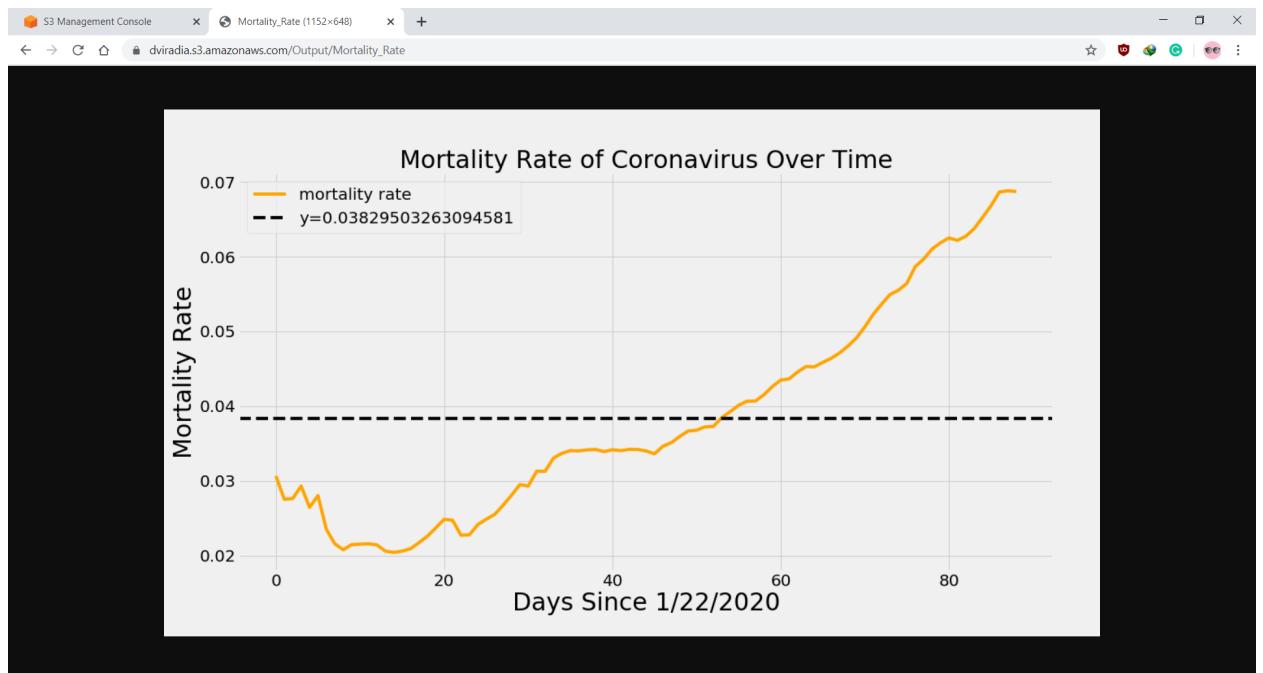
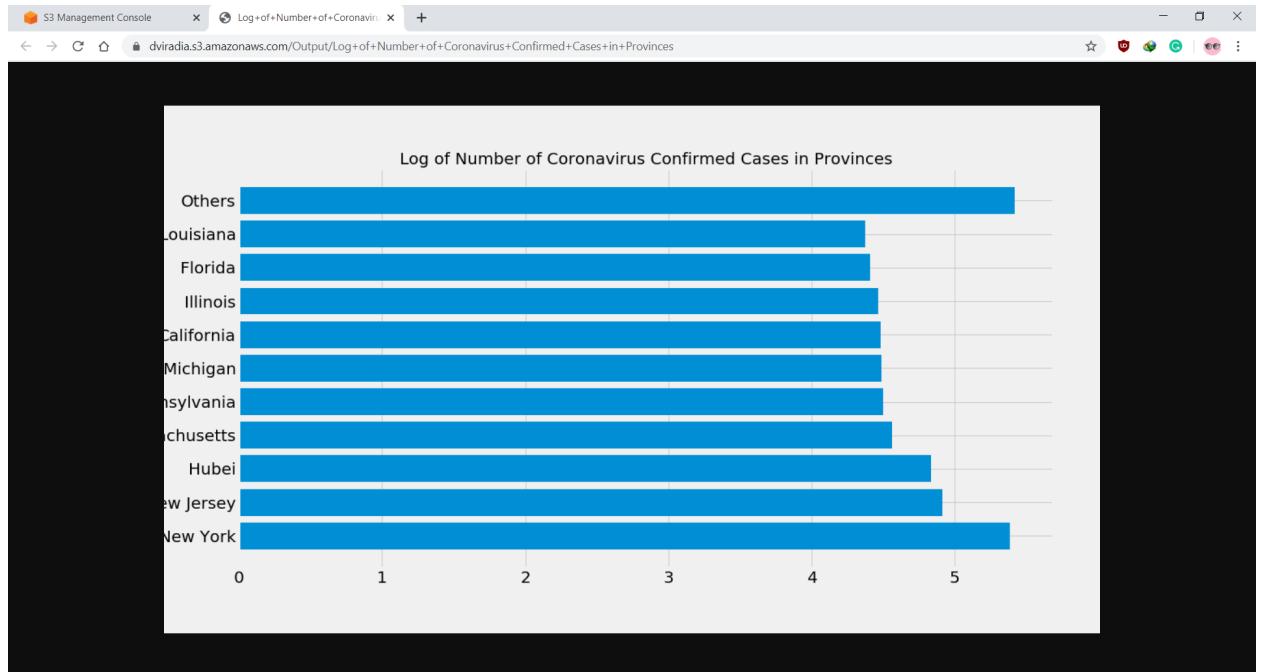


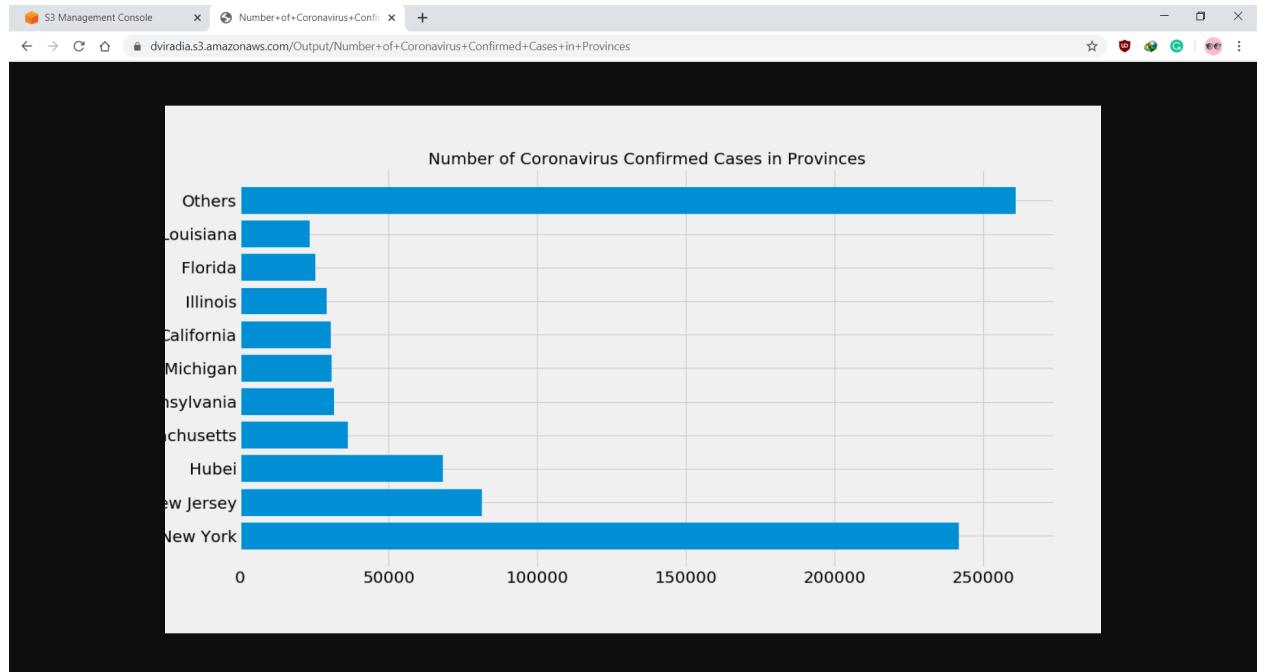


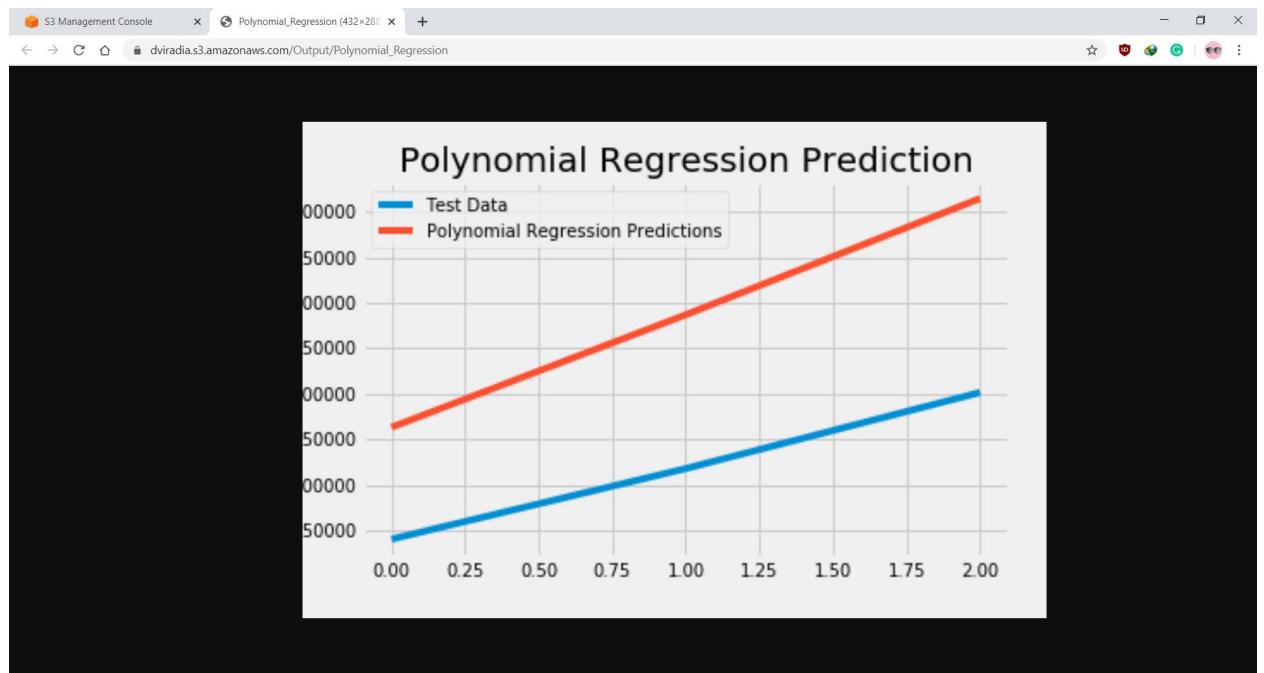
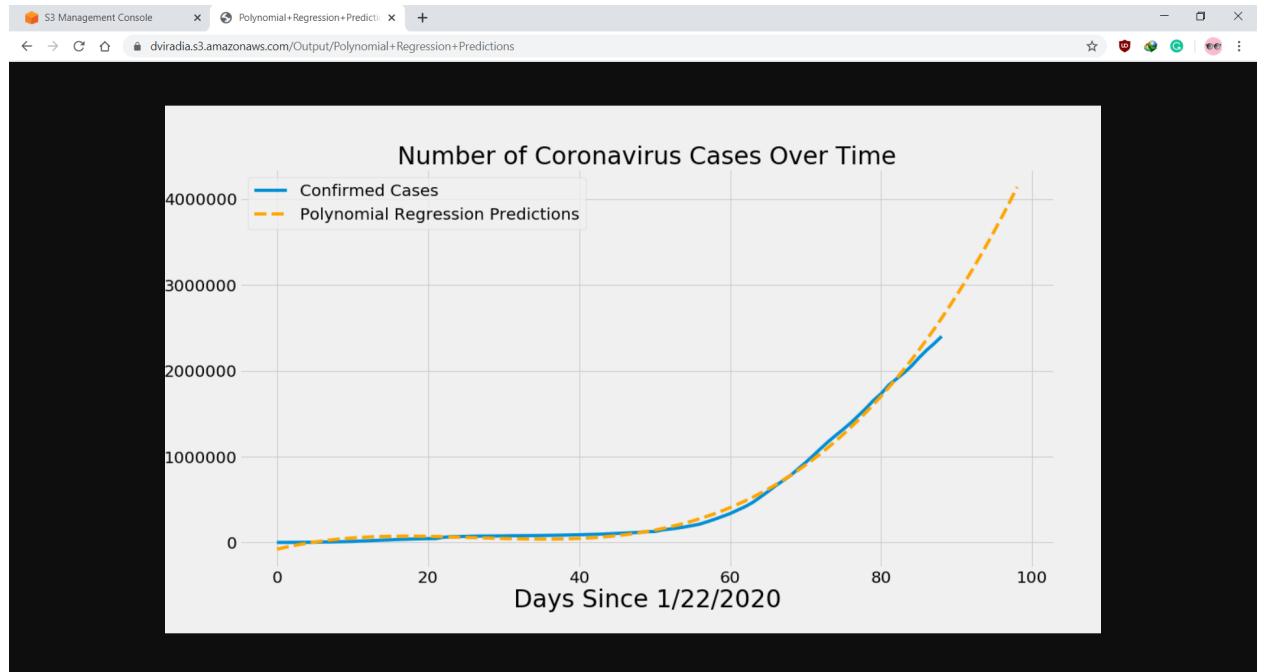


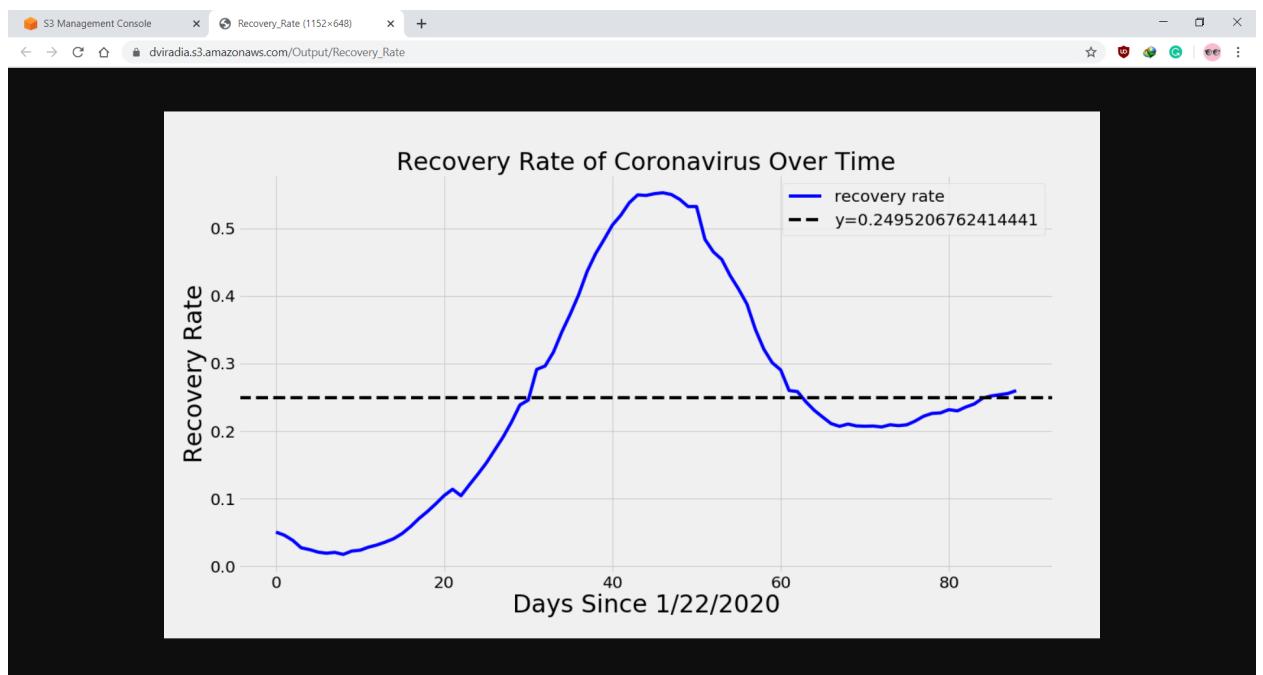
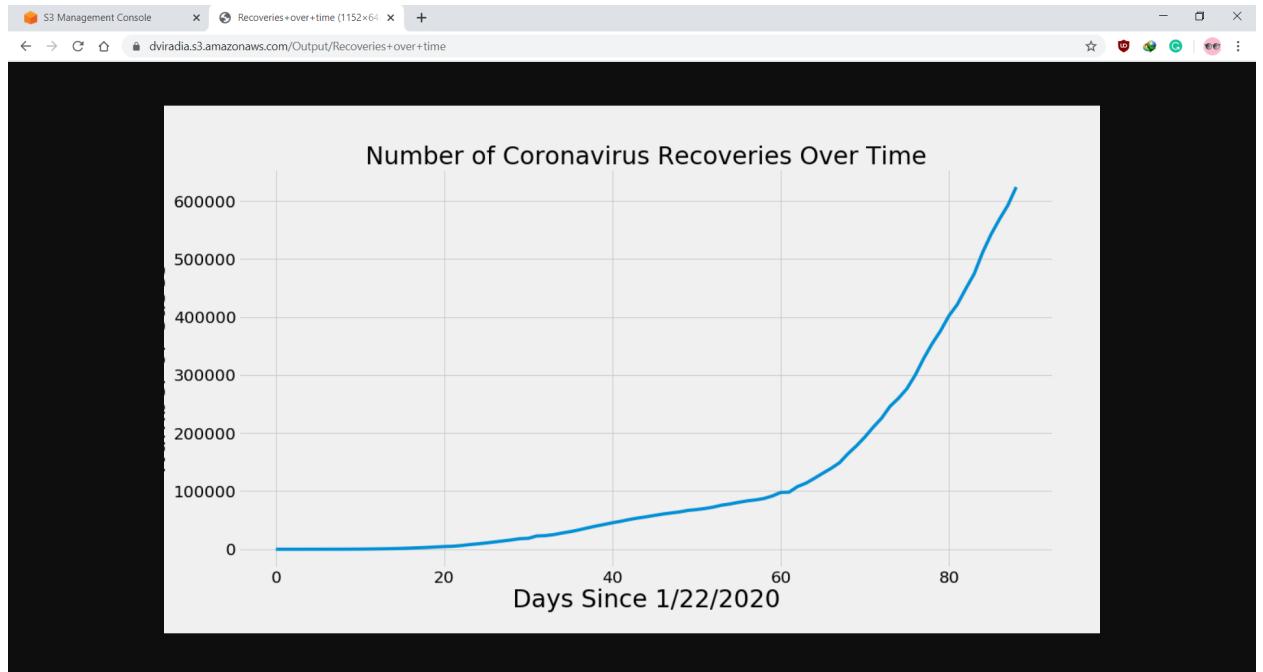


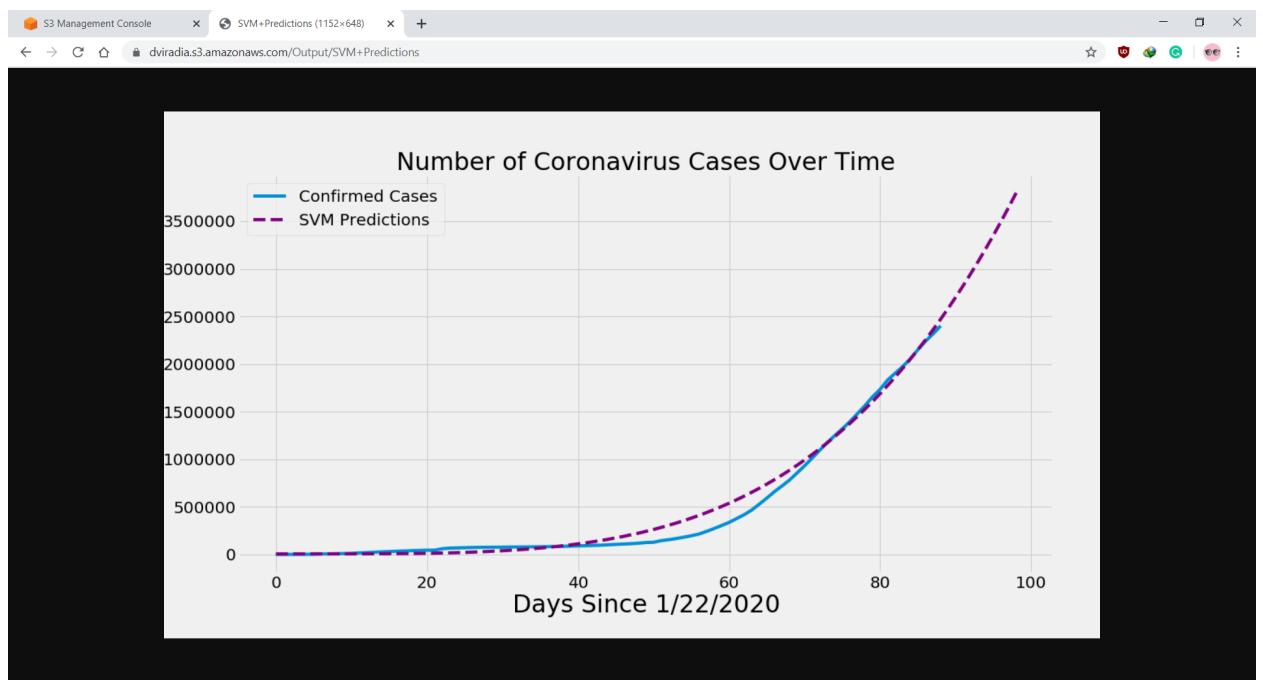
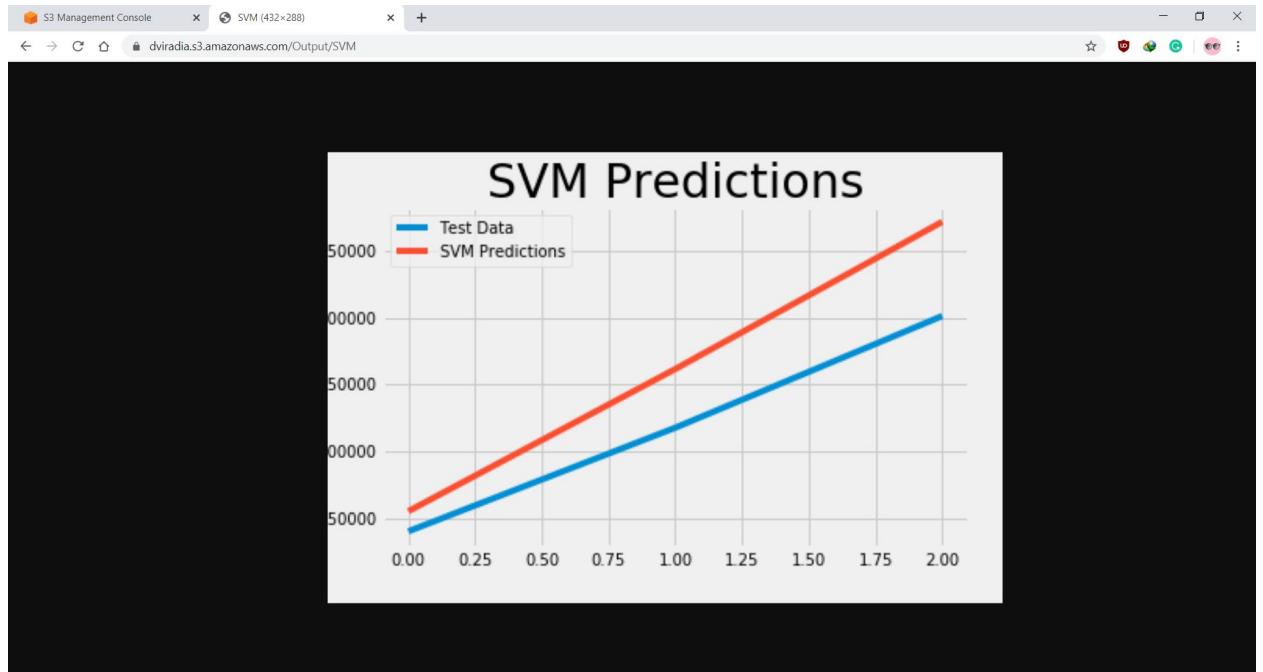


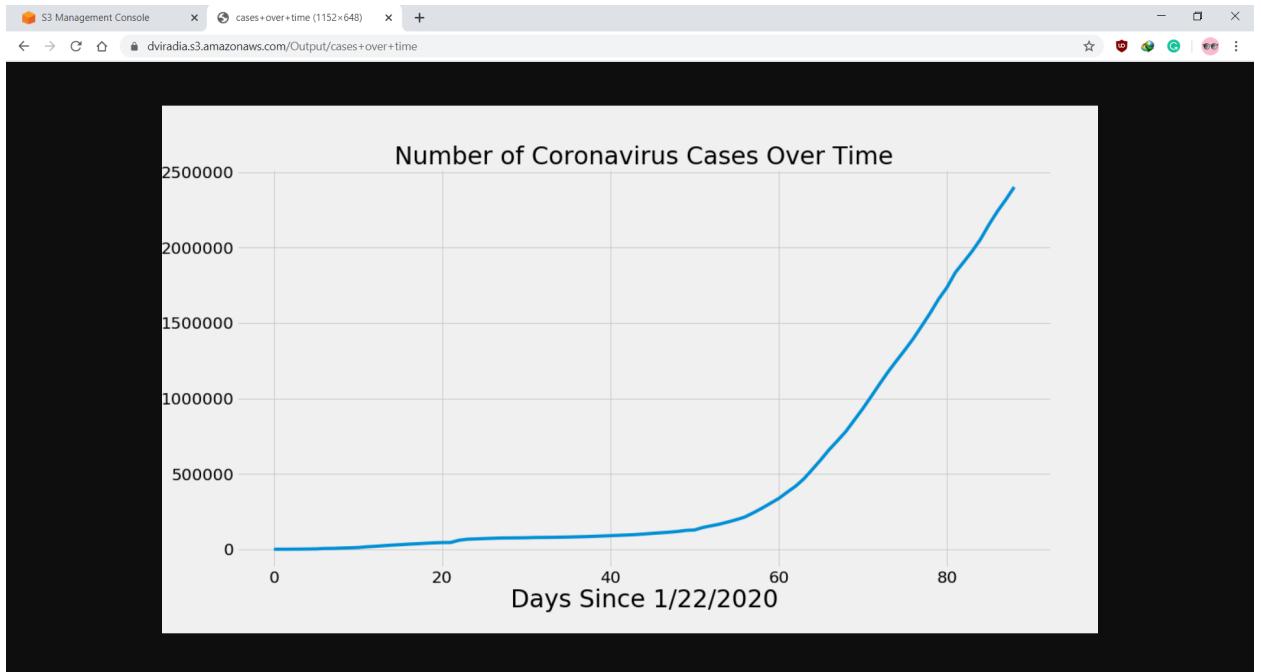












- The Amazon Sage Maker takes raw data from the given files and process that input into various Graphs.
Graphs represents COVID-19 Data into various categories such as Active Cases, Recovered Cases, Number of Death and Total Number of Cases Recorded and they are also filtered on various basis such as country, states, worldwide and many other categories.
There are various Types of Graphs Such as Pie Chart, Bar Graphs, Line Graphs and even Tabular Representations.