DAYANANDA SAGAR COLLEGE OF ENGINEERING
COMPUTER SCIENCE & ENGINEERING

Minor Project- Report
Aug-2021-2022

Course Faculty: Dr. Vinothini C
Course Name & Code: Cloud & Big Data Laboratory with Minor Project & 18CS7DLCBL
Semester: 7
Date: 19-1-2022

TITLE OF THE PROJECT	Heart Disease Analysis		
STUDENT NAME	Gautam Kumar	Rithvik K Bhat	Vignesh K
USN	1DS18CS710	1DS18CS732	1DS18CS744
INDIVIDUAL CONTRIBUTION	AWS Random Forest Algorithm	Decision Tree Algorithm Random Forest Algorithm	AWS Decision Tree Algorithm
GUIDE	Mr. Ravichandra H		
PROJECT ABSTRACT	Heart Disease prediction is one of the most complicated tasks in medical field. Data science plays a crucial role in processing huge amount of data in the field of healthcare. As heart disease prediction is a complex task, there is a need to automate the prediction process to avoid risks associated with it and alert the patient well in advance. This project uses the heart disease data set available on the AWS cloud S3 platform. The project predicts the chances of heart disease and classifies patient's risk level by implementing two data mining techniques they are Decision Tree and Random Forest. Thus, this project analyses the performance of the two machine learning algorithms. The trial results verify that Random Forest algorithm has achieved the highest accuracy compared to Decision Tree.		
PLATFORM USED (H/W & S/W TOOLS TO BE USED	Jupyter Notebook & Amazon Web Services S3		

INTRODUCTION

Human heart is the main part of the human body which regulates blood flow throughout our body. Any irregularity to the heart can cause distress in other parts of the body and can be classified as a heart disease. Today, heart disease is one of the primary reasons for the occurrence of most deaths. Heart disease may occur due to unhealthy lifestyle, smoking, alcohol and high intake of fat which may cause hypertension.

The main challenge in today's healthcare is provision of best quality services and accurate diagnosis. The accuracy in management of a disease lies in the proper time of detection of that disease. The project makes an attempt to detect these heart diseases at an early stage to avoid disastrous consequences.

Records of large set of medical data are available for analyzing and extracting valuable knowledge from it. Data mining techniques are used for extracting valuable information from the large data available. The medical database consists of discrete information which makes decision making a complex and tough task. Machine Learning (ML) which is a subfield of data mining handles large scale well-formatted dataset efficiently. In the medical field, machine learning can be used for diagnosis, detection and prediction of various diseases. The main goal of our project is to provide a tool for doctors to detect heart disease at an early stage. This in turn will help to provide effective treatment to patients and avoid severe consequences. ML plays a very important role to detect the hidden discrete patterns and analyze the given data. This project shows the performance analysis of two ML techniques: Decision Tree and Random Forest for predicting heart disease at an early stage.

DESIGN

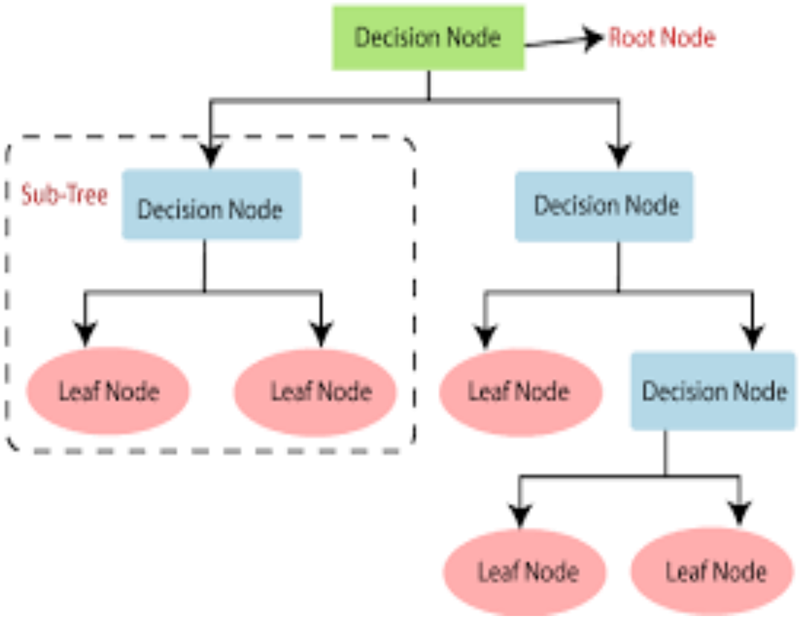
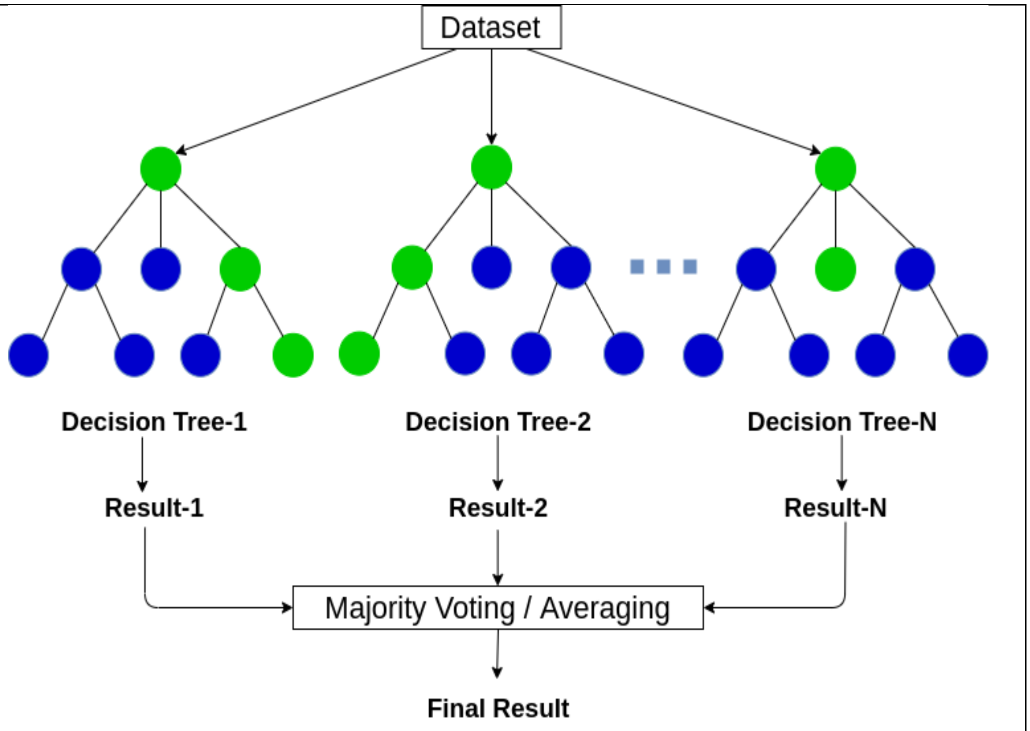
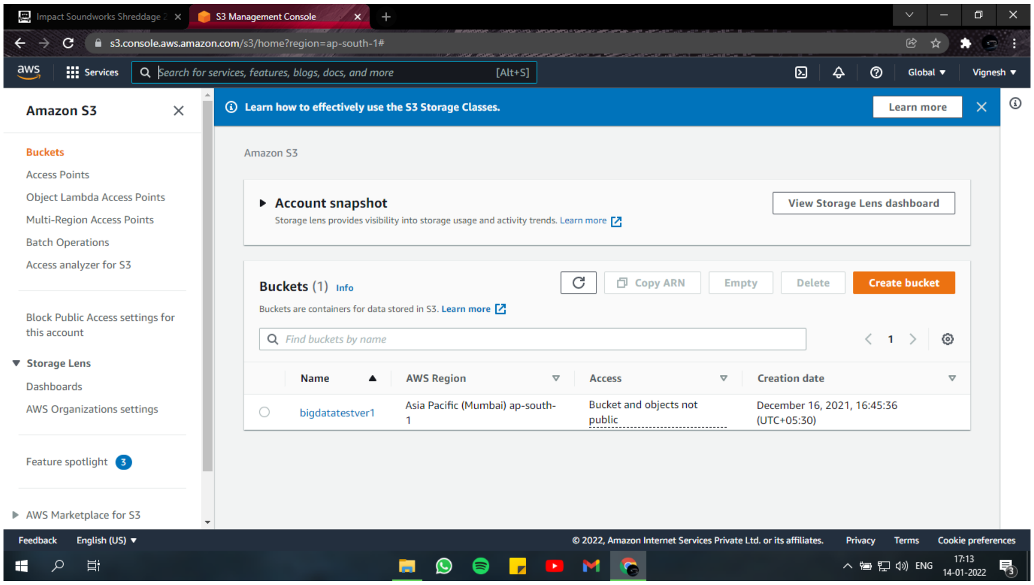


Fig. 1 – Decision Tree Algorithm

	 Dataset Decision Tree-1 Decision Tree-2 Decision Tree-N Result-1 Result-2 Result-N Majority Voting / Averaging Final Result Fig.2 – Random Forest Algorithm
PROJECT SOURCE CODE LINK (GITHUB/ GOOGLE DRIVE)	https://github.com/gautamK007/Heart-Disease-Analysis
CONCLUSION /FUTURE ENHANCEMENT	Predicting heart disease is one of the most difficult problems in medicine. In the realm of healthcare, data science is critical for examining massive amounts of data. Because predicting cardiac illness is a difficult undertaking, it is necessary to automate the process in order to avoid the risks connected with it and to inform the patient well in advance. This project makes use of the AWS cloud S3 platform's heart disease data set. The study uses two data mining approaches, Decision Tree and Random Forest, to predict the likelihood of heart disease and classify the risk level of patients. As a result, the performance of the two machine learning algorithms is examined in this study. The trial results show that the Random Forest algorithm gives the best results. For future enhancements, the project can be used to a variety of machine algorithms. Using visuals to detect cardiac disease could be a future improvement as well.

UI SCREENSHOTS



Learn how to effectively use the S3 Storage Classes.

Amazon S3

Account snapshot

Storage lens provides visibility into storage usage and activity trends. Learn more

Buckets (1) Info

Buckets are containers for data stored in S3. Learn more

Name	AWS Region	Access	Creation date
bigdatatestver1	Asia Pacific (Mumbai) ap-south-1	Bucket and objects not public	December 16, 2021, 16:45:36 (UTC+05:30)

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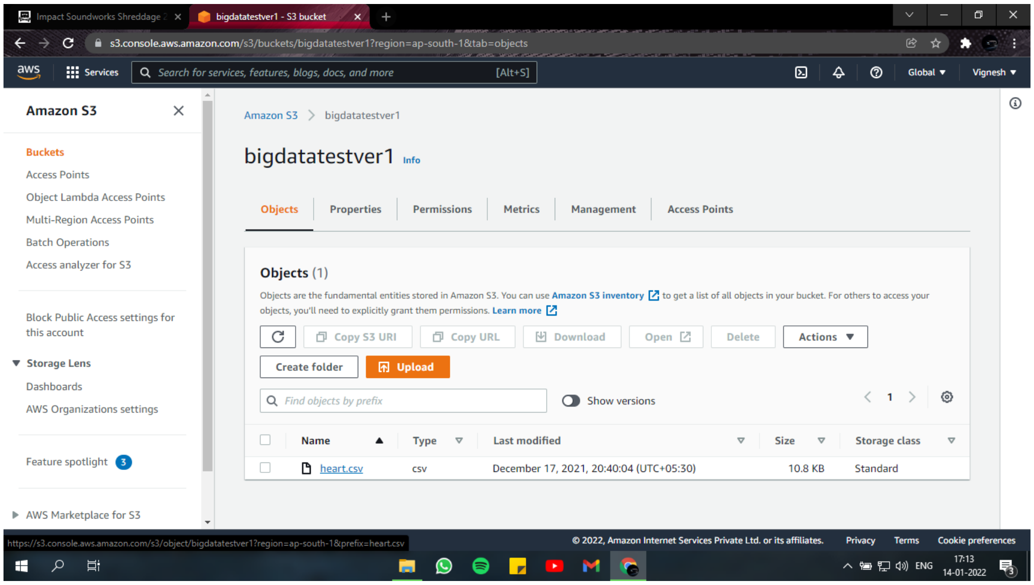
Impact Soundworks Shreddage
bigdatatestver1 - S3 bucket
s3.console.aws.amazon.com/s3/buckets/bigdatatestver1?region=ap-south-1&tab=objects
aws
Services
Search for services, features, blogs, docs, and more
[Alt+S]
Global
Vignesh
Amazon S3
Buckets
Access Points
Object Lambda Access Points
Multi-Region Access Points
Batch Operations
Access analyzer for S3
Block Public Access settings for this account
Storage Lens
Dashboards
AWS Organizations settings
Feature spotlight 3
AWS Marketplace for S3
Objects
Properties
Permissions
Metrics
Management
Access Points
Copy S3 URI
Copy URL
Download
Open
Delete
Actions
Create folder
Upload
Find objects by prefix
Show versions
https://s3.console.aws.amazon.com/s3/object/bigdatatestver1?region=ap-south-1&prefix=heart.csv
Privacy
Terms
Cookie preferences
ENG
17:13
14-01-2022

Amazon S3 > bigdatatestver1

bigdatatestver1 Info

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

Name	Type	Last modified	Size	Storage class
heart.csv	csv	December 17, 2021, 20:40:04 (UTC+05:30)	10.8 KB	Standard

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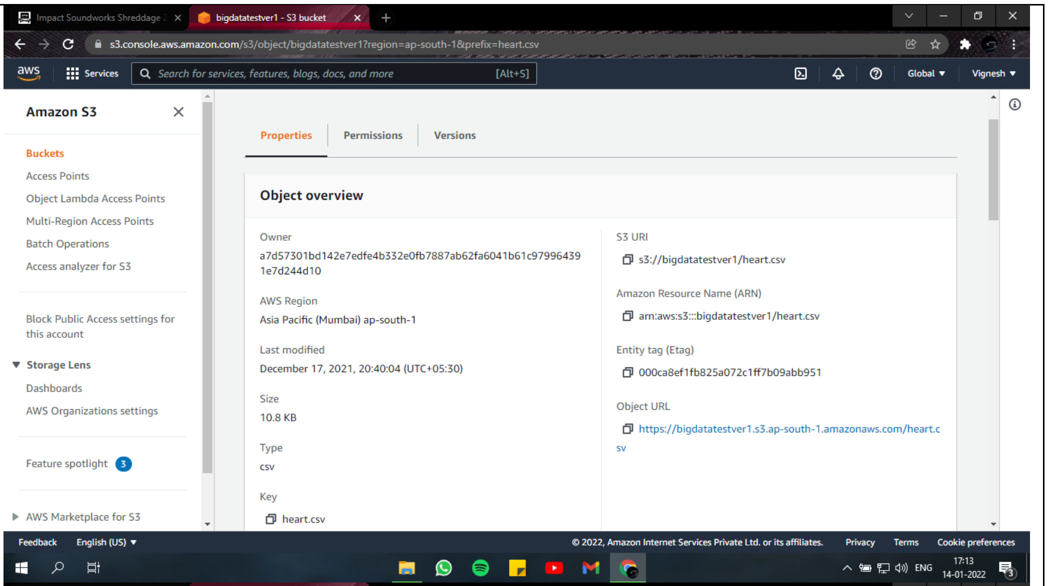
Impact Soundworks Shreddage
bigdatatestver1 - S3 bucket
s3.console.aws.amazon.com/s3/object/bigdatatestver1?region=ap-south-1&prefix=heart.csv
aws
Services
Search for services, features, blogs, docs, and more
[Alt+S]
Global ▾
Vignesh ▾
Amazon S3
Buckets
Access Points
Object Lambda Access Points
Multi-Region Access Points
Batch Operations
Access analyzer for S3
Block Public Access settings for this account
Storage Lens
Dashboards
AWS Organizations settings
Feature spotlight 3
AWS Marketplace for S3
Feedback
English (US) ▾
Privacy
Terms
Cookie preferences
ENG
17:13
14-01-2022

Properties | Permissions | Versions

Object overview

Owner
a7d57301bd142e7edfe4b332e0fb7887ab62fa6041b61c97996439 1e7d244d10

AWS Region
Asia Pacific (Mumbai) ap-south-1

Last modified
December 17, 2021, 20:40:04 (UTC+05:30)

Size
10.8 KB

Type
csv

Key
heart.csv

S3 URI
s3://bigdatatestver1/heart.csv

Amazon Resource Name (ARN)
arn:aws:s3:::bigdatatestver1/heart.csv

Entity tag (Etag)
000ca8ef1fb825a072c1ff7b09abb951

Object URL
https://bigdatatestver1.s3.ap-south-1.amazonaws.com/heart.csv

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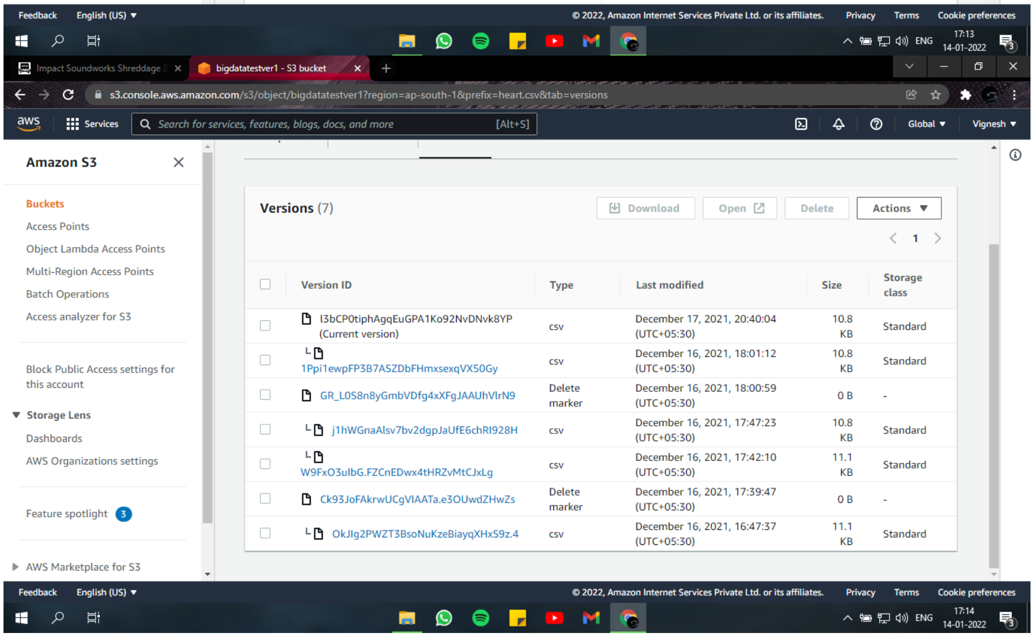
Impact Soundworks Shreddage
bigdatatestver1 - S3 bucket
s3.console.aws.amazon.com/s3/object/bigdatatestver1?region=ap-south-1&prefix=heart.csv&tab=versions
aws
Services
Search for services, features, blogs, docs, and more
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Block Public Access settings for this account
Storage Lens
Dashboards
AWS Organizations settings
Feature spotlight 3
AWS Marketplace for S3
Download
Open
Delete
Actions ▾
1
Feedback
English (US) ▾
Privacy
Terms
Cookie preferences
ENG
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14-01-2022

Versions (7)

□	Version ID	Type	Last modified	Size	Storage class
□	l3bCP0tiphAgqEuGPA1Ko92NvDNvk8YP (Current version)	csv	December 17, 2021, 20:40:04 (UTC+05:30)	10.8 KB	Standard
□	1Ppi1ewpFP3B7ASZDbFHmxsexqVX50Gy	csv	December 16, 2021, 18:01:12 (UTC+05:30)	10.8 KB	Standard
□	GR_L0S8n8yGmbVDfg4xXFgJAAUhVlrN9	Delete marker	December 16, 2021, 18:00:59 (UTC+05:30)	0 B	-
□	j1hWGnaAlsv7bv2dgpJaUfE6chRI928H	csv	December 16, 2021, 17:47:23 (UTC+05:30)	10.8 KB	Standard
□	W9FxO3uIbG.FZCnEDwx4tHRZvMtCJxLg	csv	December 16, 2021, 17:42:10 (UTC+05:30)	11.1 KB	Standard
□	Ck93JoFAkrwUCgVIAATa.e3OUwdZHwZs	Delete marker	December 16, 2021, 17:39:47 (UTC+05:30)	0 B	-
□	OkJIg2PWZT3BsoNuKzeBiayqXHxS9z.4	csv	December 16, 2021, 16:47:37 (UTC+05:30)	11.1 KB	Standard

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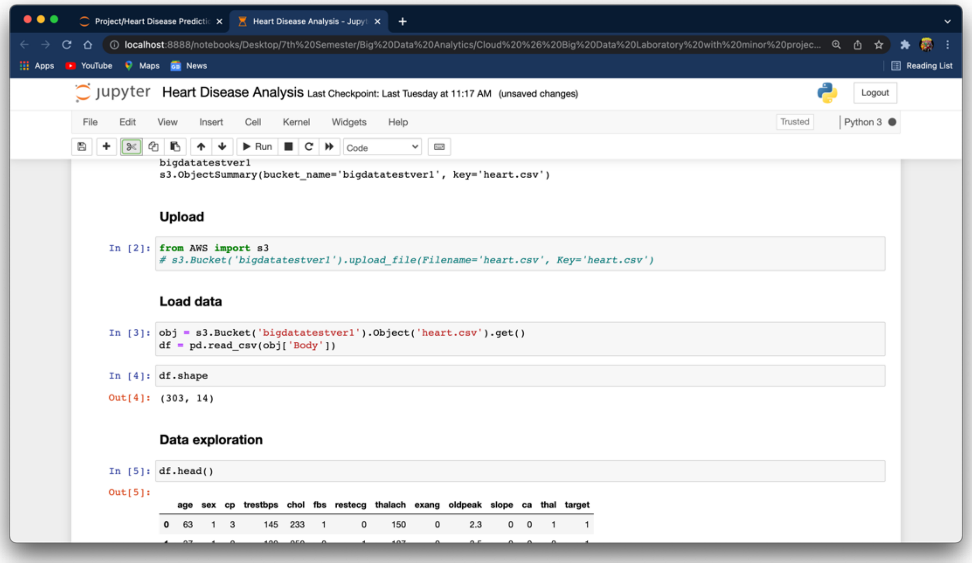
Project/Heart Disease Predictio
Heart Disease Analysis - Jupyt
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Apps
YouTube
Maps
News
Reading List
jupyter
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Trusted
Python 3
Run
Code

Heart Disease Analysis Last Checkpoint: Last Tuesday at 11:17 AM (unsaved changes)

```
bigdatatestver1
s3.ObjectSummary(bucket_name='bigdatatestver1', key='heart.csv')
```

Upload

```
In [2]: from AWS import s3
        # s3.Bucket('bigdatatestver1').upload_file(Filename='heart.csv', Key='heart.csv')
```

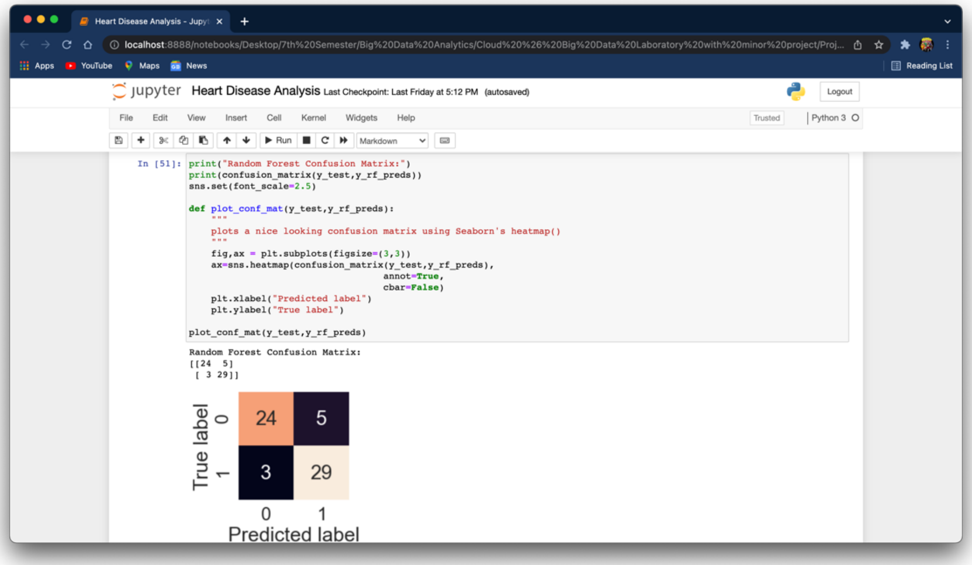
Load data

```
In [3]: obj = s3.Bucket('bigdatatestver1').Object('heart.csv').get()
        df = pd.read_csv(obj['Body'])

In [4]: df.shape

Out[4]: (303, 14)
```

Data exploration

```
In [5]: df.head()

Out[5]:
```

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
0	63	1	3	145	233	1	0	150	0	2.3	0	0	1	1


Heart Disease Analysis - Jupyt
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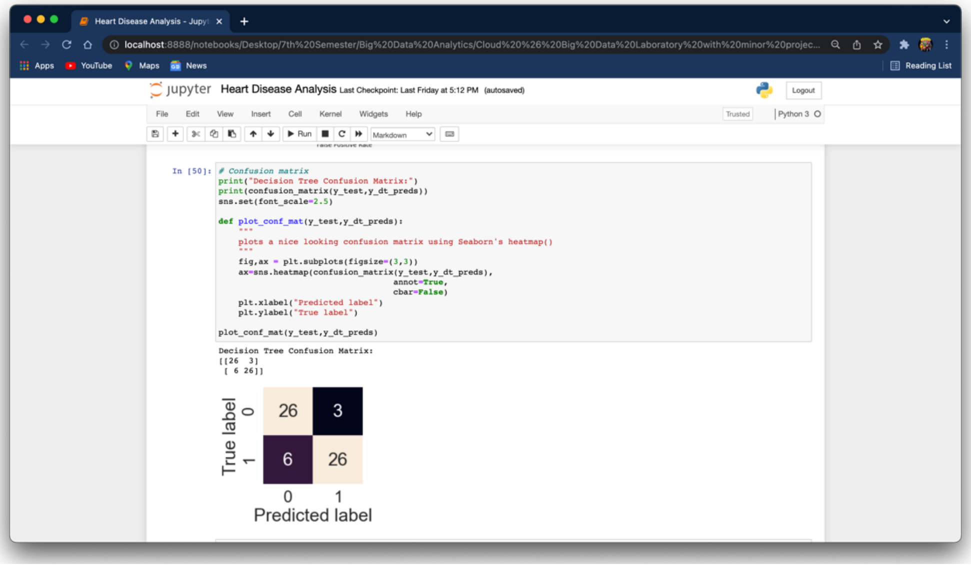
jupyter
Heart Disease Analysis Last Checkpoint: Last Friday at 5:12 PM (autosaved)
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Trusted
Python 3
Run
Markdown
True label
0
1
24
5
3
29
0
1
Predicted label

```
In [51]: print("Random Forest Confusion Matrix:")
         print(confusion_matrix(y_test,y_rf_preds))
         sns.set(font_scale=2.5)

         def plot_conf_mat(y_test,y_rf_preds):
             """
             plots a nice looking confusion matrix using Seaborn's heatmap()
             """
             fig,ax = plt.subplots(figsize=(3,3))
             ax=sns.heatmap(confusion_matrix(y_test,y_rf_preds),
                                             annot=True,
                                             cbar=False)
             plt.xlabel("Predicted label")
             plt.ylabel("True label")

         plot_conf_mat(y_test,y_rf_preds)

         Random Forest Confusion Matrix:
         [[24  5]
          [ 3 29]]
```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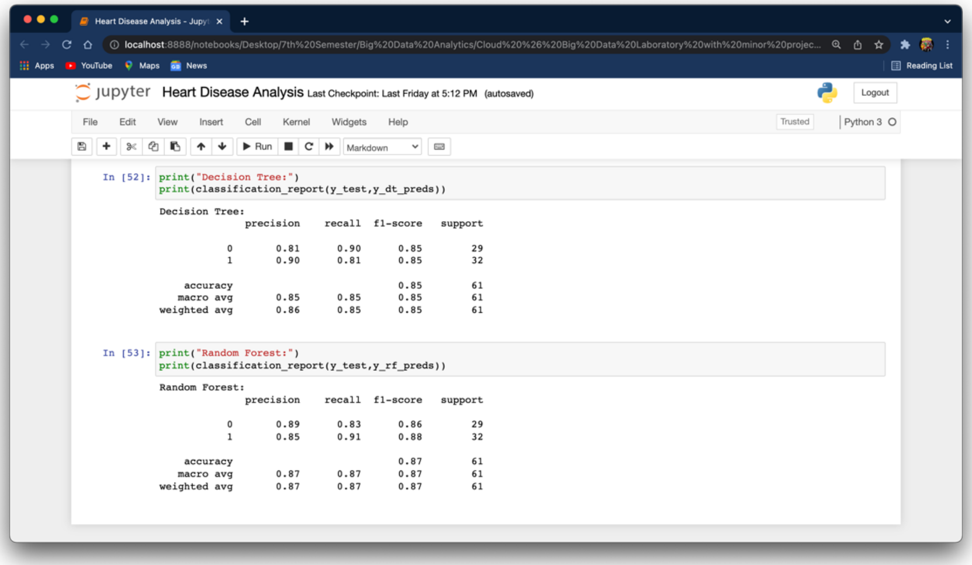
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Trusted
Python 3
Run
Markdown
True label
0
1
26
3
6
26
0
1
Predicted label

```
In [50]: # Confusion matrix
         print("Decision Tree Confusion Matrix:")
         print(confusion_matrix(y_test,y_dt_preds))
         sns.set(font_scale=2.5)

         def plot_conf_mat(y_test,y_dt_preds):
             """
             plots a nice looking confusion matrix using Seaborn's heatmap()
             """
             fig,ax = plt.subplots(figsize=(3,3))
             ax=sns.heatmap(confusion_matrix(y_test,y_dt_preds),
                                             annot=True,
                                             cbar=False)
             plt.xlabel("Predicted label")
             plt.ylabel("True label")

         plot_conf_mat(y_test,y_dt_preds)

         Decision Tree Confusion Matrix:
         [[26  3]
          [ 6 26]]
```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jupyter
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Logout
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Cell
Kernel
Widgets
Help
Trusted
Python 3
Run
Markdown

```
In [52]: print("Decision Tree:")
         print(classification_report(y_test,y_dt_preds))

         Decision Tree:
                       precision    recall  f1-score   support

                    0       0.81      0.90      0.85        29
                    1       0.90      0.81      0.85        32

             accuracy                           0.85        61
            macro avg       0.85      0.85      0.85        61
         weighted avg       0.86      0.85      0.85        61


In [53]: print("Random Forest:")
         print(classification_report(y_test,y_rf_preds))

         Random Forest:
                       precision    recall  f1-score   support

                    0       0.89      0.83      0.86        29
                    1       0.85      0.91      0.88        32

             accuracy                           0.87        61
            macro avg       0.87      0.87      0.87        61
         weighted avg       0.87      0.87      0.87        61
```