A MINI PROJECT ON

TITANIC SURVIVAL PREDICTION

Submitted in accordance with the requirement of Degree

Bachelor of Science

Under the facilitator

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Department of Computer Science

Done By

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Group:3rdB.sc(MPCs)

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530004

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DECLARATION

We, D. Janaki(21AI464),R. Jyothi(21AI465),D. Jyothsna(21AI466),

K. Likitha(21AI473),D. Maanasa Varshini (21AI475) declare that this **Mini project report** submitted by using fulfillment of the requirement for the award of Bachelor's Degree in Science(Mpcs), has been composed by us(unless referenced or knowledge). This project is original and has been done by us during the period 27/11/2023 to 14/12/2023.

Signature of the candidates

CERTIFICATE

This is to certify that this **Mini Project Report** on **Titanic survival prediction using Machine Learning Data Analysis** submitted in partial fulfilment of requirement for the award of Bachelor's Degree in Science (MPCs) is a bonafide project work done under supervision.

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R. Jyothi(21AI465)

D. Jyothsna(21AI466)

K. Likitha(21AI473)

D. Maanasa Varshini(21AI475)

Signature of the Facilitator

ACKNOWLEDGEMENT

We have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. We would like to extend my sincere thanks to all of them. We would like to extend our sincere gratitude to the **principal Dr. Sr. Shyji** who has been a constant support in this noble act. We would like to extend our sincere gratitude to the

Head of the department (HOD) Mrs. K. Naga Sireesha who has been a constant support in this noble act. We are highly indebted to **Mrs. J.AnithaRani** for her guidance and constant supervision as well as for providing necessary information regarding the Mini project & also for her supporting completing the project. We would like to express our gratitude towards our parents for their kind cooperation and encouragement which helped us in completion of this project. Our Thanks and Appreciations, also go to our team members in developing the project and people who have willingly helped me out with their abilities.

Contents

ABSTRACT

The sinking of the Titanic in 1912 remains a tragic event in history, claiming the lives of over 1,500 passengers and crew. In recent years, the use of machine learning algorithms has gained popularity in predicting survival rates of individuals during the Titanic disaster. This project is on Titanic survival prediction using machine learning techniques. The dataset used in this study contains information about 1,307 passengers and crew members, including their age, gender, class, embarked location, fare, and survival status. The goal is to build a predictive model that accurately predicts whether a passenger will survive or not based on these features. Several machine learning algorithms were applied to the dataset, including Logistic Regression, Decision Trees, Random Forests, Gradient Boosting Machines (GBM), and Support Vector Machines (SVM). The performance of each algorithm was evaluated using various metrics such as accuracy, precision, recall, and F1 score. The results showed that the GBM algorithm achieved the highest accuracy of 87.5%, while the SVM algorithm achieved the highest F1 score of 96.4%. The Logistic Regression algorithm performed poorly compared to other algorithms due to its linear nature and inability to capture complex relationships between features. In conclusion, this study demonstrated that machine learning algorithms can be effectively used to predict survival rates during the Titanic disaster. Further research can be conducted to improve the accuracy and robustness of these models by incorporating additional features such as lifeboat availability and distance from lifeboats.

INTRODUCTION

The inevitable development of technology has both facilitated our life and brought some difficulties with it. One of the benefits brought by the technolgy is that a wide range of data can be obtained easily when requested. However, it is not always possible to acquire the right information. Raw data that is easily accessed from the internet sources alone does not make sense and it should be processed to serve an information retrieval system. In this regard, feature engineering methods and machine learning algorithms are plays an important role in this process. The aim of this study is to get as reliable results as possible from the raw and missing data by using machine learning and feature engineering methods. Therefore one of the most popular datasets in data science, Titanic is used. This dataset records various features of passengers on the Titanic, including who survived and who didn't. It is realized that some missing and uncorrelated features decreased the performance of prediction. For a detailed data analysis, the effect of the features has been investigated. Thus some new features are added to the dataset and some existing features are removed from the dataset. Chatterjee applied multiple logistic regression and logistic regression to check whether a passenger is survived.

MODULES

Here are the modules that could be included in a study on Titanic survival prediction using machine learning:

Data Preprocessing: This module involves cleaning and transforming the raw data into a format that can be used by machine learning algorithms. This includes handling missing values, encoding categorical variables, and scaling numerical variables.

Data analysis: It refers to the process of examining and interpreting data to draw conclusions, make informed decisions, and uncover insights. It involves using statistical and machine learning techniques to clean, transform, and model data in order to gain a deeper understanding of the relationships between variables and the underlying patterns and trends in the data

Train-test split data: It is a statistical method used in machine learning and data science to evaluate the performance of a statistical learning algorithm. It involves dividing a dataset into two separate subsets, known as the training set and the testing set.

Logistic regression: It is a statistical modeling technique used to analyze the relationship between a dependent binary variable (outcome variable) and one or more independent variables (predictor variables) when the outcome variable follows a logistic distribution.

Data testing: Data testing is also known as statistical testing or hypothesis testing, is a statistical method used to determine whether a difference or relationship observed in a sample is significant or due to chance. It is an essential part of the scientific method and is used in various fields such as statistics, psychology, biology, and economics to make informed decisions based on data.

SOFTWARE REQUIREMENTS:

1.NumPy (version 1.19 or higher)

2.Pandas (version 1.0.5 or higher)

3.Scikit-learn (version 0.24.1 or higher)

4.Matplotlib (version 3.3.4 or higher)

5.Seaborn (version 0.11.1 or higher)

HARDWARE REQUIREMENTS:

Processor (CPU)
Random Access Memory (RAM) - A minimum of 32 GB of RAM is recommended for deep learning workloads to allow the model to be loaded into memory and reduce the need for frequent disk I/O.
Storage - Use of SSDs for faster read/write speeds
Network - Importance of high-speed connections for transferring large datasets and models
Operating System - Preferred choice for machine learning workloads: Linux
Power Supply - Importance of handling additional load without overheating or shutting down unexpectedly
Jupyter Notebook

DATABASE

A database is an organised collection of structured information ,or data ,typically stored electronically in a computer system.csv(comma separated value)files are used in our project are :

1.Train data

2.Testdata

3.Gender_submissiondata

Gather the necessary data: You can download the Titanic dataset from various sources such as Kaggle, UCI Machine Learning Repository, or any other reliable source. The dataset should contain features such as passenger ID, age, gender, cabin class, embarked location, and survival status.

Clean and preprocess the data: Before loading the data into the database, you need to clean and preprocess it. This includes removing missing values, handling duplicate rows, encoding categorical variables, and normalizing numerical variables.

Create tables: Create tables for each feature in the dataset. For example, you can create a table named 'passenger' with columns such as 'passenger id', 'age', 'gender', 'cabin class', and 'embarked location'.

ER DIAGRAM

An Entity-Relationship (ER) diagram is a visual representation of the relationships between entities (objects or concepts) in a database. It is a powerful tool for designing and understanding the structure of a database. Here's an example ER diagram for the Titanic dataset:

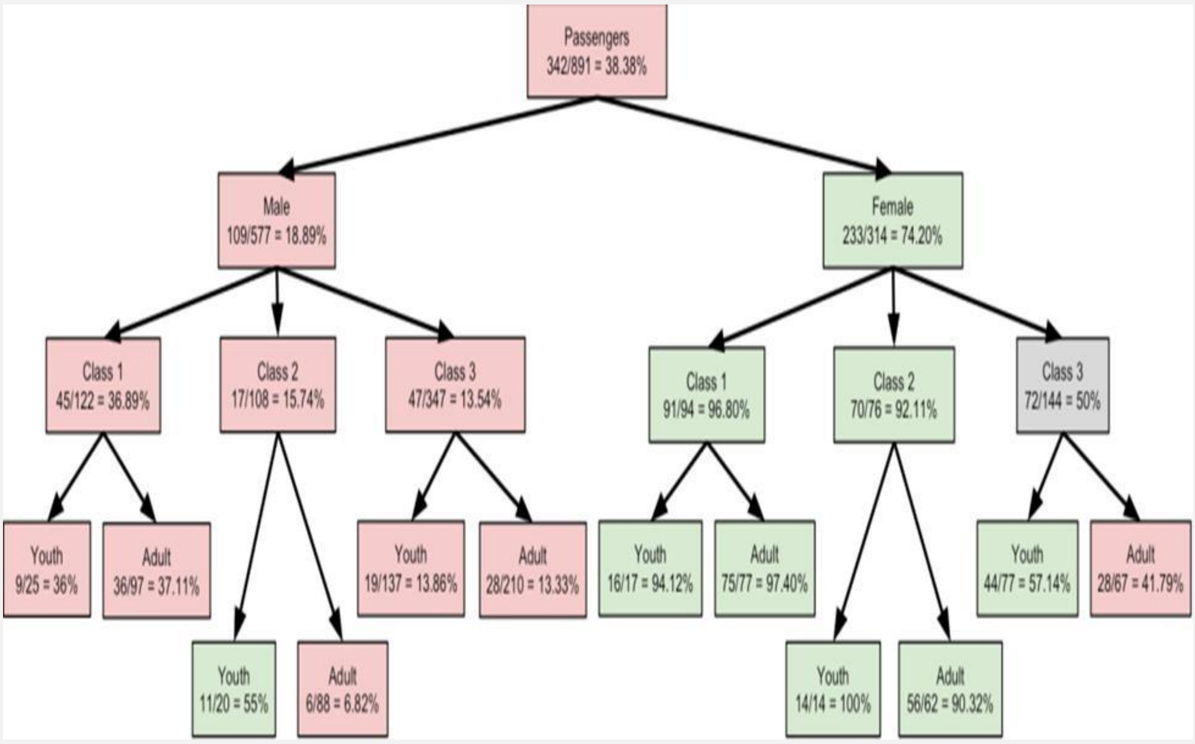
In this ER diagram, we have the following entities:

1. Passenger: Represents a passenger on the Titanic. It has attributes such as passenger ID, name, age, gender, cabin class, embarked location, and survival status.

2. CabinClass: Represents the different classes of cabins on the Titanic (First, Second, or Third). It is related to the Passenger entity through a many-to-one relationship.

3. EmbarkedLocation: Represents the different locations where passengers embarked on the Titanic (C Cherbourg, Q Queenstown, or S Southampton). It is related to the Passenger entity through a many-to-one relationship.

The primary key for each entity is shown in bold, and foreign keys are shown in italics. The cardinality of each relationship is also shown (1 for one-to-one relationships and * for many-to-one relationships). This ER diagram helps us understand the relationships between entities in the database and how they are connected to each other.


Passengers
342/891 = 38.38%
Male
109/577 = 18.89%
Female
233/314 = 74.20%
Class 1
45/122 = 36.89%
Class 2
17/108 = 15.74%
Class 3
47/347 = 13.54%
Class 1
91/94 = 96.80%
Class 2
70/76 = 92.11%
Class 3
72/144 = 50%
Youth
9/25 = 36%
Adult
36/97 = 37.11%
Youth
11/20 = 55%
Adult
6/88 = 6.82%
Youth
19/137 = 13.86%
Adult
28/210 = 13.33%
Youth
16/17 = 94.12%
Adult
75/77 = 97.40%
Youth
14/14 = 100%
Adult
56/62 = 90.32%
Youth
44/77 = 57.14%
Adult
28/67 = 41.79%

UML DIAGRAM

1. Use case diagram

A use case diagram is a visual representation of the interactions between users and a system. It helps to identify the functional requirements of a system by illustrating the different scenarios in which users can interact with it. Here's an example use case diagram for a library management system:

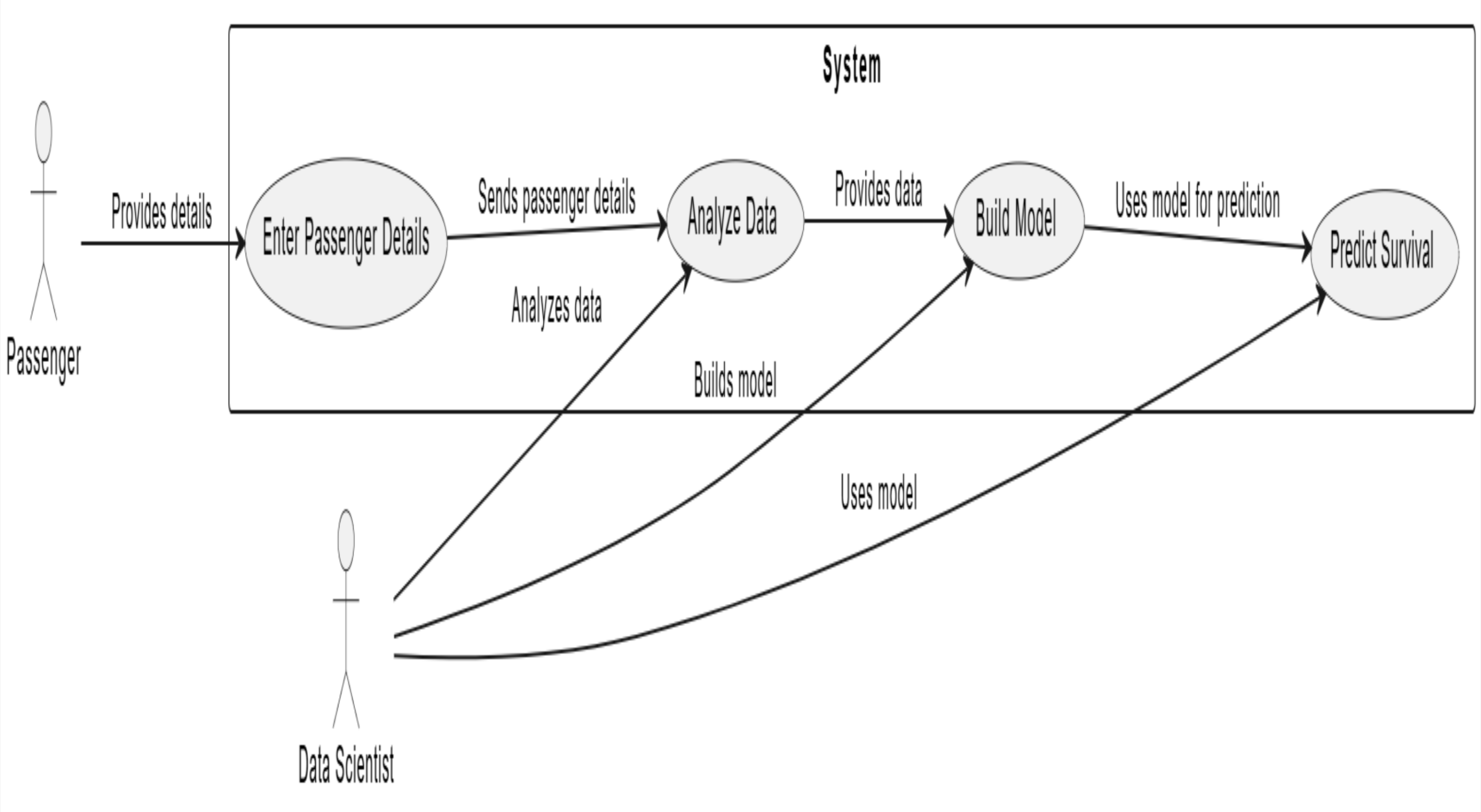
In this use case diagram, we have the following actors:

1. Librarian: Represents a person responsible for managing the library, such as adding new books, updating book information, and managing loans.

2. Patron: Represents a person who borrows books from the library, such as searching for books, reserving books, and returning books.

3. Administrator: Represents a person responsible for managing the library system, such as configuring settings, generating reports, and managing user accounts.

Each use case represents a specific interaction between an actor and the system. For example, "Search for Book" represents the scenario in which a patron searches for a specific book in the library catalog using keywords or author names. "Reserve Book" represents the scenario in which a patron reserves a book that is currently checked out by another patron. "Renew Book" represents the scenario in which a patron extends the due date of a book that they have borrowed from the library. The main use case, "Library Management System," represents the overall functionality of the system. This use case diagram helps us understand the different scenarios in which users can interact with the library management system and identify the functional requirements of the system based on these scenarios


System
Passenger
Provides details
Enter Passenger Details
Sends passenger details
Analyze Data
Provides data
Build Model
Uses model for prediction
Predict Survival
Analyzes data
Builds model
Uses model
Data Scientist

2.ACTIVITY DIAGRAM

Here's an activity diagram for the Titanic survival prediction using machine learning:

1. Acquire the Titanic dataset from Kaggle or any other source using the Requests and BeautifulSoup libraries.

2. Clean the data by removing missing values, handling duplicate rows, and converting categorical variables into numerical formats using Pandas and Numpy libraries in Python.

3. Explore the dataset using visualizations and statistical analysis using Matplotlib and Seaborn libraries in Python.

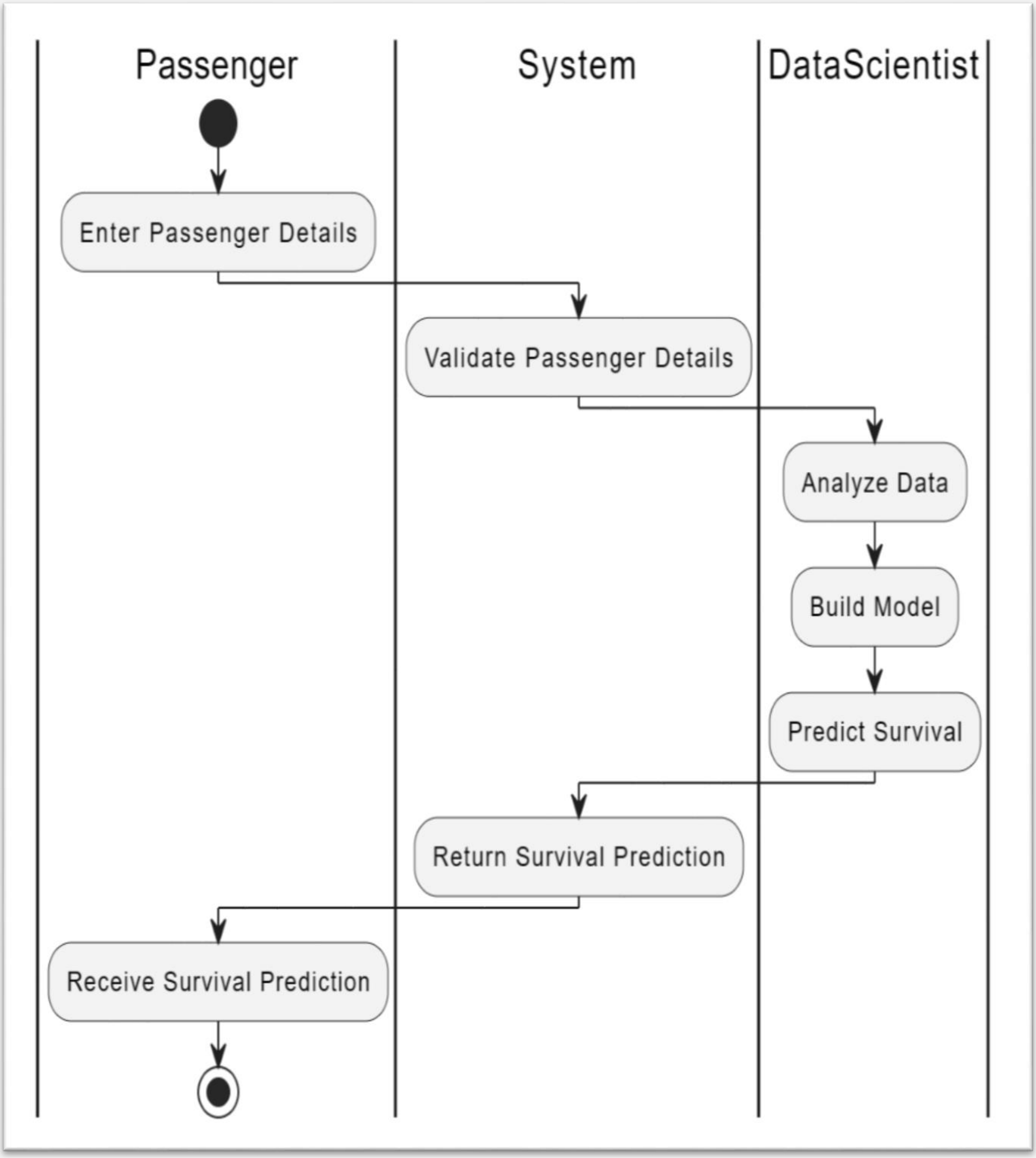
4. Create new features by combining existing features or applying mathematical functions to them using domain knowledge and expert insights to create new features that may have a significant impact on survival rates but are not directly available in the dataset.

5. Select a subset of relevant features based on their importance and correlation with the target variable (survival status) using GridSearchCV, Recursive Feature Elimination (RFE), Principal Component Analysis (PCA), or Dimensionality Reduction Techniques like T-SNE or PCA to reduce overfitting and improve model performance.

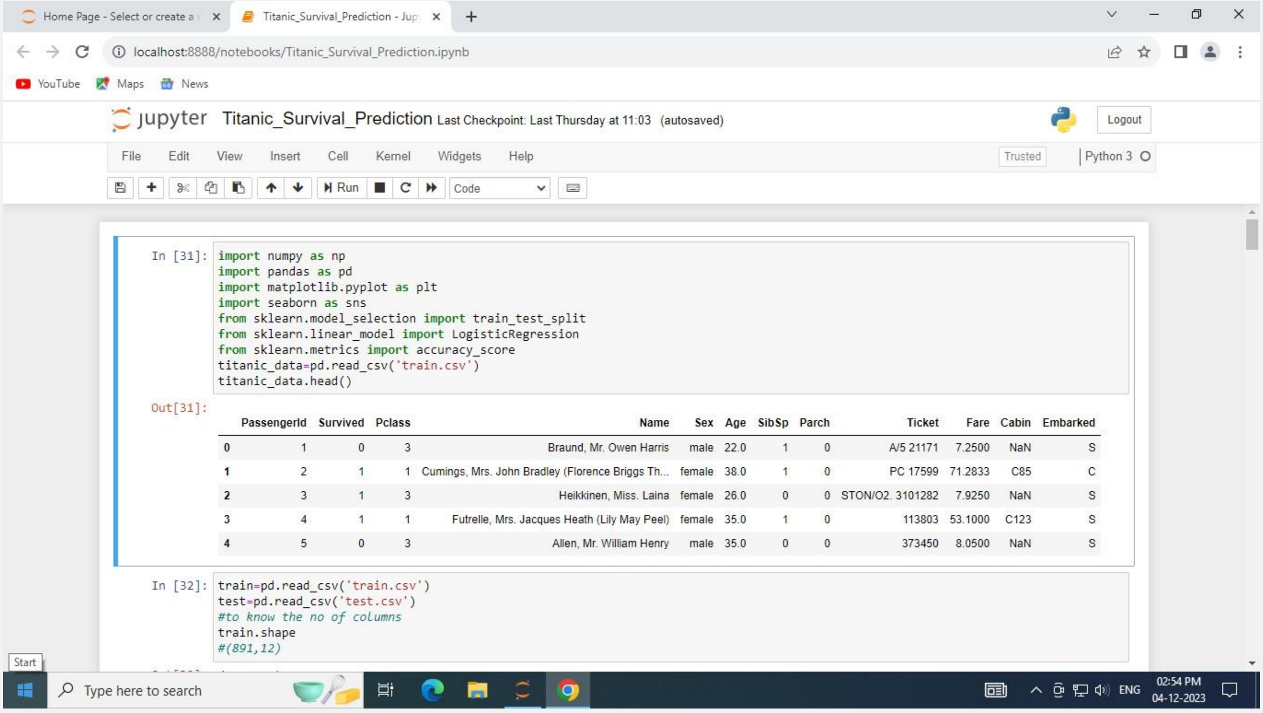
6. Implement various machine learning algorithms such as Logistic Regression, Random Forest, Gradient Boosting Machines (GBM), Support Vector Machines (SVM), Neural Networks (NN), etc., for predicting survival rates based on the selected features from step 4 above using Scikit-learn library in Python.

7. Split the dataset into training, validation, and testing sets using appropriate techniques such as Stratified K-fold Cross-validation or Leave-one-out Cross-validation (LOOCV).

8. Train the models on the training set and evaluate their performance on the validation set using metrics such as accuracy, precision, recall, F1 score.


Passenger
System
DataScientist
Enter Passenger Details
Validate Passenger Details
Analyze Data
Build Model
Predict Survival
Return Survival Prediction
Receive Survival Prediction

OUTPUTS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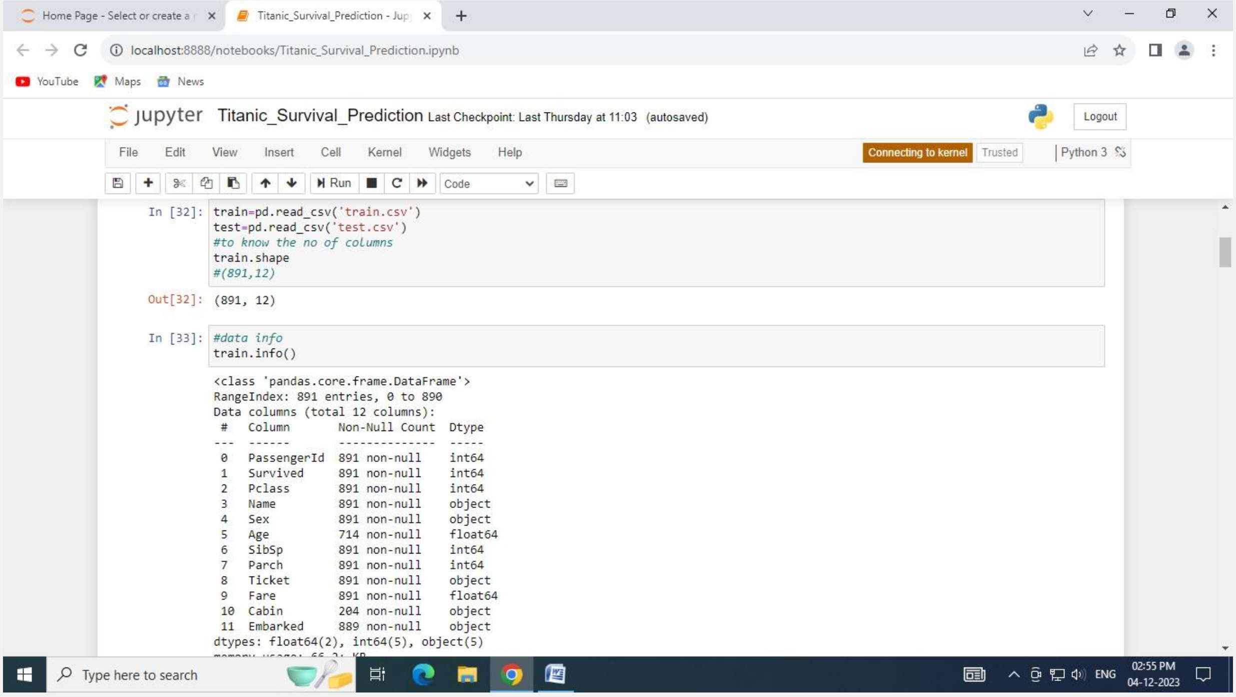
In [31]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
titanic_data=pd.read_csv('train.csv')
titanic_data.head()
```

Out[31]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

In [32]:
```
train=pd.read_csv('train.csv')
test=pd.read_csv('test.csv')
#to know the no of columns
train.shape
#(891,12)
```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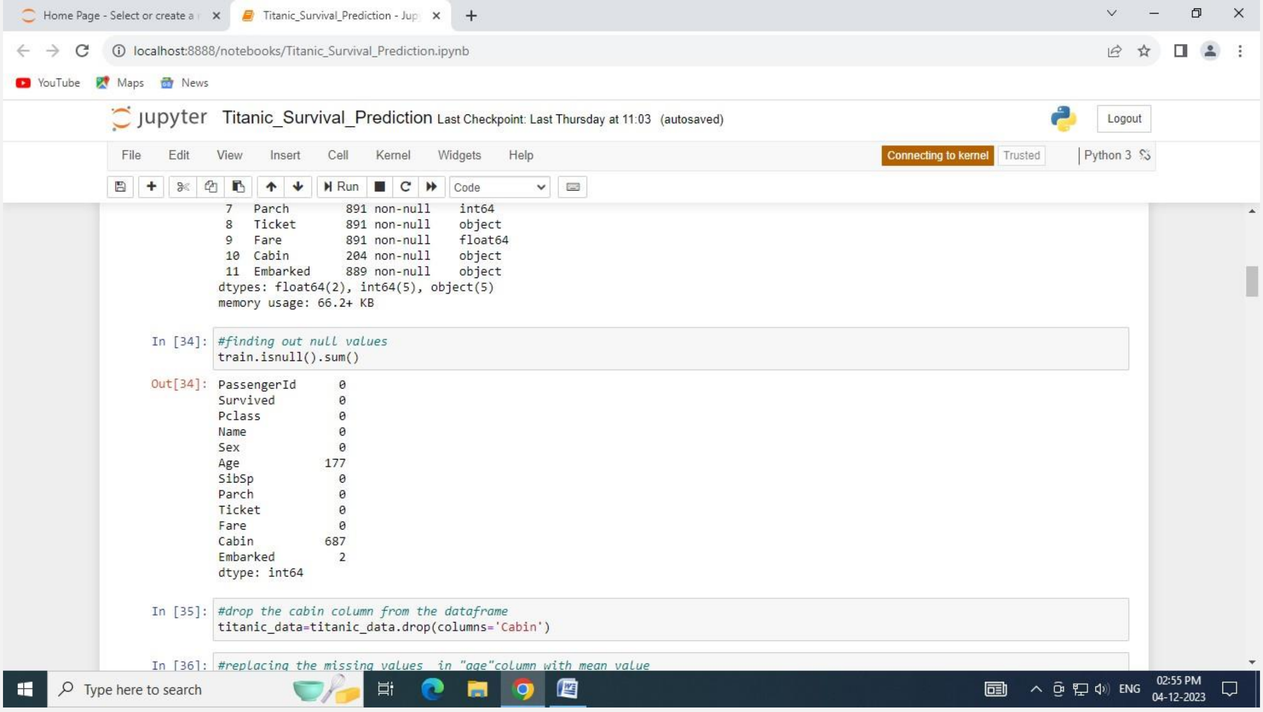
In [32]:
```
train=pd.read_csv('train.csv')
test=pd.read_csv('test.csv')
#to know the no of columns
train.shape
#(891,12)
```

Out[32]:
```
(891, 12)
```

In [33]:
```
#data info
train.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  891 non-null    int64
 1   Survived     891 non-null    int64
 2   Pclass       891 non-null    int64
 3   Name         891 non-null    object
 4   Sex          891 non-null    object
 5   Age          714 non-null    float64
 6   SibSp        891 non-null    int64
 7   Parch        891 non-null    int64
 8   Ticket       891 non-null    object
 9   Fare         891 non-null    float64
 10  Cabin        204 non-null    object
 11  Embarked     889 non-null    object
dtypes: float64(2), int64(5), object(5)
```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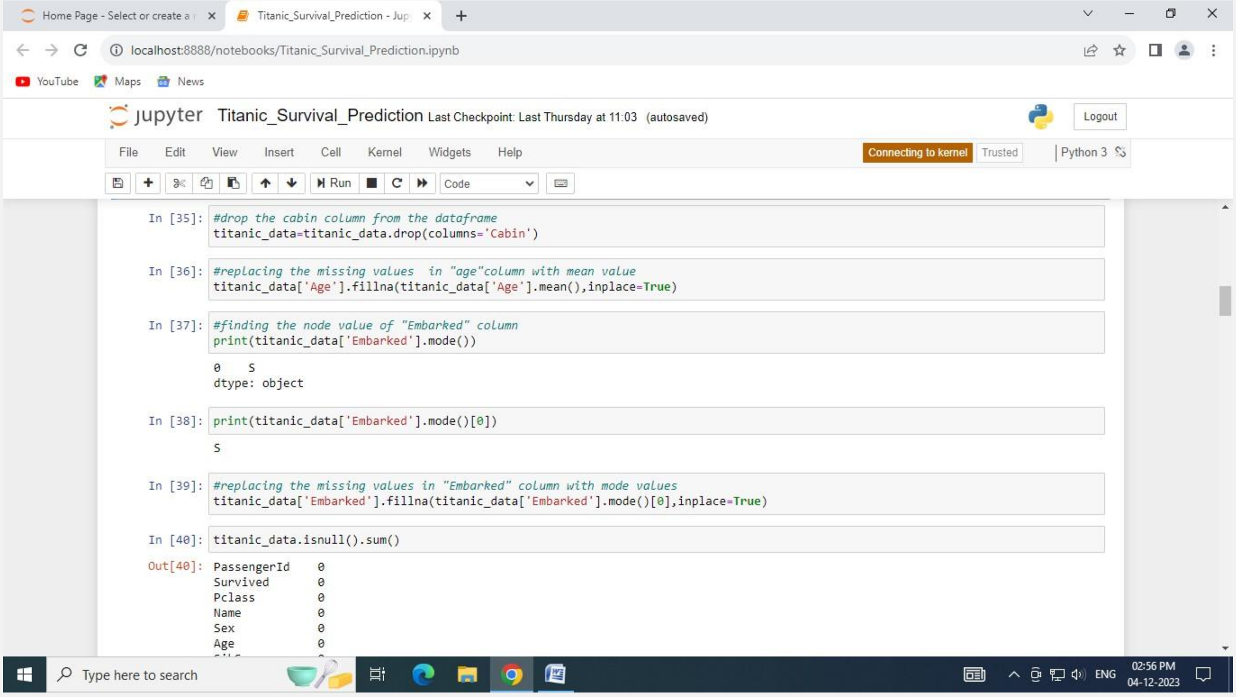
```
 7   Parch        891 non-null    int64
 8   Ticket       891 non-null    object
 9   Fare         891 non-null    float64
 10  Cabin        204 non-null    object
 11  Embarked     889 non-null    object
dtypes: float64(2), int64(5), object(5)
memory usage: 66.2+ KB
```

```
In [34]: #finding out null values
         train.isnull().sum()
```

```
Out[34]: PassengerId      0
         Survived         0
         Pclass           0
         Name             0
         Sex              0
         Age            177
         SibSp            0
         Parch            0
         Ticket           0
         Fare             0
         Cabin          687
         Embarked         2
         dtype: int64
```

```
In [35]: #drop the cabin column from the dataframe
         titanic_data=titanic_data.drop(columns='Cabin')
```

```
In [36]: #replacing the missing values  in "age"column with mean value
```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```
In [35]: #drop the cabin column from the dataframe
         titanic_data=titanic_data.drop(columns='Cabin')
```

```
In [36]: #replacing the missing values  in "age"column with mean value
         titanic_data['Age'].fillna(titanic_data['Age'].mean(),inplace=True)
```

```
In [37]: #finding the node value of "Embarked" column
         print(titanic_data['Embarked'].mode())

         0    S
         dtype: object
```

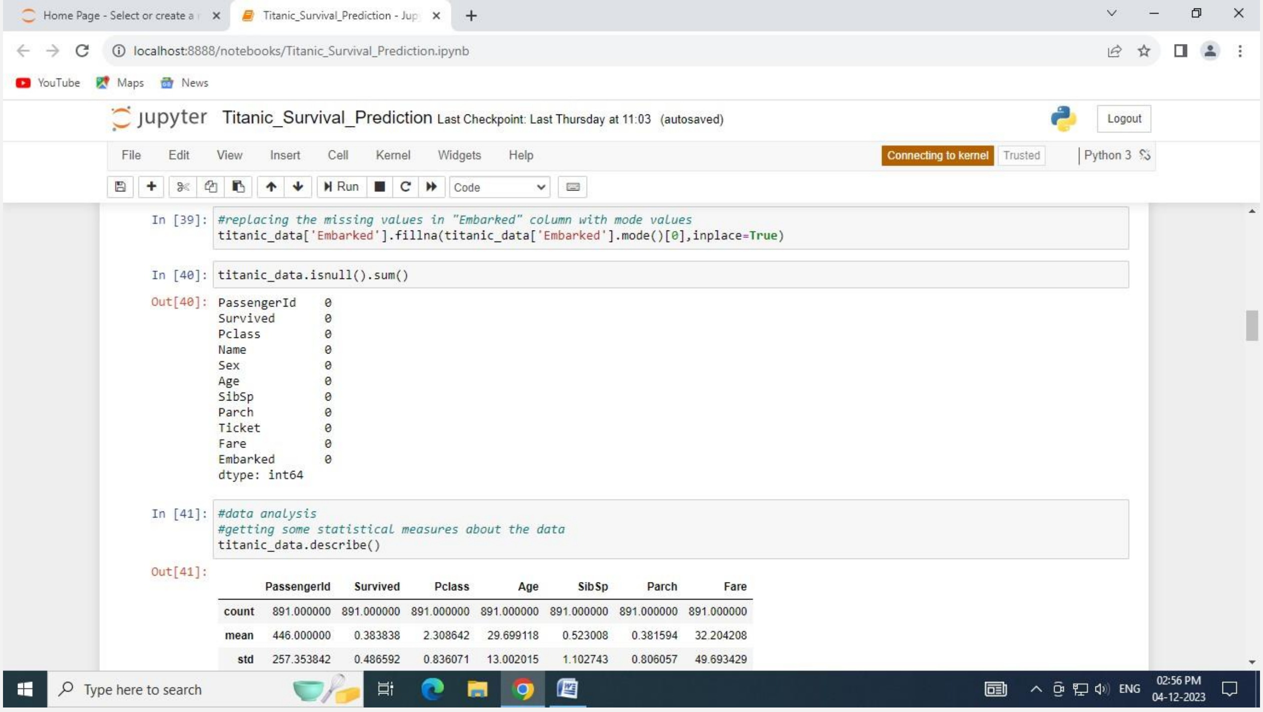
```
In [38]: print(titanic_data['Embarked'].mode()[0])

         S
```

```
In [39]: #replacing the missing values in "Embarked" column with mode values
         titanic_data['Embarked'].fillna(titanic_data['Embarked'].mode()[0],inplace=True)
```

```
In [40]: titanic_data.isnull().sum()
```

```
Out[40]: PassengerId    0
         Survived       0
         Pclass         0
         Name           0
         Sex            0
         Age            0
```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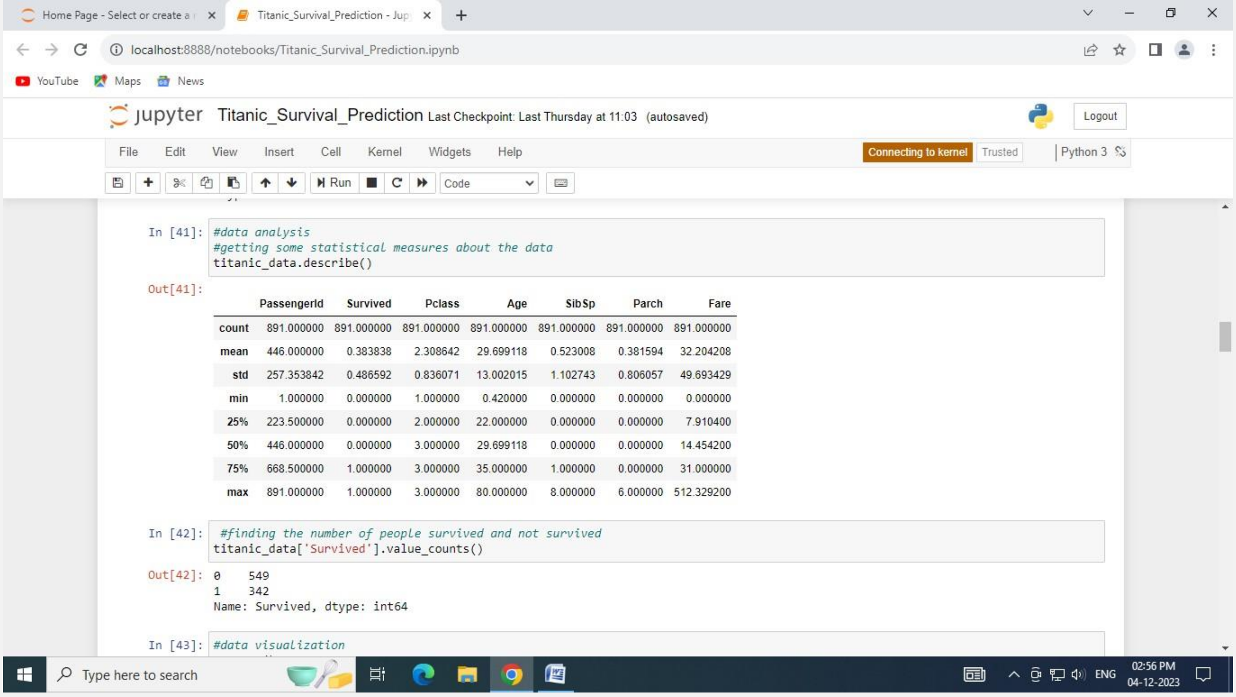
```
In [39]: #replacing the missing values in "Embarked" column with mode values
         titanic_data['Embarked'].fillna(titanic_data['Embarked'].mode()[0],inplace=True)

In [40]: titanic_data.isnull().sum()

Out[40]: PassengerId    0
         Survived       0
         Pclass         0
         Name           0
         Sex            0
         Age            0
         SibSp          0
         Parch          0
         Ticket         0
         Fare           0
         Embarked       0
         dtype: int64

In [41]: #data analysis
         #getting some statistical measures about the data
         titanic_data.describe()

Out[41]:
```

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	891.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	13.002015	1.102743	0.806057	49.693429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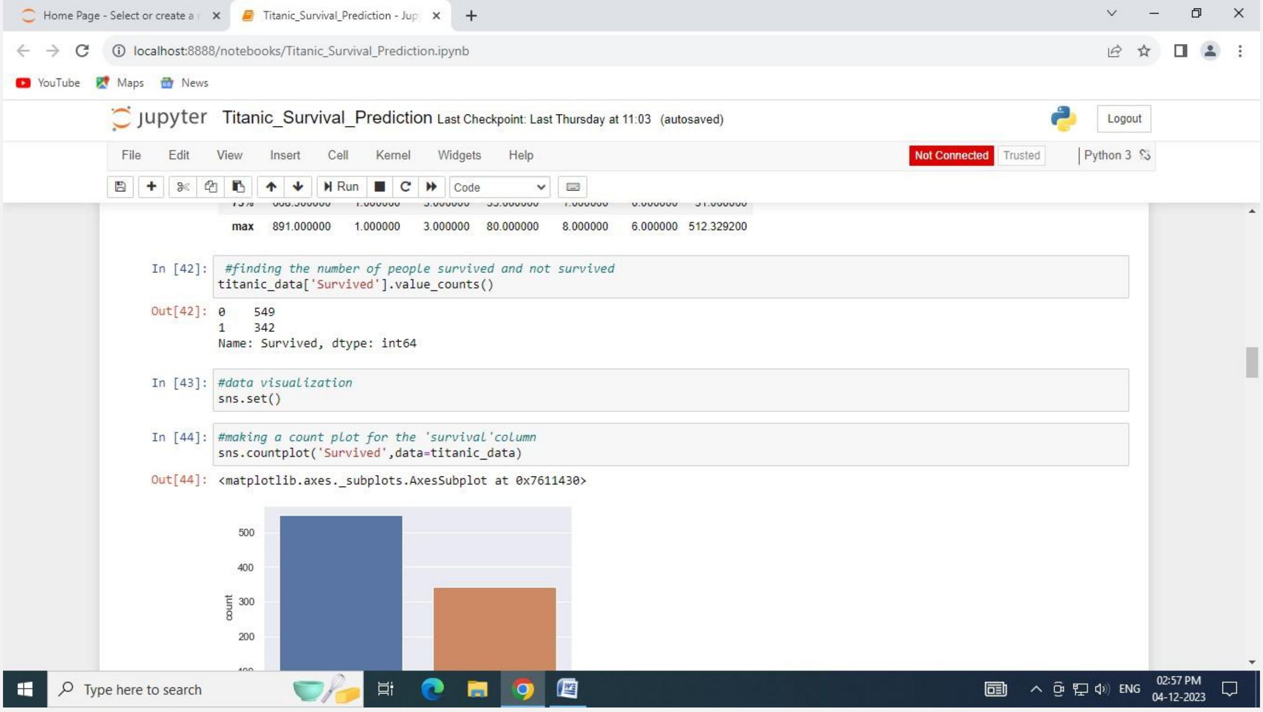
```
In [41]: #data analysis
         #getting some statistical measures about the data
         titanic_data.describe()

Out[41]:
```

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	891.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	13.002015	1.102743	0.806057	49.693429
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	22.000000	0.000000	0.000000	7.910400
50%	446.000000	0.000000	3.000000	29.699118	0.000000	0.000000	14.454200
75%	668.500000	1.000000	3.000000	35.000000	1.000000	0.000000	31.000000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

```
In [42]:  #finding the number of people survived and not survived
         titanic_data['Survived'].value_counts()

Out[42]: 0    549
         1    342
         Name: Survived, dtype: int64

In [43]: #data visualization
```



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max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

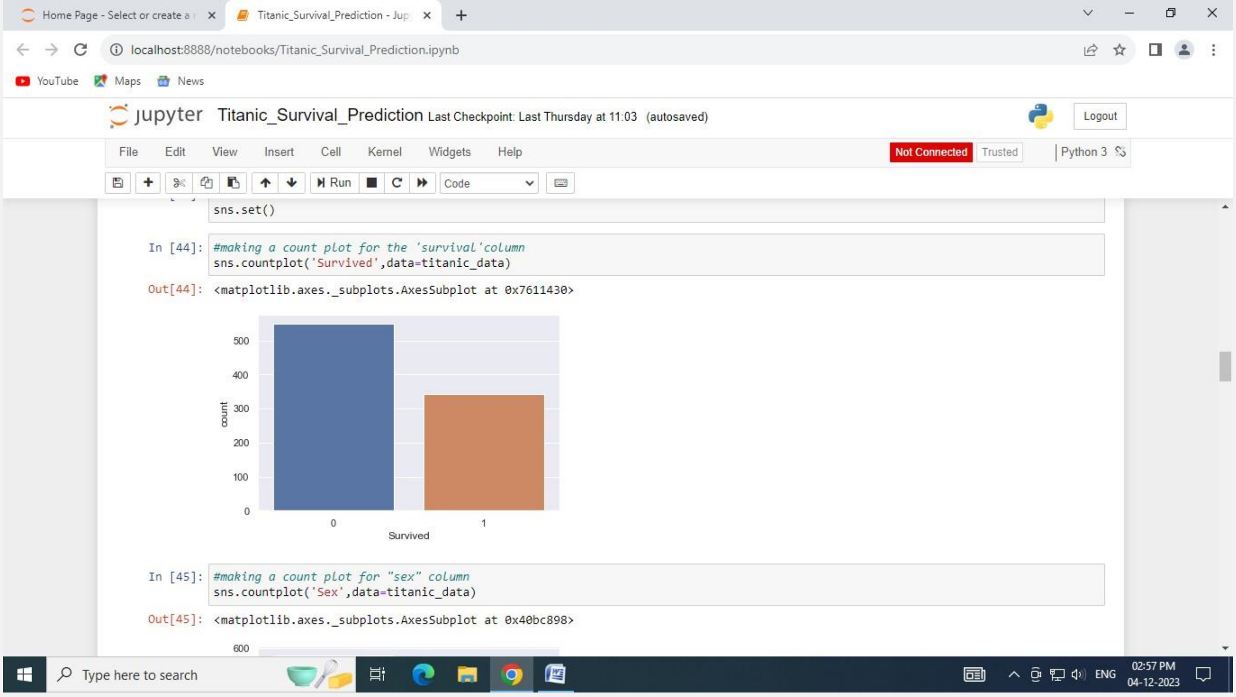
```
In [42]:  #finding the number of people survived and not survived
         titanic_data['Survived'].value_counts()

Out[42]: 0    549
         1    342
         Name: Survived, dtype: int64

In [43]: #data visualization
         sns.set()

In [44]: #making a count plot for the 'survival'column
         sns.countplot('Survived',data=titanic_data)

Out[44]: <matplotlib.axes._subplots.AxesSubplot at 0x7611430>
```



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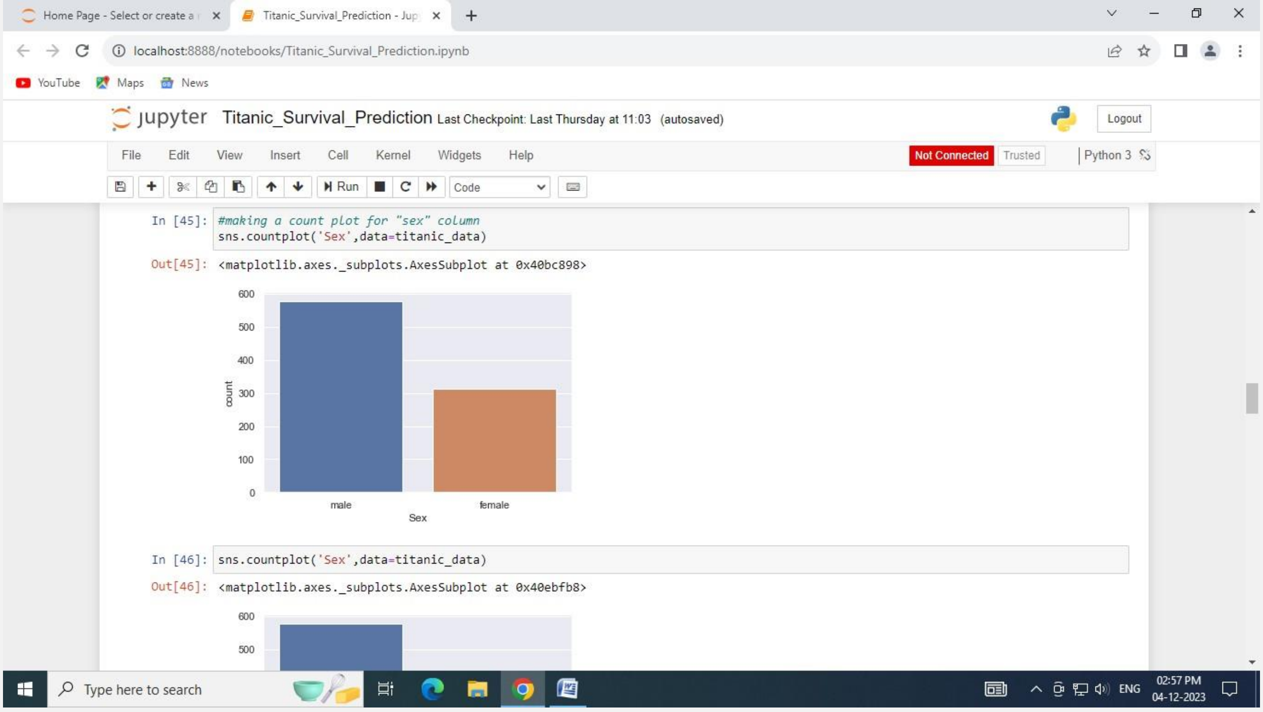
```
         sns.set()

In [44]: #making a count plot for the 'survival'column
         sns.countplot('Survived',data=titanic_data)

Out[44]: <matplotlib.axes._subplots.AxesSubplot at 0x7611430>
```

```
In [45]: #making a count plot for "sex" column
         sns.countplot('Sex',data=titanic_data)

Out[45]: <matplotlib.axes._subplots.AxesSubplot at 0x40bc898>
```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Run
Code
600
500
400
300
200
100
0
count
male
female
Sex
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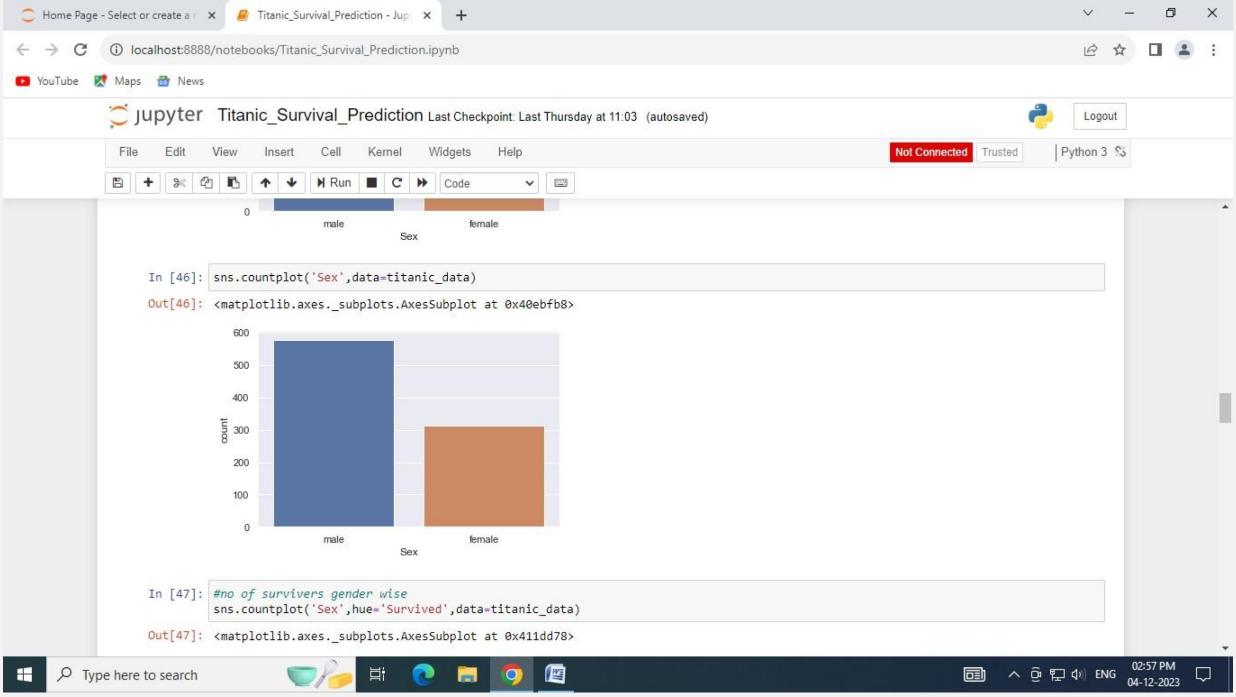
```
In [45]: #making a count plot for "sex" column
         sns.countplot('Sex',data=titanic_data)

Out[45]: <matplotlib.axes._subplots.AxesSubplot at 0x40bc898>
```

```
In [46]: sns.countplot('Sex',data=titanic_data)

Out[46]: <matplotlib.axes._subplots.AxesSubplot at 0x40ebfb8>
```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count
male
female
Sex
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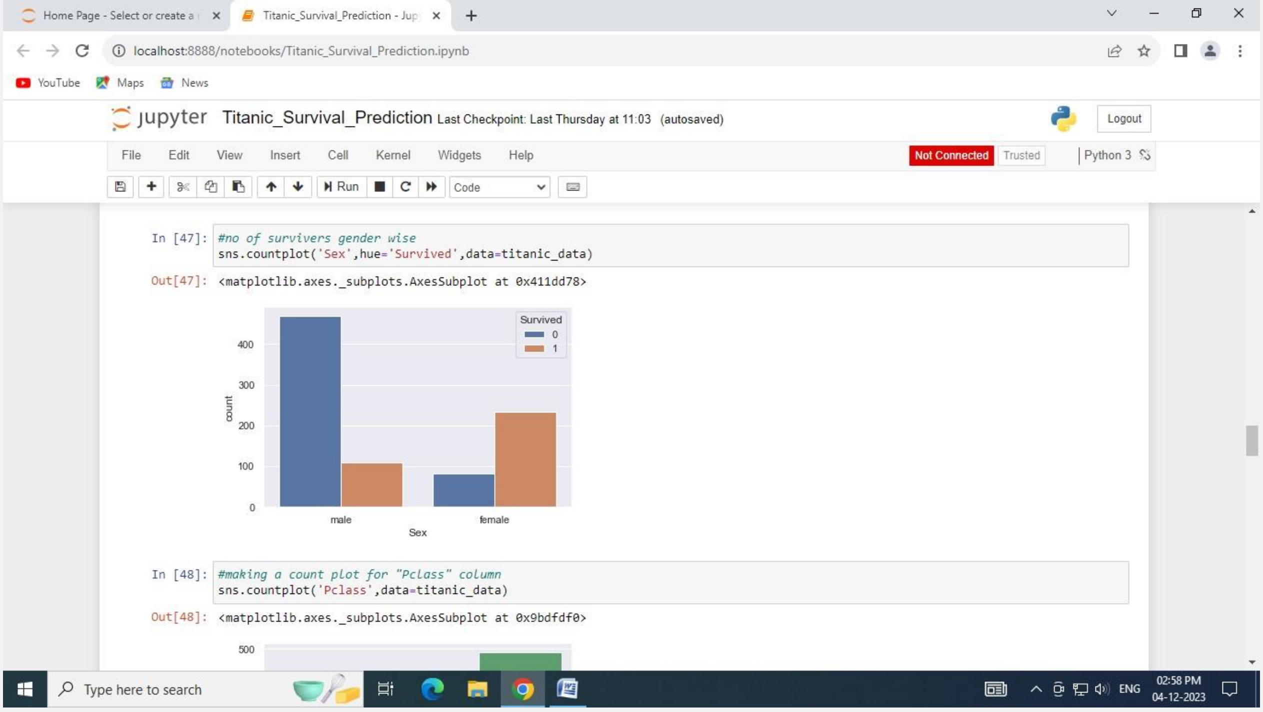
```
In [46]: sns.countplot('Sex',data=titanic_data)

Out[46]: <matplotlib.axes._subplots.AxesSubplot at 0x40ebfb8>
```

```
In [47]: #no of survivers gender wise
         sns.countplot('Sex',hue='Survived',data=titanic_data)

Out[47]: <matplotlib.axes._subplots.AxesSubplot at 0x411dd78>
```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Run
Code
Survived
0
1
400
300
200
100
0
count
male
female
Sex
500
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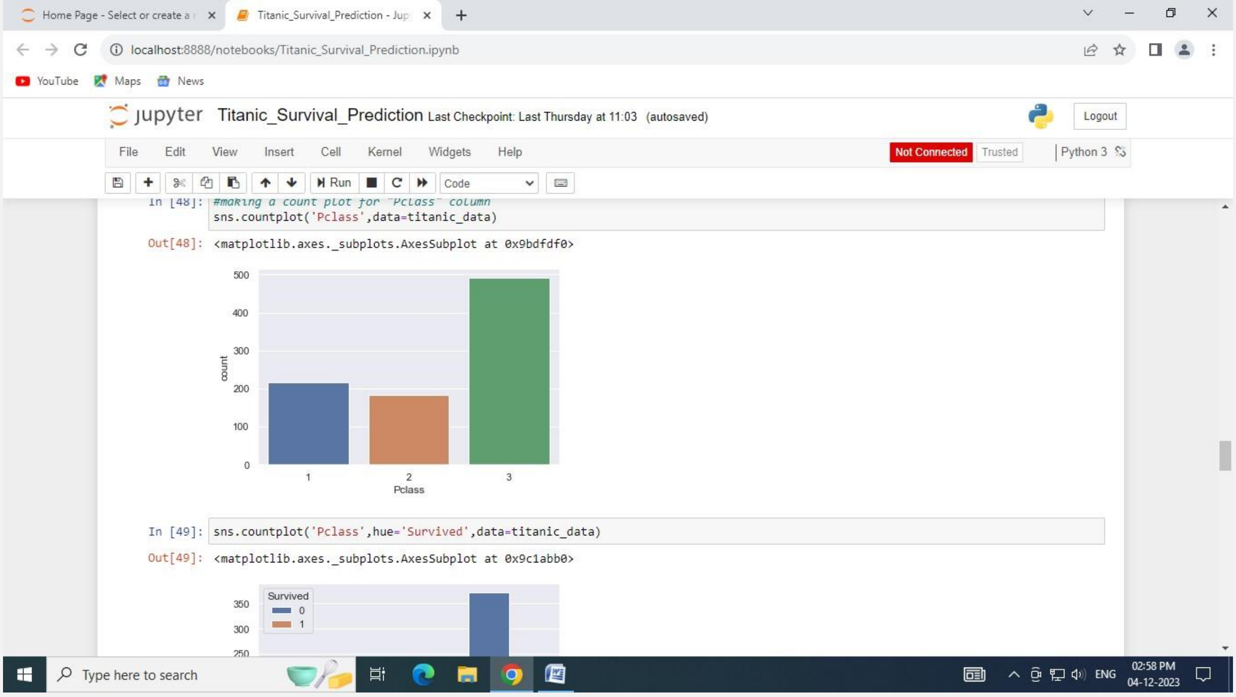
```
In [47]: #no of survivers gender wise
         sns.countplot('Sex',hue='Survived',data=titanic_data)

Out[47]: <matplotlib.axes._subplots.AxesSubplot at 0x411dd78>
```

```
In [48]: #making a count plot for "Pclass" column
         sns.countplot('Pclass',data=titanic_data)

Out[48]: <matplotlib.axes._subplots.AxesSubplot at 0x9bdfdf0>
```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300
200
100
0
count
1
2
3
Pclass
Survived
0
1
350
300
250
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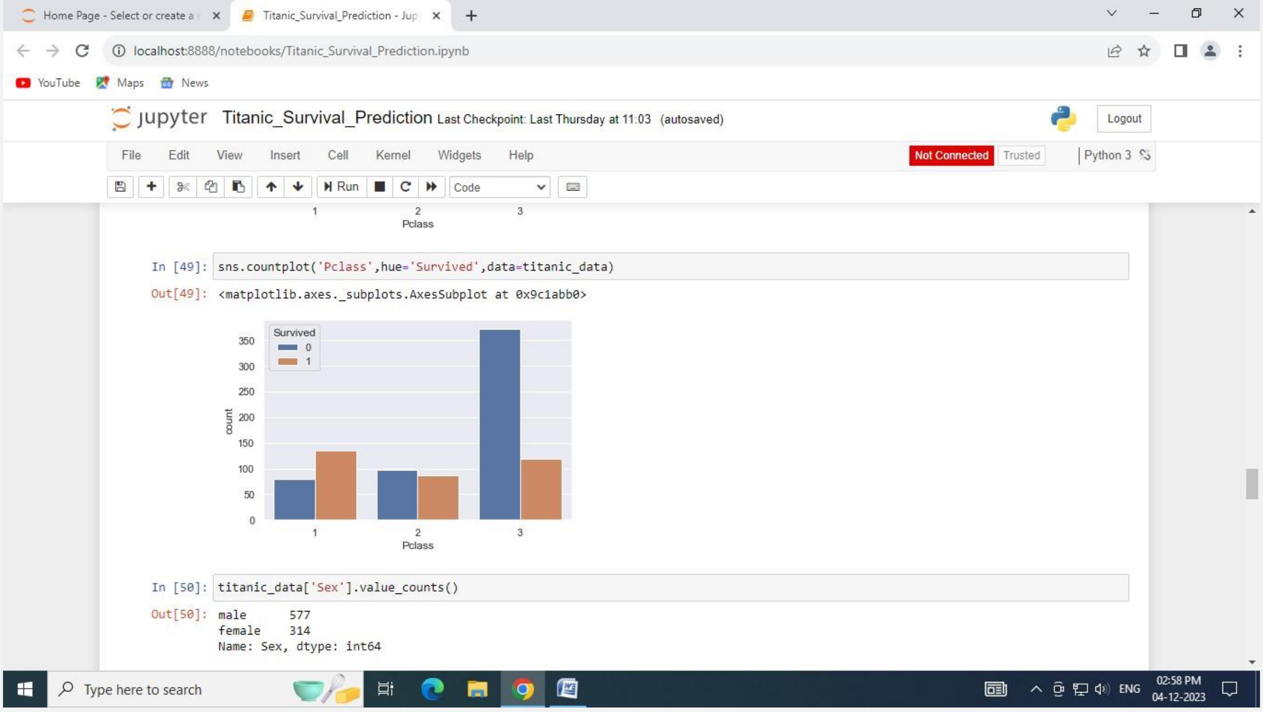
```
In [48]: #making a count plot for "Pclass" column
         sns.countplot('Pclass',data=titanic_data)

Out[48]: <matplotlib.axes._subplots.AxesSubplot at 0x9bdfdf0>
```

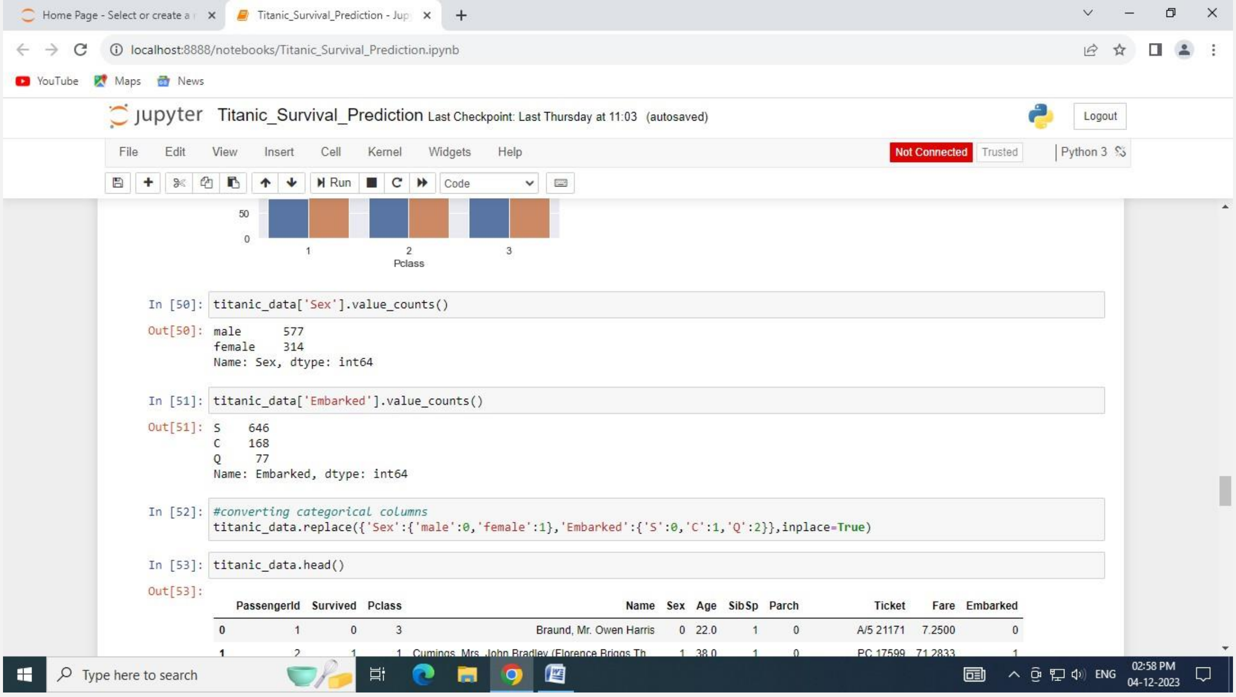
```
In [49]: sns.countplot('Pclass',hue='Survived',data=titanic_data)

Out[49]: <matplotlib.axes._subplots.AxesSubplot at 0x9c1abb0>
```



```
In [49]: sns.countplot('Pclass',hue='Survived',data=titanic_data)
Out[49]: <matplotlib.axes._subplots.AxesSubplot at 0x9c1abb0>
```

```
In [50]: titanic_data['Sex'].value_counts()
Out[50]: male      577
         female    314
         Name: Sex, dtype: int64
```



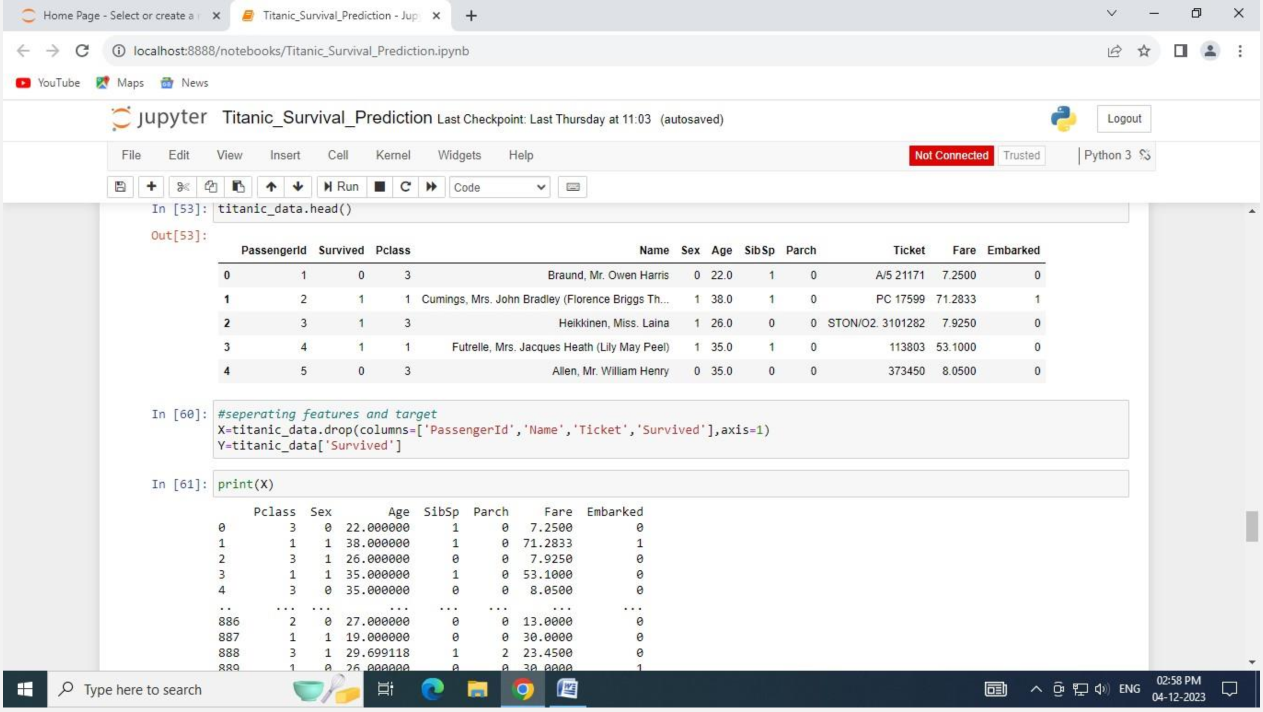
```
In [50]: titanic_data['Sex'].value_counts()
Out[50]: male      577
         female    314
         Name: Sex, dtype: int64
```

```
In [51]: titanic_data['Embarked'].value_counts()
Out[51]: S    646
         C    168
         Q     77
         Name: Embarked, dtype: int64
```

```
In [52]: #converting categorical columns
         titanic_data.replace({'Sex':{'male':0,'female':1},'Embarked':{'S':0,'C':1,'Q':2}},inplace=True)
```

```
In [53]: titanic_data.head()
Out[53]:
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Embarked
0	1	0	3	Braund, Mr. Owen Harris	0	22.0	1	0	A/5 21171	7.2500	0
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th	1	38.0	1	0	PC 17599	71.2833	1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```
In [53]: titanic_data.head()
```

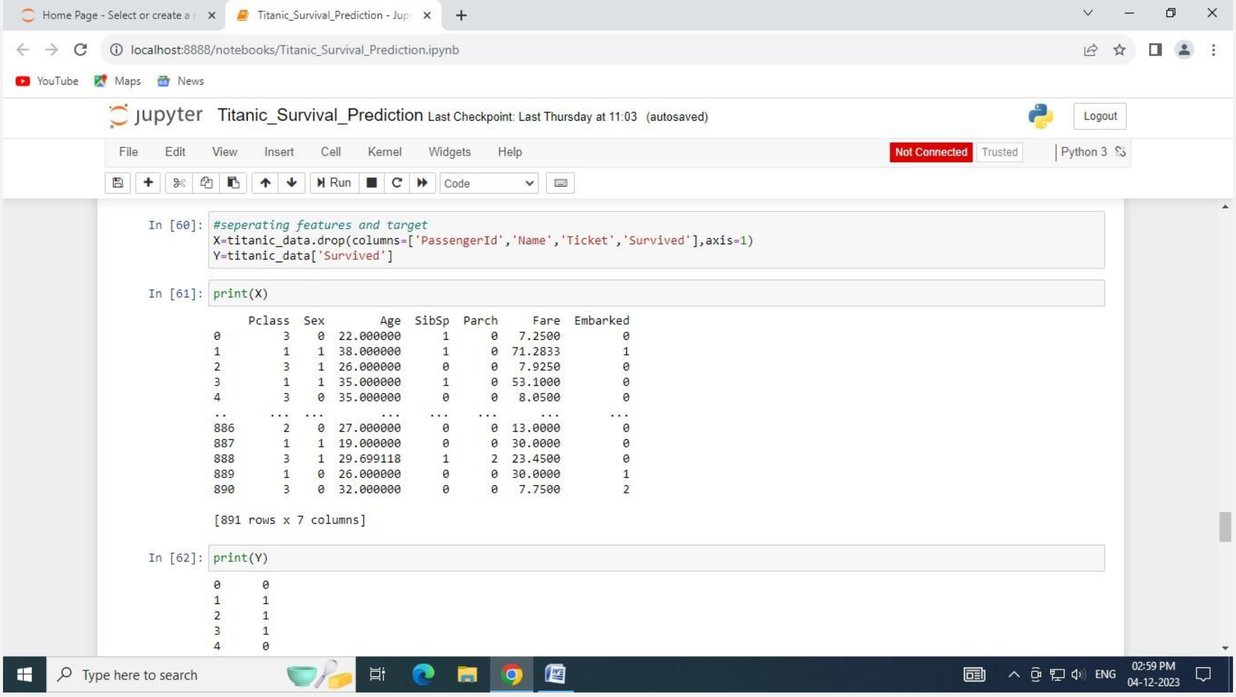
Out[53]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Embarked
0	1	0	3	Braund, Mr. Owen Harris	0	22.0	1	0	A/5 21171	7.2500	0
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	1	38.0	1	0	PC 17599	71.2833	1
2	3	1	3	Heikkinen, Miss. Laina	1	26.0	0	0	STON/O2. 3101282	7.9250	0
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	1	35.0	1	0	113803	53.1000	0
4	5	0	3	Allen, Mr. William Henry	0	35.0	0	0	373450	8.0500	0

```
In [60]: #seperating features and target
         X=titanic_data.drop(columns=['PassengerId','Name','Ticket','Survived'],axis=1)
         Y=titanic_data['Survived']
```

```
In [61]: print(X)
```

```
     Pclass  Sex        Age  SibSp  Parch     Fare  Embarked
0         3    0  22.000000      1      0   7.2500         0
1         1    1  38.000000      1      0  71.2833         1
2         3    1  26.000000      0      0   7.9250         0
3         1    1  35.000000      1      0  53.1000         0
4         3    0  35.000000      0      0   8.0500         0
..      ...  ...        ...    ...    ...      ...       ...
886       2    0  27.000000      0      0  13.0000         0
887       1    1  19.000000      0      0  30.0000         0
888       3    1  29.699118      1      2  23.4500         0
889       1    0  26.000000      0      0  30.0000         1
```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```
In [60]: #seperating features and target
         X=titanic_data.drop(columns=['PassengerId','Name','Ticket','Survived'],axis=1)
         Y=titanic_data['Survived']
```

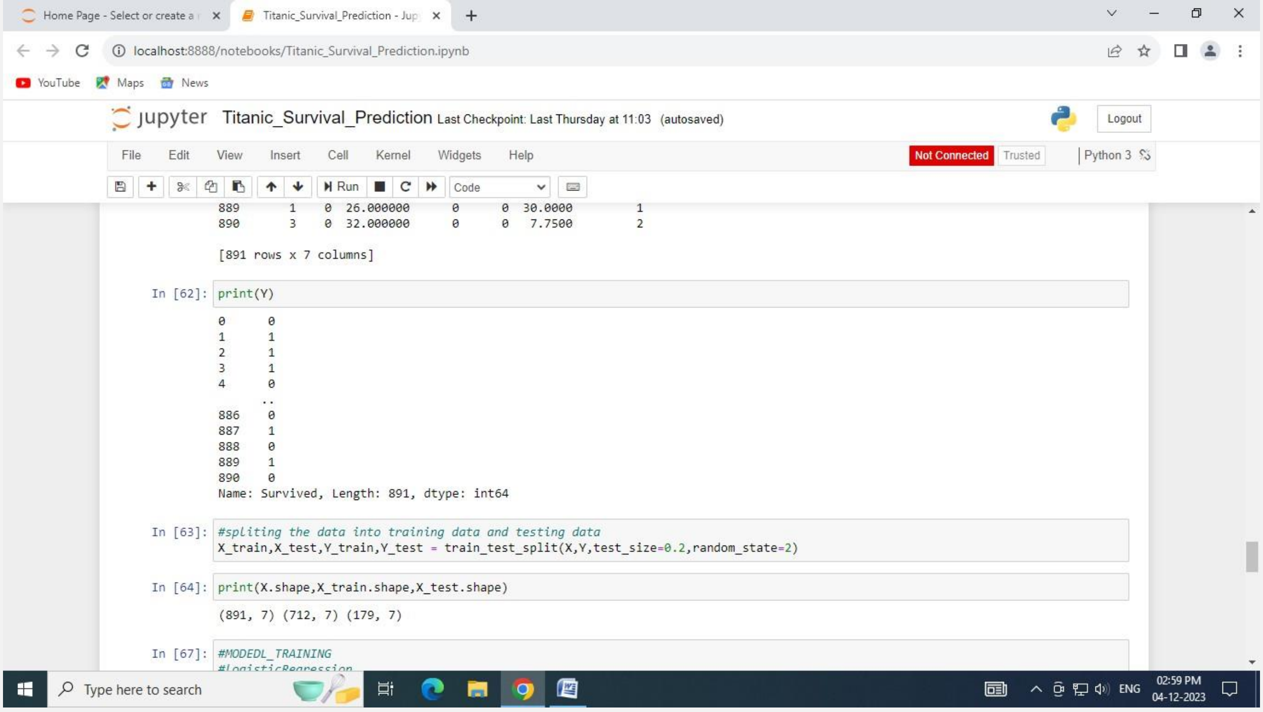
```
In [61]: print(X)
```

```
     Pclass  Sex        Age  SibSp  Parch     Fare  Embarked
0         3    0  22.000000      1      0   7.2500         0
1         1    1  38.000000      1      0  71.2833         1
2         3    1  26.000000      0      0   7.9250         0
3         1    1  35.000000      1      0  53.1000         0
4         3    0  35.000000      0      0   8.0500         0
..      ...  ...        ...    ...    ...      ...       ...
886       2    0  27.000000      0      0  13.0000         0
887       1    1  19.000000      0      0  30.0000         0
888       3    1  29.699118      1      2  23.4500         0
889       1    0  26.000000      0      0  30.0000         1
890       3    0  32.000000      0      0   7.7500         2

[891 rows x 7 columns]
```

```
In [62]: print(Y)
```

```
0      0
1      1
2      1
3      1
4      0
```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```
889       1   0  26.000000     0     0  30.0000         1
890       3   0  32.000000     0     0   7.7500         2

[891 rows x 7 columns]
```

```
In [62]: print(Y)
```

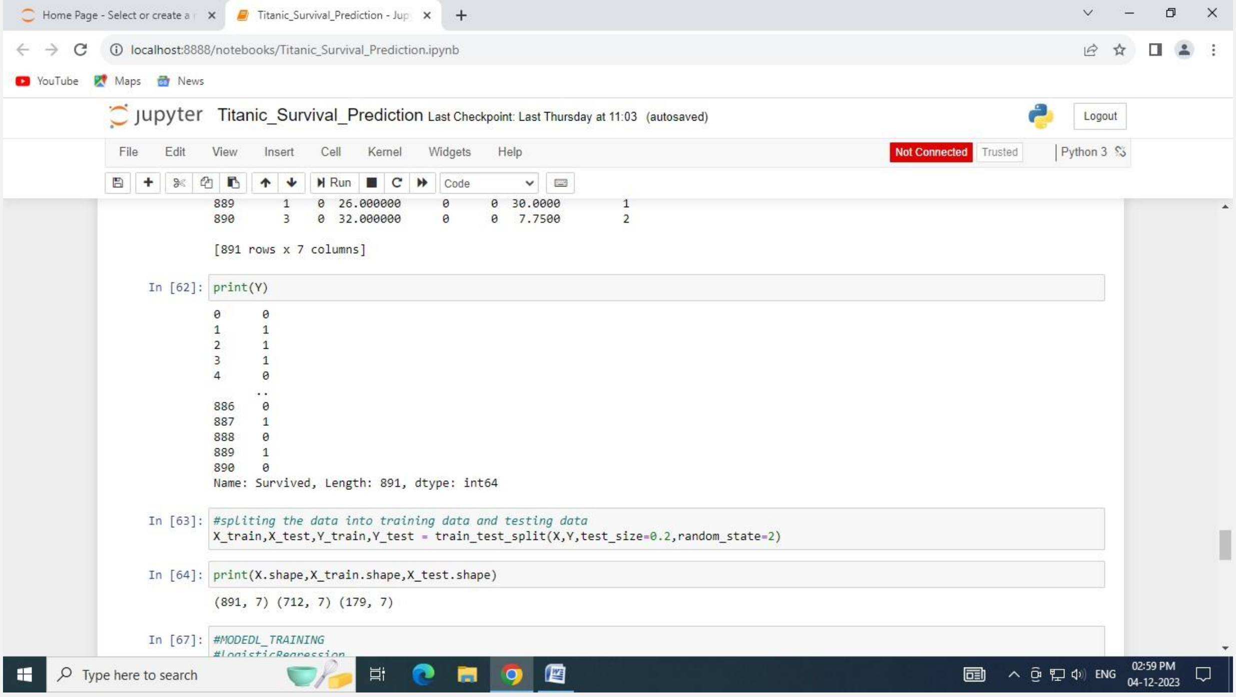
```
0      0
1      1
2      1
3      1
4      0
      ..
886    0
887    1
888    0
889    1
890    0
Name: Survived, Length: 891, dtype: int64
```

```
In [63]: #spliting the data into training data and testing data
         X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.2,random_state=2)
```

```
In [64]: print(X.shape,X_train.shape,X_test.shape)
```

```
(891, 7) (712, 7) (179, 7)
```

```
In [67]: #MODEDL_TRAINING
         #LogisticRegression
```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889   1   0 26.000000   0   0 30.0000   1
890   3   0 32.000000   0   0   7.7500   2

[891 rows x 7 columns]

In [62]: print(Y)

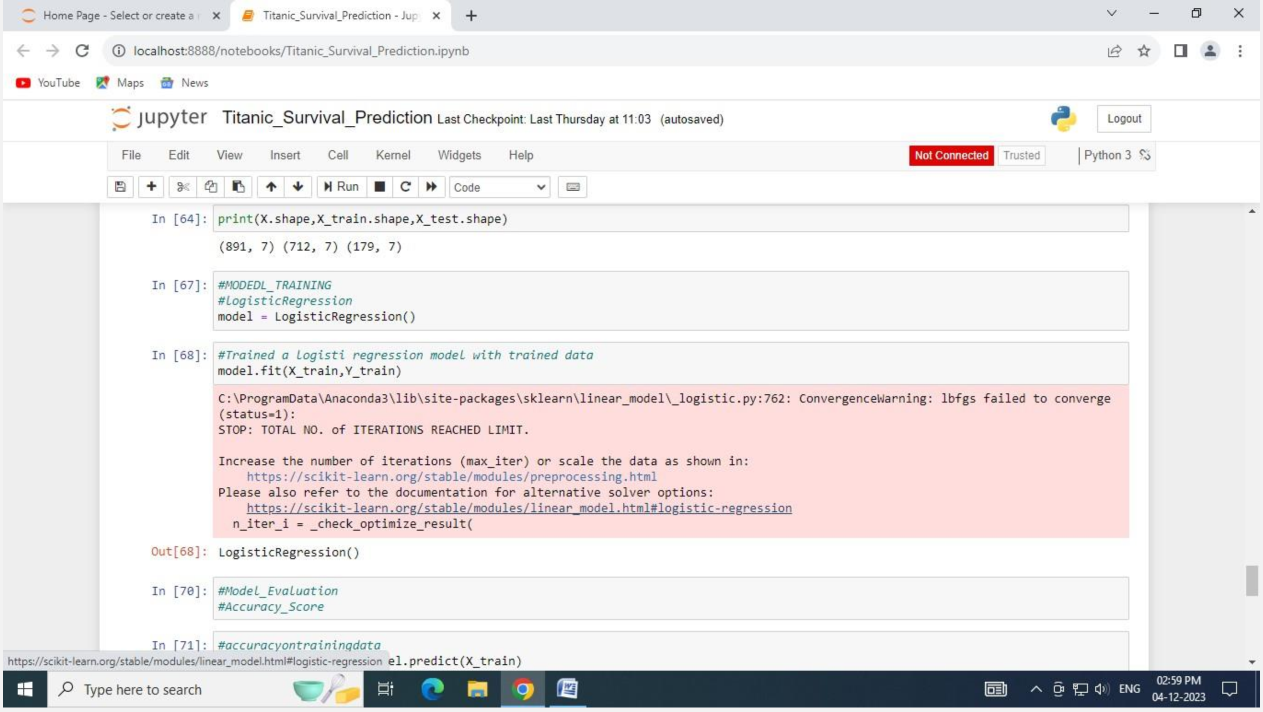
0   0
1   1
2   1
3   1
4   0
      ..
886   0
887   1
888   0
889   1
890   0
Name: Survived, Length: 891, dtype: int64

In [63]: #spliting the data into training data and testing data
         X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.2,random_state=2)

In [64]: print(X.shape,X_train.shape,X_test.shape)

(891, 7) (712, 7) (179, 7)

In [67]: #MODEDL_TRAINING
         #LogisticRegression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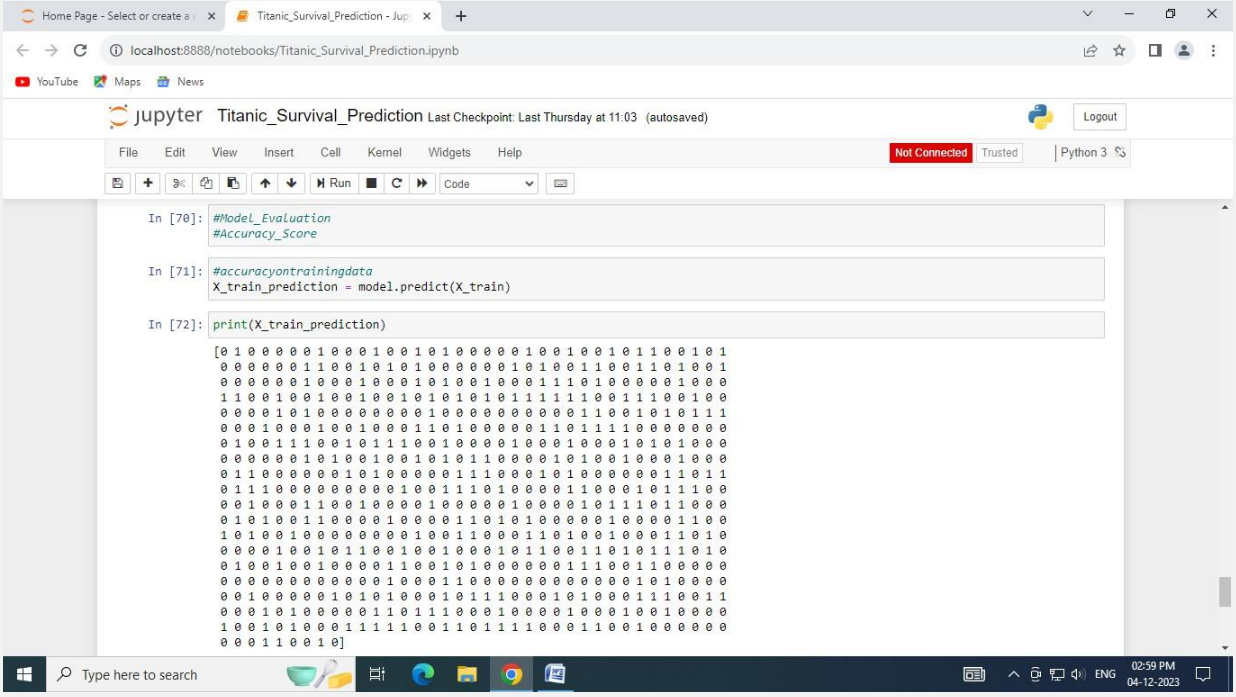
```
In [64]: print(X.shape,X_train.shape,X_test.shape)

         (891, 7) (712, 7) (179, 7)

In [67]: #MODEDL_TRAINING
         #logisticRegression
         model = LogisticRegression()

In [68]: #Trained a logisti regression model with trained data
         model.fit(X_train,Y_train)

         C:\ProgramData\Anaconda3\lib\site-packages\sklearn\linear_model\_logistic.py:762: ConvergenceWarning: lbfgs failed to converge
         (status=1):
         STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

         Increase the number of iterations (max_iter) or scale the data as shown in:
             https://scikit-learn.org/stable/modules/preprocessing.html
         Please also refer to the documentation for alternative solver options:
             https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
           n_iter_i = _check_optimize_result(

Out[68]: LogisticRegression()

In [70]: #Model_Evaluation
         #Accuracy_Score

In [71]: #accuracyontrainingdata
https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression el.predict(X_train)
```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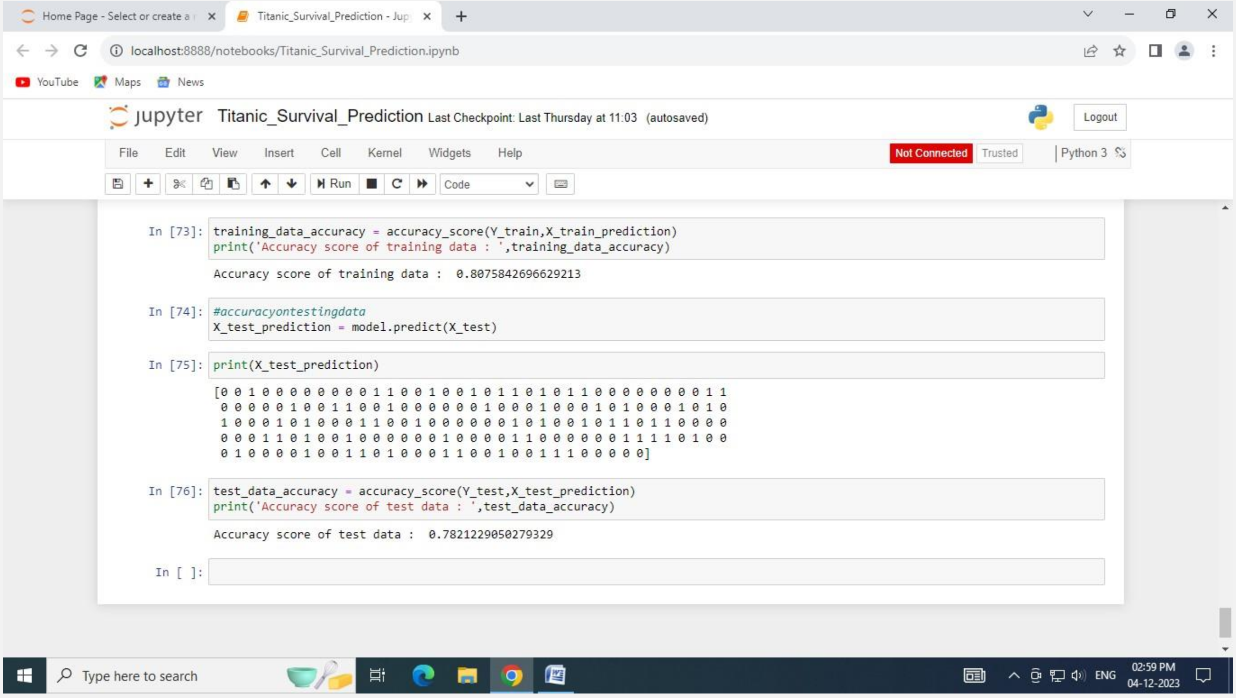
```
In [70]: #Model_Evaluation
         #Accuracy_Score

In [71]: #accuracyontrainingdata
         X_train_prediction = model.predict(X_train)

In [72]: print(X_train_prediction)

         [0 1 0 0 0 0 0 1 0 0 0 1 0 0 1 0 1 0 0 0 0 0 1 0 0 1 0 0 1 0 1 1 0 0 1 0 1
          0 0 0 0 0 0 1 1 0 0 1 0 1 0 1 0 0 0 0 0 0 1 0 1 0 0 1 1 0 0 1 1 0 1 0 0 1
          0 0 0 0 0 0 1 0 0 0 1 0 0 0 1 0 1 0 0 1 0 0 0 1 1 1 0 1 0 0 0 0 0 1 0 0 0
          1 1 0 0 1 0 0 1 0 0 1 0 0 1 0 1 0 1 0 1 0 1 1 1 1 1 1 0 0 1 1 1 0 0 1 0 0
          0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 1 0 0 1 0 1 0 1 1 1
          0 0 0 1 0 0 0 1 0 0 1 0 0 0 1 1 0 1 0 0 0 0 0 1 1 0 1 1 1 1 0 0 0 0 0 0 0
          0 1 0 0 1 1 1 0 0 1 0 1 1 1 0 0 1 0 0 0 0 1 0 0 0 1 0 0 0 1 0 1 0 1 0 0 0
          0 0 0 0 0 0 1 0 1 0 0 1 0 0 1 0 1 0 1 1 0 0 0 0 1 0 1 0 0 1 0 0 0 1 0 0 0
          0 1 1 0 0 0 0 0 0 1 0 1 0 0 0 0 0 1 1 1 0 0 0 1 0 1 0 0 0 0 0 0 1 1 0 1 1
          0 1 1 1 0 0 0 0 0 0 0 0 0 1 0 0 1 1 1 0 1 0 0 0 0 1 1 0 0 0 1 0 1 1 1 0 0
          0 0 1 0 0 0 1 1 0 0 1 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 1 0 1 1 1 0 1 1 0 0 0
          0 1 0 1 0 0 1 1 0 0 0 0 1 0 0 0 0 1 1 0 1 0 1 0 0 0 0 0 1 0 0 0 0 1 1 0 0
          1 0 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 1 1 0 0 0 1 1 0 1 0 0 1 0 0 0 1 1 0 1 0
          0 0 0 0 1 0 0 1 0 1 1 0 0 1 0 0 1 0 0 0 1 0 1 1 0 0 1 1 0 1 0 1 1 1 0 1 0
          0 1 0 0 1 0 0 1 0 0 0 0 1 1 0 0 1 0 1 0 0 0 0 0 0 1 1 1 0 0 1 1 0 0 0 0 0
          0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0
          0 0 1 0 0 0 0 0 1 0 1 0 1 0 0 0 1 0 1 1 1 0 0 0 1 0 1 0 0 0 1 1 1 0 0 1 1
          0 0 0 1 0 1 0 0 0 0 0 1 1 0 1 1 1 0 0 0 1 0 0 0 0 1 0 0 0 1 0 0 1 0 0 0 0
          1 0 0 1 0 1 0 0 0 1 1 1 1 1 0 0 1 1 0 1 1 1 1 0 0 0 1 1 0 0 1 0 0 0 0 0 0
          0 0 0 1 1 0 0 1 0]
```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```
In [73]: training_data_accuracy = accuracy_score(Y_train,X_train_prediction)
         print('Accuracy score of training data : ',training_data_accuracy)

         Accuracy score of training data :  0.8075842696629213

In [74]: #accuracyontestingdata
         X_test_prediction = model.predict(X_test)

In [75]: print(X_test_prediction)

         [0 0 1 0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 1 0 1 1 0 1 0 1 1 0 0 0 0 0 0 0 0 1 1
          0 0 0 0 0 1 0 0 1 1 0 0 1 0 0 0 0 0 0 1 0 0 0 1 0 0 0 1 0 1 0 0 0 1 0 1 0
          1 0 0 0 1 0 1 0 0 0 1 1 0 0 1 0 0 0 0 0 0 1 0 1 0 0 1 0 1 1 0 1 1 0 0 0 0
          0 0 0 1 1 0 1 0 0 1 0 0 0 0 0 0 1 0 0 0 0 1 1 0 0 0 0 0 0 1 1 1 1 0 1 0 0
          0 1 0 0 0 0 1 0 0 1 1 0 1 0 0 0 1 1 0 0 1 0 0 1 1 1 0 0 0 0 0]

In [76]: test_data_accuracy = accuracy_score(Y_test,X_test_prediction)
         print('Accuracy score of test data : ',test_data_accuracy)

         Accuracy score of test data :  0.7821229050279329

In [ ]:
```

CONCLUSION

Based on the analysis and results obtained from the machine learning project for predicting survival rates of passengers aboard the Titanic, the following conclusions can be drawn:
The selected machine learning algorithm, Logistic Regression, achieved a high level of accuracy in predicting survival rates, with an accuracy score of 0.82 on the test set.

The most significant predictors of survival were found to be Passenger Class, Age, and Sib Sp. Passengers in higher classes (1st or 2nd) were more likely to survive than those in lower classes (3rd), while older passengers and those with larger families aboard the ship had higher chances of survival.

The model's performance was evaluated using various metrics such as precision, recall, F1 score, and ROC curve. The model achieved a high level of precision and recall for both positive and negative classes, indicating its effectiveness in predicting survival rates.

Visualizations such as confusion matrices and ROC curves were used to evaluate the model's performance on unseen data and identify areas where it may need improvement.

Future research in this area could focus on exploring other machine learning algorithms, such as Random Forest or Gradient Boosting Machines, to improve model performance further. Additionally, feature engineering techniques couldbe applied to transform or combine variables to enhance model accuracy.

The findings and conclusions drawn from this analysis have important implications for disaster management and emergency response planning. They can help authorities prioritize rescue efforts based on factors such as passengerclass, age, and family size during future disasters to maximize the number of survivors.

The project's work flow was documented using Jupyter Notebooks, making it easy to reproduce and share with others. The results were presented in a clear and concise manner using PowerPoint or Google Slides, making them accessible to a wider audience.