

Data and Artificial Intelligence

Cyber Shujaa Program

Week 3 Assignment

Titanic Exploratory Data Analysis

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Student ID: CS-DA03-26054

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Introduction

The objective of this assignment was to develop hands-on experience in **Exploratory Data Analysis (EDA)** using a real-world dataset sourced from Kaggle. The Titanic dataset was used to systematically explore, clean, and analyze passenger data in order to understand patterns, relationships, and factors influencing survival outcomes.

The assignment focused on applying core EDA techniques including initial data exploration, handling missing values and outliers, univariate, bivariate, and multivariate analysis, as well as in-depth target variable exploration. Using Python and the Pandas, Matplotlib, and Seaborn libraries within a Kaggle Notebook environment enabled reproducible and well-documented analysis.

Through this exercise, practical skills were developed in data profiling, visualization, statistical reasoning, and interpretation of insights, all of which are essential for data-driven decision-making and machine learning preparation.

The key objectives of the assignment were to:

1. Initial Data Exploration
2. Handling Missing Values and Outliers
3. Univariate Analysis
4. Bivariate Analysis
5. Multivariate Analysis
6. Target Variable Analysis

Tasks Completed

The assignment began with loading the Titanic dataset from Kaggle into a Pandas DataFrame and conducting an initial exploration to understand its structure, size, and feature composition. Key exploratory functions were used to inspect data types, identify missing values, detect duplicate records, and generate summary statistics for numerical features.

Subsequently, data quality issues were addressed by handling missing values in features such as Age and Embarked using appropriate imputation techniques, while features with excessive missing data were treated cautiously. Outlier detection was performed on numerical variables like Fare, and decisions were made to retain outliers where they represented meaningful real-world variations.

Univariate analysis was carried out to examine the distribution of individual variables such as age, passenger class, embarkation point, and fare. This was followed by bivariate analysis to explore relationships between survival and key features including gender, passenger class, age, and embarkation location. Multivariate analysis further examined the combined effects of multiple variables to uncover interaction patterns influencing survival outcomes.

Finally, the target variable **Survived** was analyzed to assess class balance and identify factors associated with higher or lower survival rates. Relevant visualizations were created to support findings, and the complete analysis was documented and published in a Kaggle Notebook with supporting screenshots as evidence of task completion.

Link to Code: <https://www.kaggle.com/code/salomekungu/salome-kungu-cs-da03-26054-titanic-eda-report>

Conclusion

This assignment provided a comprehensive introduction to Exploratory Data Analysis using a real-world dataset. By systematically exploring and visualizing the Titanic dataset, meaningful insights were uncovered regarding passenger survival patterns and influencing factors such as gender, class, and age.

The exercise strengthened practical skills in data cleaning, visualization, statistical reasoning, and analytical storytelling. These competencies are foundational for advanced data analytics and machine learning workflows. The completed Kaggle Notebook and report also serve as valuable additions to my professional data science portfolio.

Screenshots of the project

The screenshots illustrate the Exploratory Data Analysis conducted on the Titanic dataset, including data cleaning, handling missing values, and univariate and multivariate visualizations. These steps enabled the identification of survival trends across demographic and socioeconomic variables, supporting data-driven insights and model readiness.

Question 1: Load the Dataset and Initial Data Exploration

Load the Dataset:

What:

Import the Titanic CSV file using `pd.read_csv()` and display the first few rows using `df.head()`.

Why:

Loading the dataset into Pandas provides a structured format for analysis. Viewing the first rows helps verify successful loading and gives an initial understanding of the data.

Initial Data Exploration:

What:

Use functions such as:

- `df.shape`
- `df.info()`
- `df.describe()`
- `df.columns`
- `df.nunique()`
- `df.duplicated().sum()`

Why:

This step helps identify:

- The size of the dataset
- Data types of each feature
- Missing values and duplicates
- Numerical distributions and potential anomalies

Understanding these aspects early prevents incorrect assumptions during analysis.

DAI-2026 Assignment 3: Titanic | Salome Kungu_CS-DA03-2605 | Salome Kungu_CS-DA03-2605 | Kaggle Notebook Editor

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Notebook

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5:15 PM 2/1/2026

Title: Titanic Exploratory Data Analysis
Name: Salome Kungu
Cyber Shujaa ID: CS-DA03-26054
Program: DAI-2026
Date: 1st Feb 2026

Description:
 This week's assignment will develop hands-on experience with Titanic Exploratory Data Analysis using the Kaggle Data Set and publishing your work on Kaggle.

```
[1]: 'nTitle: Titanic Exploratory Data Analysis\nName: Salome Kungu\nCyber Shujaa ID: CS-DA03-26054\nProgram: DAI-2026\nDate: 1st Feb 2026\nDescription:\nThis week's assignment will develop hands-on experience with Titanic Exploratory Data Analysis using the Kaggle Data Set and publishing your work on Kaggle.\n'
```

+ Code + Markdown

[2]: #Question 1

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#Question 1
 #Profile the list of features and analyze their: data types, missing values, duplicates, errors, and plots you can explore per feature.

```
[3]: import pandas as pd #for data manipulation and analysis
import numpy as np #for numerical computation and linear algebra
import matplotlib.pyplot as plt #for static visualization
import seaborn as sns #for statistical plots and heatmaps

sns.set(style='whitegrid')
```

Summary of Question 1(Profile the list)

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[4]:

```
import os
os.listdir('/kaggle/input')
!ls /kaggle/input/titanic
```

gender_submission.csv test.csv train.csv

[5]:

```
#Load Titanic dataset
```

[5]:

	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

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[5]:

	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	33.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	Nan	S

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Summary of Question 1(Profile the list)

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Notebook

```
[6]: # shape and info

df.shape
df.info()
df.describe()
df.columns
df.unique()
df.duplicated().sum()

<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       284 non-null   object 
 11  Embarked    889 non-null   object 
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB
```

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Summary of Question 1(Profile the list)

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Notebook

```
[6]: # shape and info

df.shape
df.info()
df.describe()
df.columns
df.unique()
df.duplicated().sum()

<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       284 non-null   object 
 11  Embarked    889 non-null   object 
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB
```

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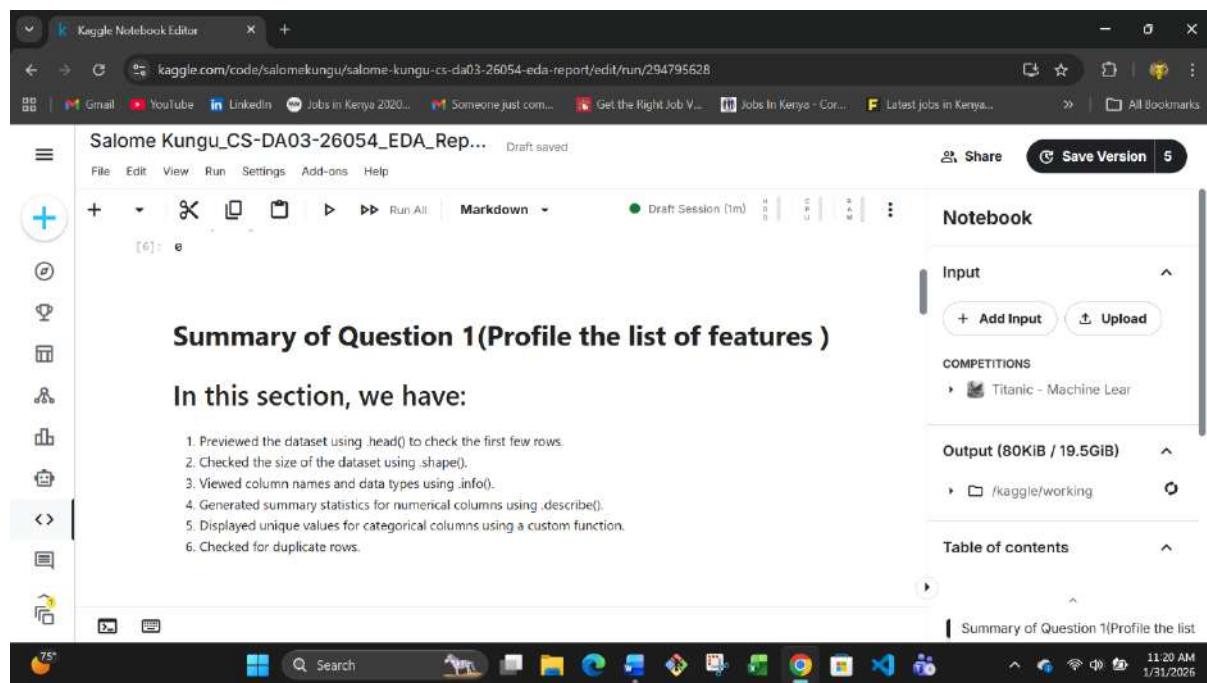
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Summary of Question 1(Profile the list)

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Summary of Question 1(Profile the list of features)

In this section, we have:

1. Previewed the dataset using `.head()` to check the first few rows.
2. Checked the size of the dataset using `.shape()`.
3. Viewed column names and data types using `.info()`.
4. Generated summary statistics for numerical columns using `.describe()`.
5. Displayed unique values for categorical columns using a custom function.
6. Checked for duplicate rows.

Question 2: Univariate Analysis.

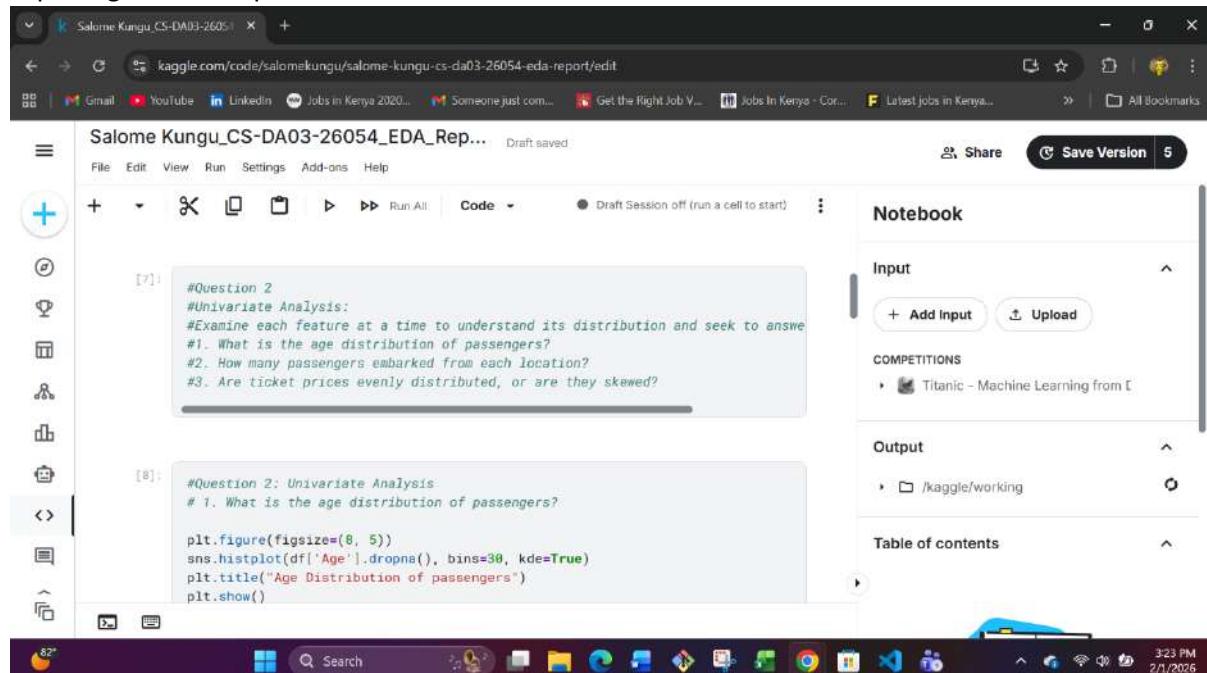
What:

Analyze individual features using histograms, count plots, and bar charts to answer questions such as:

- What is the age distribution of passengers?
- How many passengers embarked from each port?
- Is the Fare distribution skewed?

Why:

Univariate analysis provides a foundational understanding of each variable independently before exploring relationships.



```
[7]: #Question 2
#Univariate Analysis:
#Examine each feature at a time to understand its distribution and seek to answer
#1. What is the age distribution of passengers?
#2. How many passengers embarked from each location?
#3. Are ticket prices evenly distributed, or are they skewed?

[8]: #Question 2: Univariate Analysis:
# 1. What is the age distribution of passengers?

plt.figure(figsize=(8, 5))
sns.histplot(df['Age'].dropna(), bins=30, kde=True)
plt.title("Age Distribution of passengers")
plt.show()
```

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[8]: #Question 2: Univariate Analysis:
1. What is the age distribution of passengers?

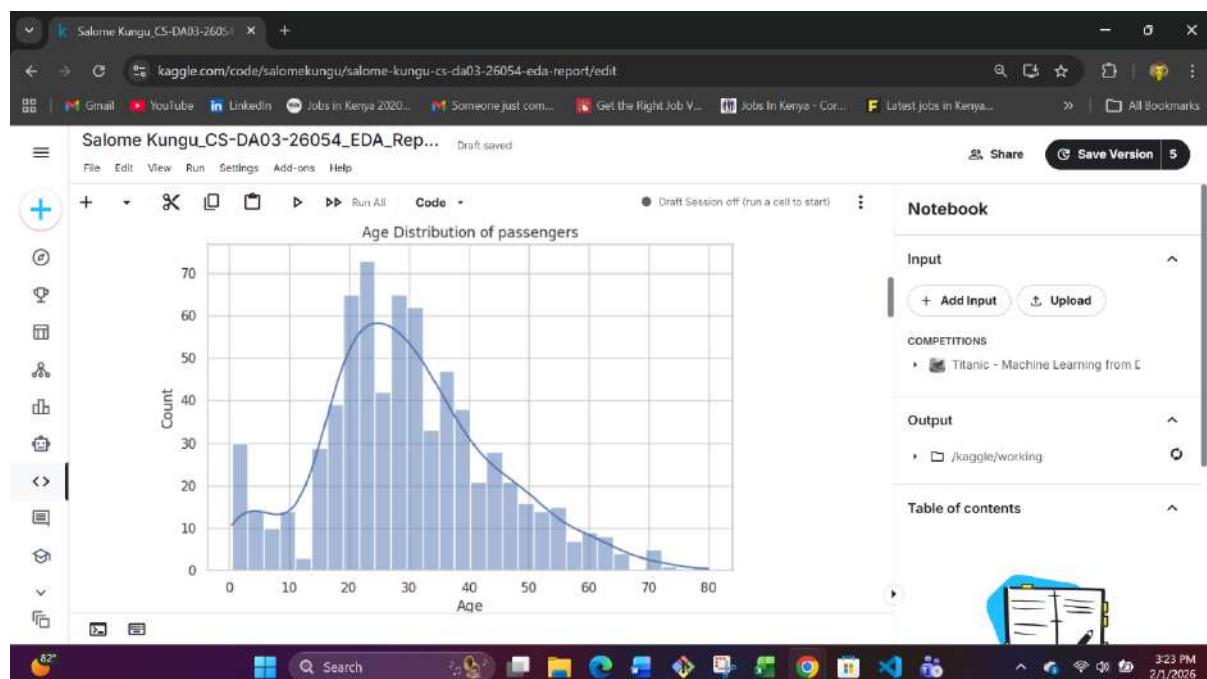
```
plt.figure(figsize=(8, 5))
sns.histplot(df['Age'].dropna(), bins=30, kde=True)
plt.title("Age Distribution of passengers")
plt.show()
```

/usr/local/lib/python3.10/dist-packages/seaborn/_oldcore.py:1119: FutureWarning: use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
with pd.option_context('mode.use_inf_as_na', True):

Age Distribution of passengers



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[9]: # Question 2: univariate analysis
#2. How many passengers embarked from each location?

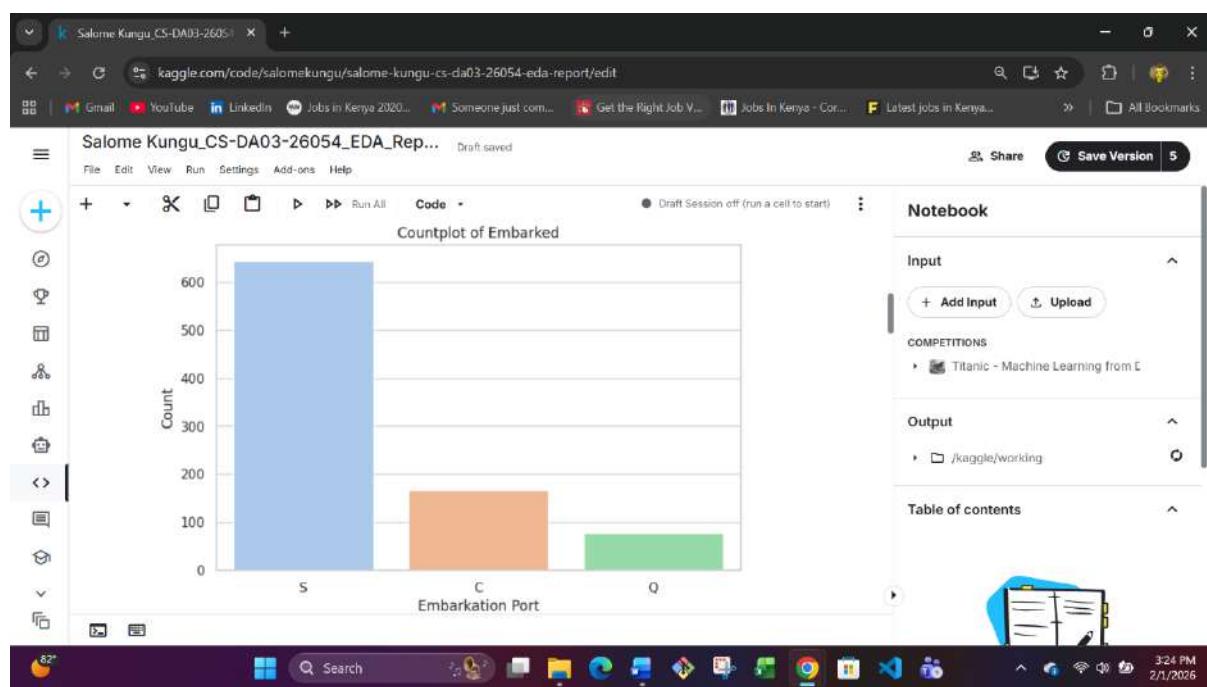
```
plt.figure(figsize=(8, 5))  
sns.countplot(x='Embarked', data=df, palette='pastel')  
plt.title('Countplot of Embarked')  
plt.xlabel('Embarkation Port')  
plt.ylabel('Count')  
plt.show()
```

Countplot of Embarked



Embarkation Port	Count
S	~650
C	~180
Q	~80

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```
[10]: # Question 2: univariate analysis
#3. Are ticket prices evenly distributed, or are they skewed?

plt.figure(figsize=(8, 5))
sns.kdeplot(df['Fare'], shade=True)
plt.title('KDE Plot of Fare')
plt.xlabel('Fare')
plt.show()
```

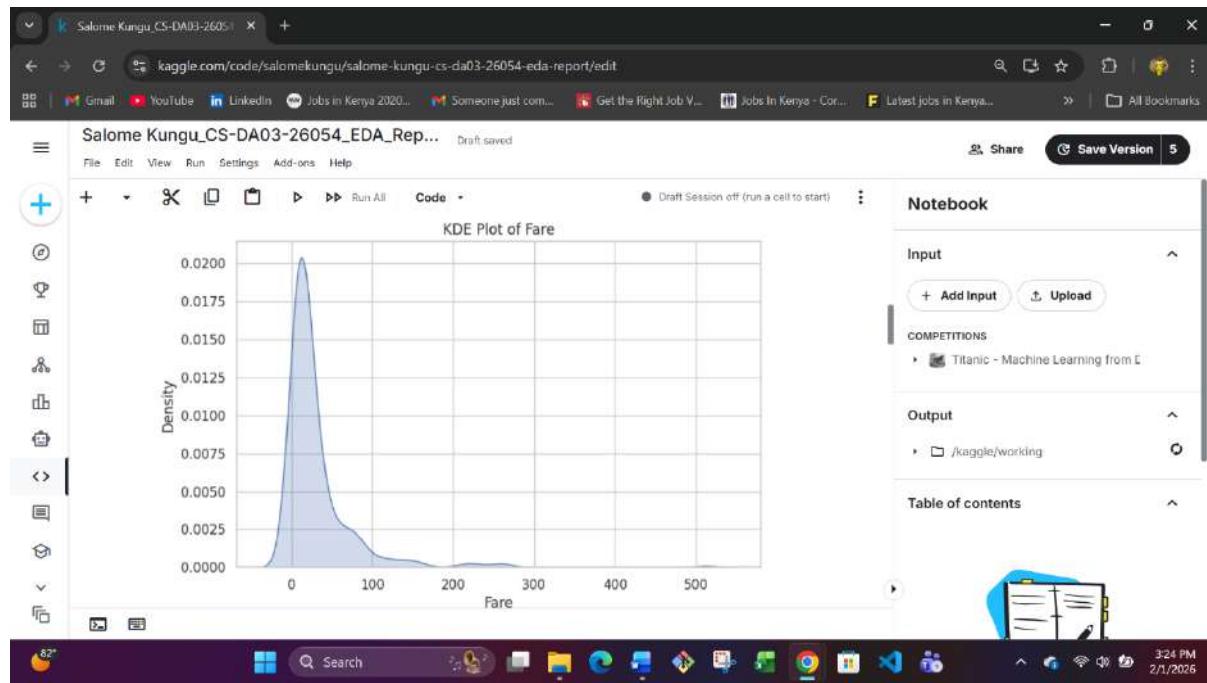
<ipython-input-10-2ab684f25e06>:5: FutureWarning:
'shade' is now deprecated in favor of 'fill'; setting 'fill=True'.
This will become an error in seaborn v0.14.0; please update your code.

sns.kdeplot(df['Fare'], shade=True)
/usr/local/lib/python3.10/dist-packages/seaborn/_oldcore.py:1119: FutureWarning: use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
with pd.option_context('mode.use_inf_as_na', True):

KDE Plot of Fare



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1. What is the age distribution of passengers?

- Distribution shape: The distribution is right-skewed, indicating a higher frequency of younger passengers.
- Peak frequency: The highest counts (around 60 - 70 passengers) are observed in the youngest age group.
- Age range: Passengers' ages range from infancy up to approximately 80 years old.
- General trend: The number of passengers generally decreases as age increases, though a small peak is visible around the late 20s and early 30s age bracket.

2. How many passengers embarked from each location?

- Port S: Has the highest number of embarked passengers, with a count of over 600.
- Port C: Has the second-highest count, with approximately 150 to 200 passengers.
- Port Q: Has the lowest number of passengers, with a count of less than 100.
- Overall, the data indicate that port S was the most frequently used embarkation point among the options presented.

3. Are ticket prices evenly distributed, or are they skewed?

- Variable: The plot visualizes the distribution of a variable named "fare".
- Distribution shape: The distribution is highly right-skewed, meaning most of the data points are concentrated at lower fare values.
- Main peak: There is a significant peak in density near a fare of 0, indicating that a large number of observations have very low fares.
- Higher fares: As the fare increases, the density decreases sharply, though smaller, less frequent occurrences are visible at higher fare values such as 200, 300, and 500.

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SUMMARY OF QUESTION 2

1. What is the age distribution of passengers?

- Distribution shape: The distribution is right-skewed, indicating a higher frequency of younger passengers.
- Peak frequency: The highest counts (around 60 - 70 passengers) are observed in the youngest age group.
- Age range: Passengers' ages range from infancy up to approximately 80 years old.
- General trend: The number of passengers generally decreases as age increases, though a small peak is visible around the late 20s and early 30s age bracket.

2. How many passengers embarked from each location?

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3. Are ticket prices evenly distributed, or are they skewed?

- Variable: The plot visualizes the distribution of a variable named "fare".
- Distribution shape: The distribution is highly right-skewed, meaning most of the data points are concentrated at lower fare values.
- Main peak: There is a significant peak in density near a fare of 0, indicating that a large number of observations have very low fares.
- Higher fares: As the fare increases, the density decreases sharply, though smaller, less frequent occurrences are visible at higher fare values such as 200, 300, and 500.

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Question 3: Bivariate Analysis.

What:

Examine relationships between two variables, such as:

- Survival vs Gender
- Survival vs Passenger Class
- Survival vs Age
- Fare vs Pclass

Why:

This analysis helps identify factors that may influence survival and justifies feature importance for predictive modeling.

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[11]: # Question 3: Bivariate Analysis
#Examine pairs of features of interest.
#Justify which features you would like to pair in the analysis and seek to answer questions like?
#1. Does the Fare change depending on the Pclass?
#2. Are younger passengers more likely to survive on the Titanic?
#3. Does the Embarked location affect the survival rate?

[12]: #Question 3
#1. Does the Fare change depending on the Pclass?
Boxplot of Fare grouped by Pclass
plt.figure(figsize=(8, 5))
sns.boxplot(x='Pclass', y='Fare', data=df, palette='Set2')
plt.title('Boxplot of Fare by Pclass')
plt.xlabel('Passenger Class')
plt.ylabel('Fare')
plt.show()

Notebook

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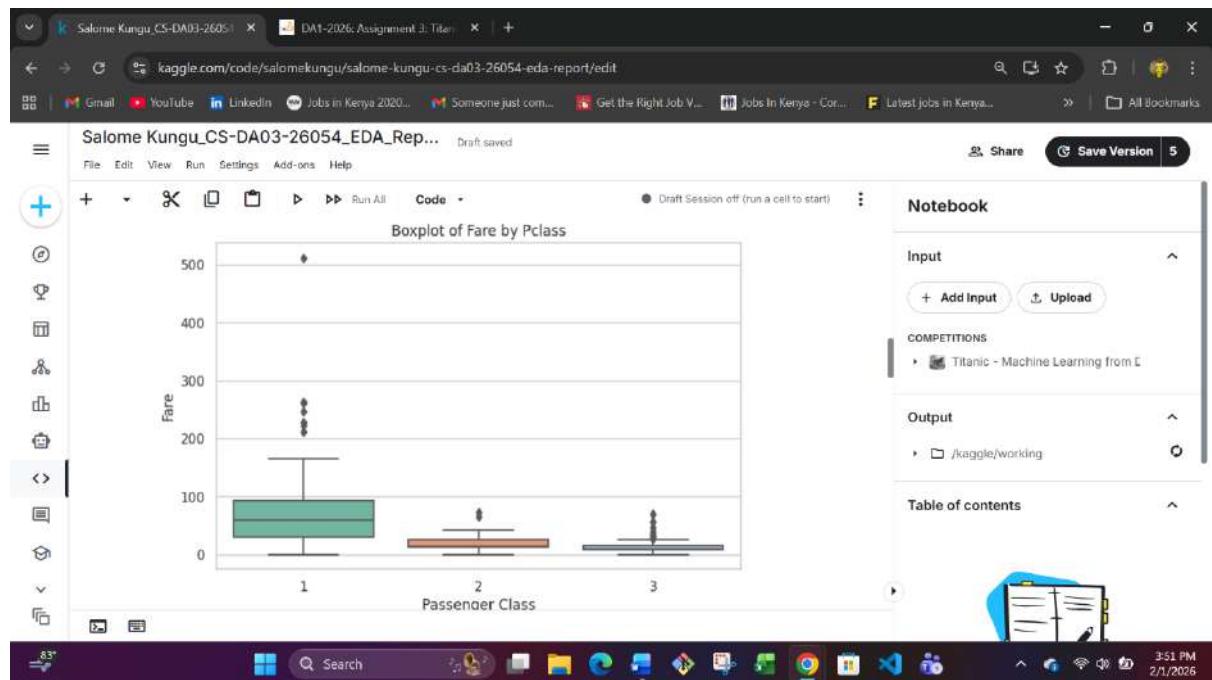
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[1]: #Question 3
#2. Are younger passengers more likely to survive on the Titanic?

```
plt.figure(figsize=(8, 6))
sns.boxplot(x='Survived', y='Age', data=df, palette='RdBu_r')
plt.title('Age Distribution by Survival Status')
plt.xlabel('Survived (0=No, 1=Yes)')
plt.ylabel('Age')
plt.show()
```

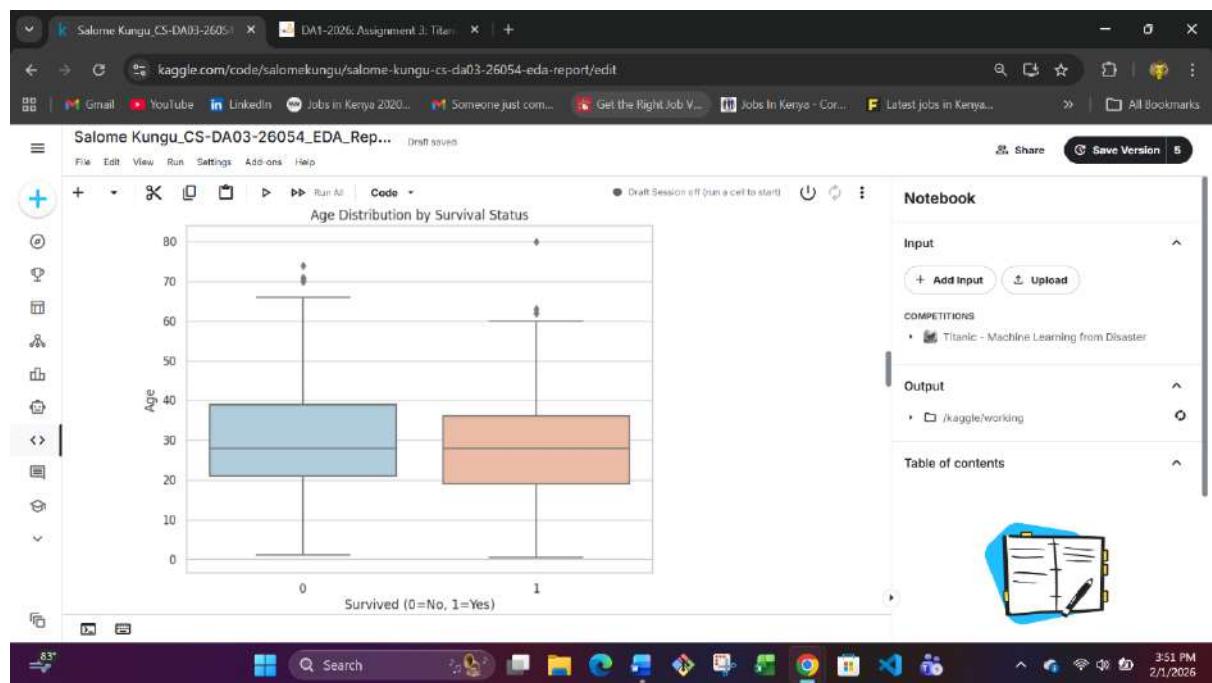
Age Distribution by Survival Status



Output

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[1]: # Question 3
3. Does the Embarked location affect survival rate?

```
plt.figure(figsize=(8, 5))
sns.countplot(x='Embarked', hue='Survived', data=df, palette='RdBu_r')
plt.title('Survival Rate by Embarked Location')
plt.ylabel('Count')
plt.show()
```

Survival Rate by Embarked Location



Embarked	Survived	Count
S	0	410
S	1	210
C	0	70
C	1	90
Q	0	50
Q	1	20

Notebook

Input

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COMPETITIONS

- Titanic - Machine Learning from Disaster

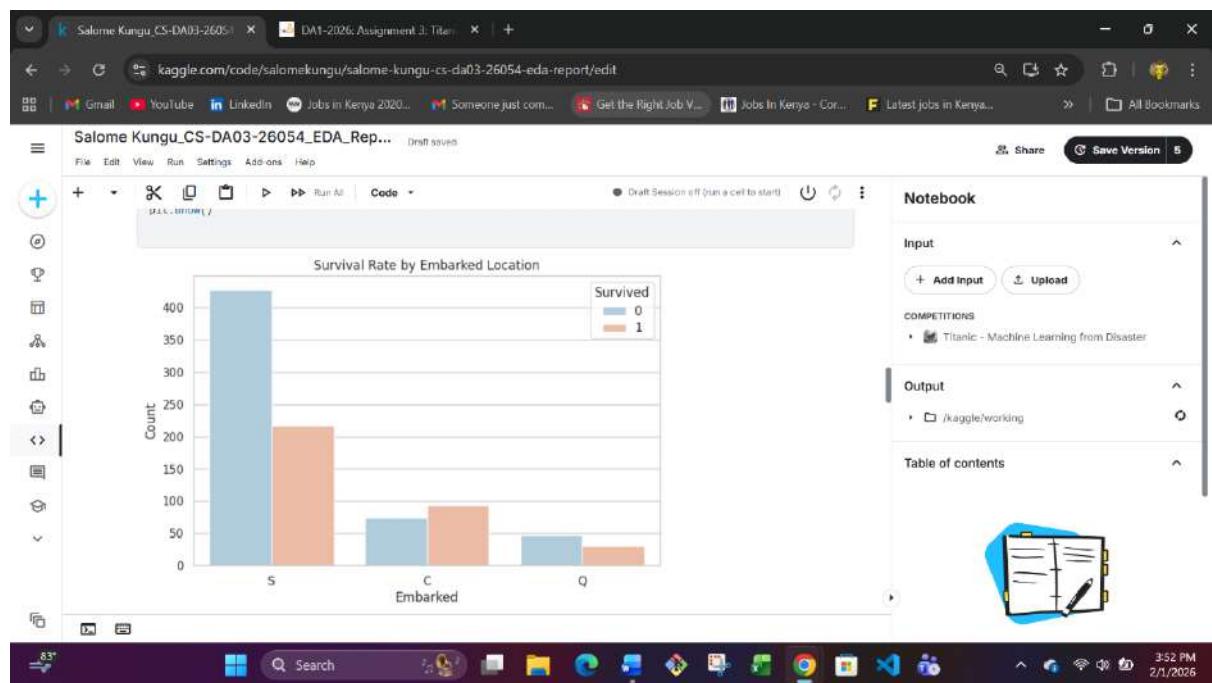
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Summary of Question 1(Profile the list of feature...
In this section, we have:
SUMMARY OF QUESTION 2

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SUMMARY OF QUESTION 3

- Does the Fare change depending on the Pclass?
 - Class 1: Has the highest median fare, estimated at around 80 - 90 dollars. Fares are widely distributed, with many high-value outliers exceeding \$ 500. The interquartile range is large, indicating significant variation in prices.
 - Class 2: The fare distribution is much more concentrated, with an interquartile range mostly between 15 and 35 US dollars. There are outliers around 70 dollars. Has a lower median fare than class 1, estimated at around 25 dollars.
 - Class 3: Has the lowest median fare, estimated at around 8 - 10 dollars. The fares are the most concentrated with the smallest Interquartile range. Several outliers exist, reaching up to \$ 60.
- Are younger passengers more likely to survive on the Titanic?
 - Survival status 0 (deceased): The median age for individuals who didn't survive is around 30 years. The interquartile range is wider, indicating a greater spread of ages in the group compared to the survivors. The bulk of the ages (between the 25th and 75th percentile) falls roughly between the early 20s and the late 40s. There few outliers at older ages around 70 years old.
 - Survival status 1 (Survived): The median age for individuals who survived was slightly lower than that of the deceased group, around the late 20s. The interquartile range is narrower, suggesting that the ages of survivors are more concentrated around the median. The middle of 50 % of the data falls between late teens and late 30s. The older group has outliers around 70 years old.

wider, indicating a greater spread of ages in the group compared to the survivors. The bulk of the ages (between the 25th and 75th percentile) falls roughly between the early 20s and the late 40s. There few outliers at older ages around 70 years old.

- Survival status 1 (Survived): The median age for individuals who survived was slightly lower than that of the deceased group, around the late 20s. The interquartile range is narrower, suggesting that the ages of survivors are more concentrated around the median. The middle of 50 % of the data falls between late teens and late 30s. The older group has outliers around 70 years old.
- Overall comparison While the median ages are similar. There appears to be slightly difference in the distribution of ages between those who survived and those who didn't. The wider age range within the deceased group IQR might suggest a more varied age demographic among those who perished.

- Does the Embarked location affect the survival rate?
 - S (Southampton): The majority of the individuals embarked from Southampton. A large number of people from S didn't survive compared to those who did.
 - C (Cherbourg): The counts of both survivors and non-survivors are more balanced in C compared to S. Slightly more people survived compared to non-survivors.
 - Q (Queenstown): The fewest people embarked from Q. The number of non_survivors is slightly higher than the number of survivors.

Question 4: Multivariate analysis.

What:

Analyze three or more variables simultaneously, for example:

- Survival by Pclass and Gender
- Survival by Age, Fare, and Pclass
- Survival across Embarked locations while considering class

Why:

Multivariate analysis reveals interaction effects and complex patterns not visible in simpler analyses.

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Markdown Run All Draft Session (13m)

[16]: #Question 4
#Multivariate analysis
#Explore more complex relationships between three or more variables simultaneously.
#Detect interactions, combined effects, and hidden patterns that may not be visible in bivariate analysis.
#This can help answer complex questions, such as:
#1. How do Pclass, Age, and Fare jointly affect survival?
#2. Are survival rates different for Embarked locations when considering Pclass?

[37]: #Question 4
#1. How do Pclass, Age, and Fare jointly affect survival?
Pair plot for numerical columns

```
plt.figure(figsize=(10, 10))
sns.pairplot(data=df, vars=['Pclass', 'Age', 'Fare'], hue='Survived', diag_kind='kde', palette='Set1')
plt.show()
```

Notebook

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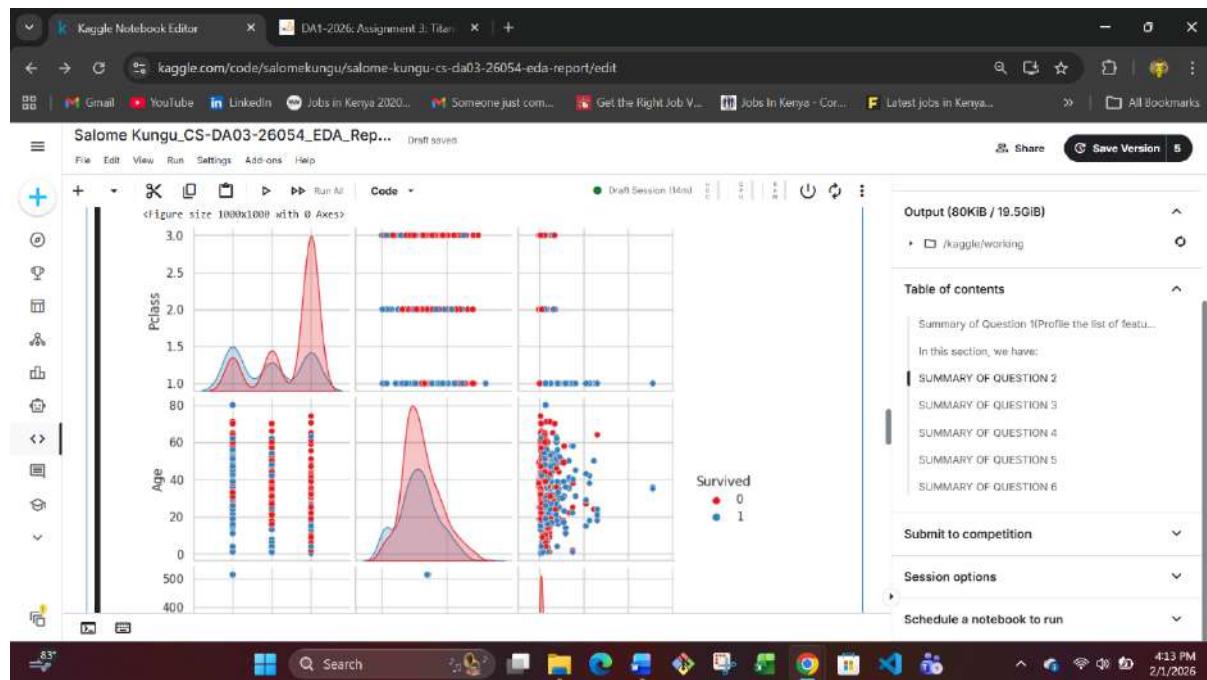
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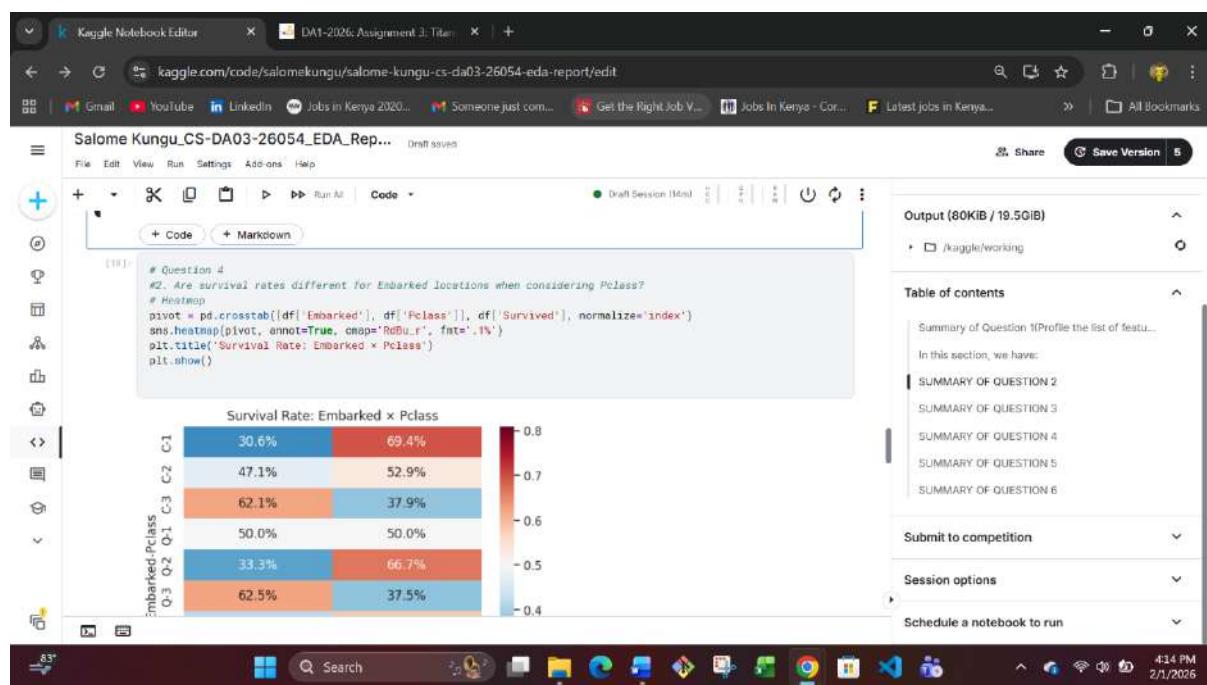
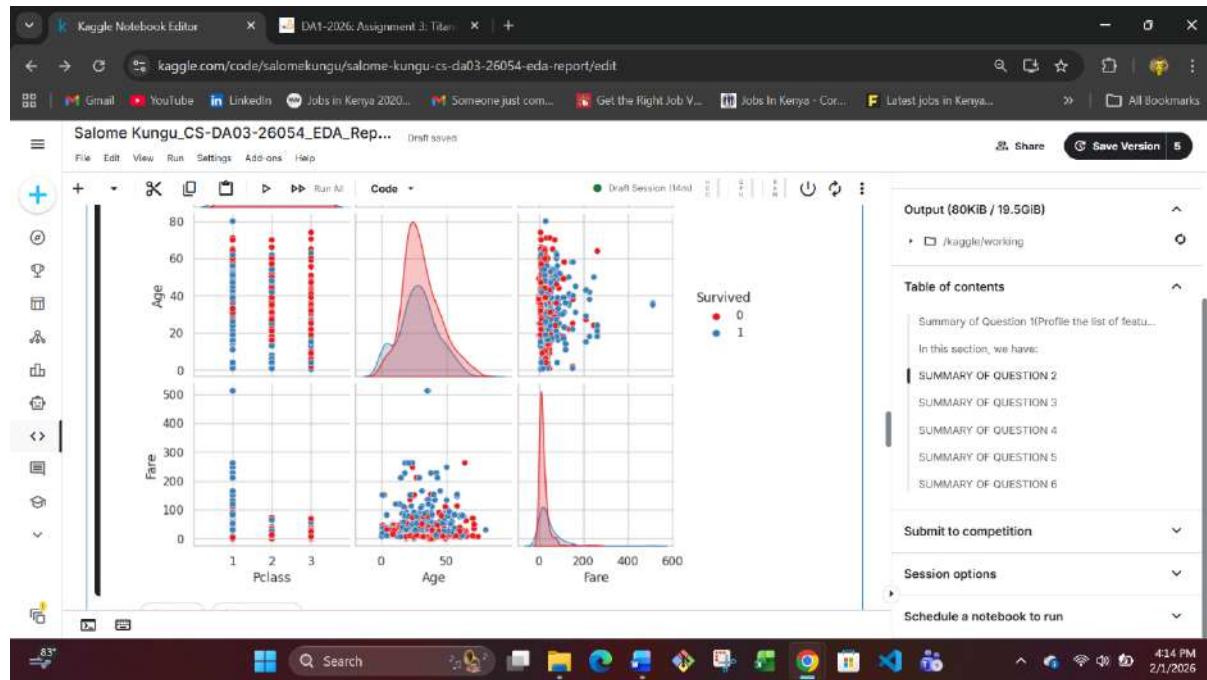
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Code Draft Session (1min)

Survival Rate: Embarked x Pclass

Embarked_Pclass	Survived	
	0	1
C1	30.6%	69.4%
C2	47.1%	52.9%
C3	62.1%	37.9%
Q1	50.0%	50.0%
Q2	33.3%	66.7%
Q3	62.5%	37.5%
S1	41.7%	58.3%
S2	53.7%	46.3%
S3	81.0%	19.0%

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SUMMARY OF QUESTION 4

- How do Pclass, Age, and Fare jointly affect survival?
 - Distributions(Diagonal plots)**

Pclass: The majority of passengers were in class 3, with fewer in class 1 and class 2.

Age: The distribution is somewhat normal, with a peak around 20 - 40 years old, and a long tail for older ages.

Fare: The distribution is heavily skewed right, with most fares being low and a few very high fares.
 - Relationships (off_diagonal plots)**

Age vs Pclass: Younger passengers are present across all classes, while older passengers are in Pclass 1.

Fare vs Pclass: Higher fares are exclusively associated with Pclass 1, while Pclass 3 has the lowest fares.

Fare vs Age: There isn't a strong linear correlation, but higher fares tend to be paid by a range of ages, mostly in Pclass 1.
- Are survival rates different for Embarked locations when considering Pclass?

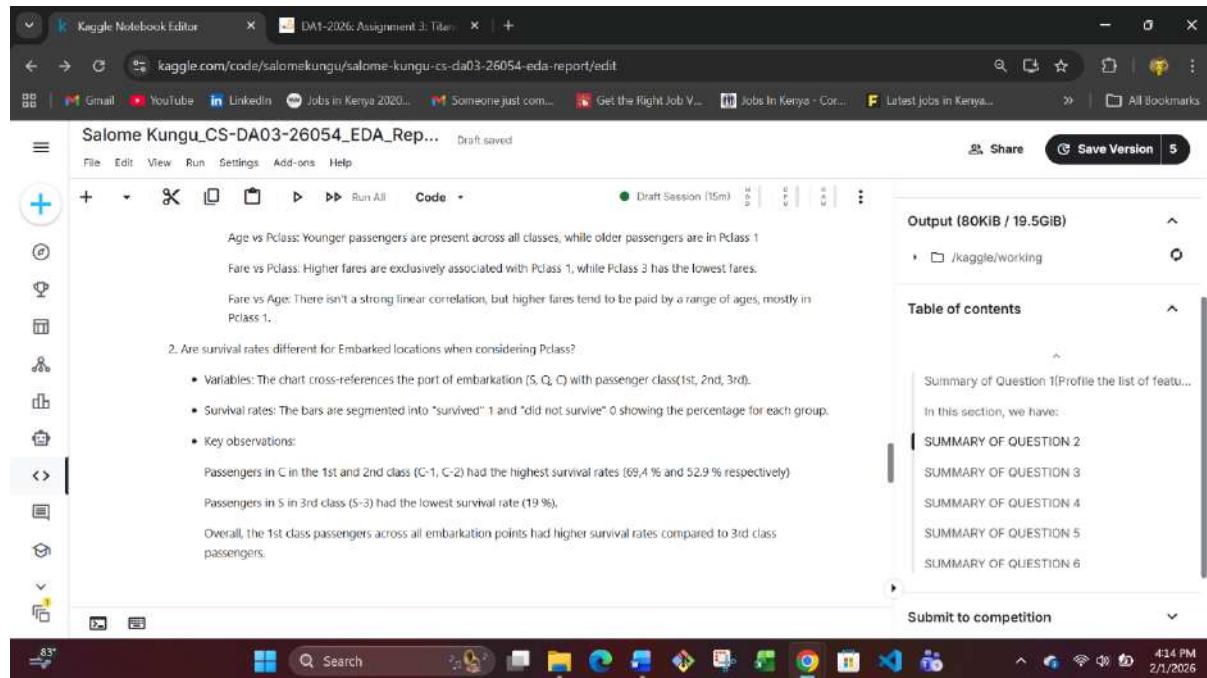
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The screenshot shows a Kaggle Notebook Editor window. The title bar says "Kaggle Notebook Editor" and "DAT-2026: Assignment 3: Title". The main area contains a Jupyter-style notebook interface with a sidebar and a central code/text editor. The notebook content discusses passenger survival rates, mentioning that passengers in C (C1st, C2nd, C3rd) class had the highest survival rates (69.4% and 52.9% respectively), while those in S (S1st, S2nd, S3rd) class had the lowest survival rate (19%). The right sidebar shows a "Table of contents" with links to various sections of the report.

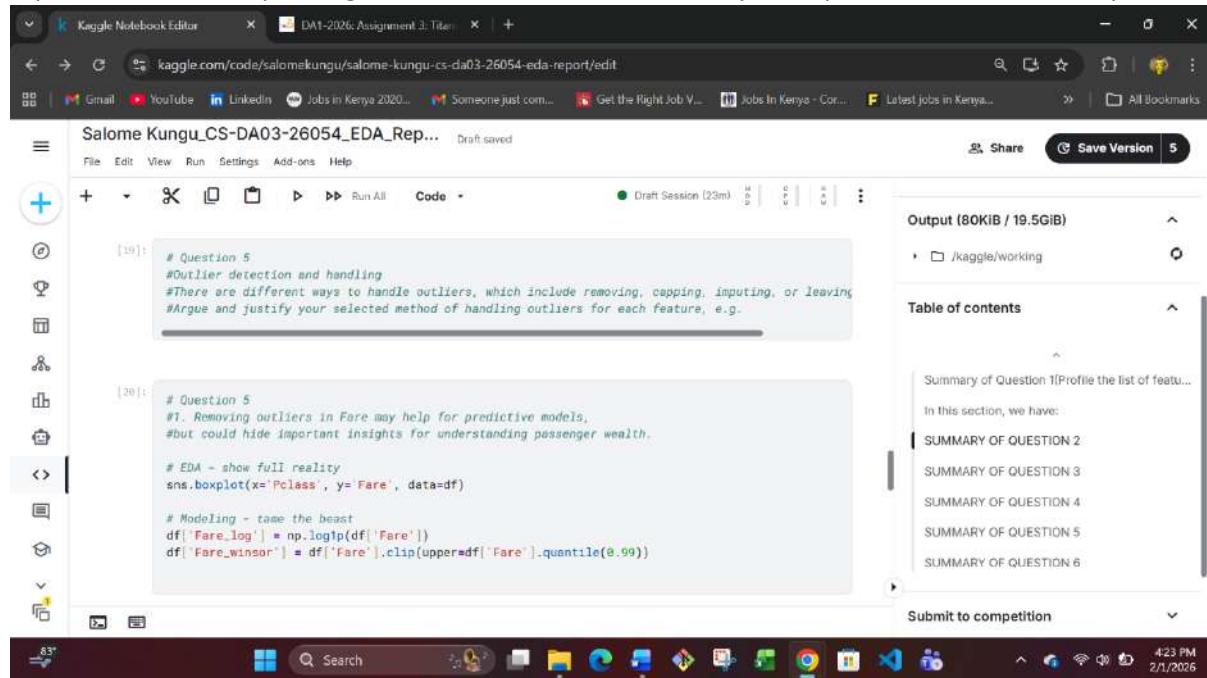
Question 5: Outlier detection and handling:

What:

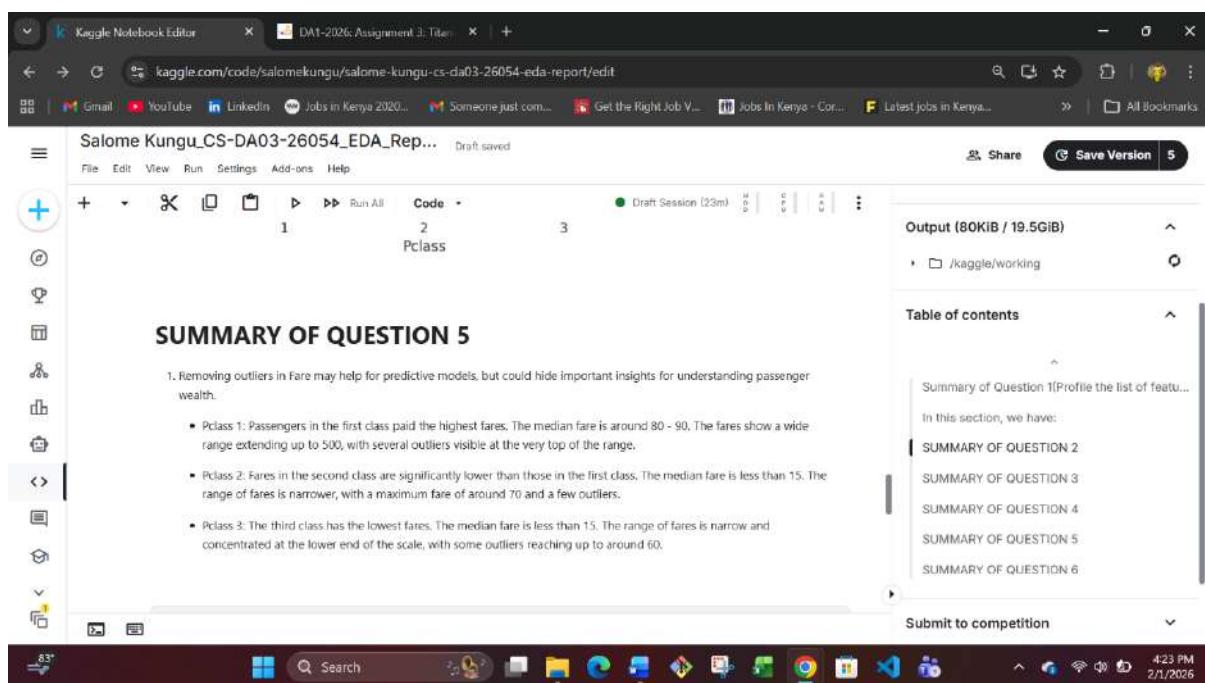
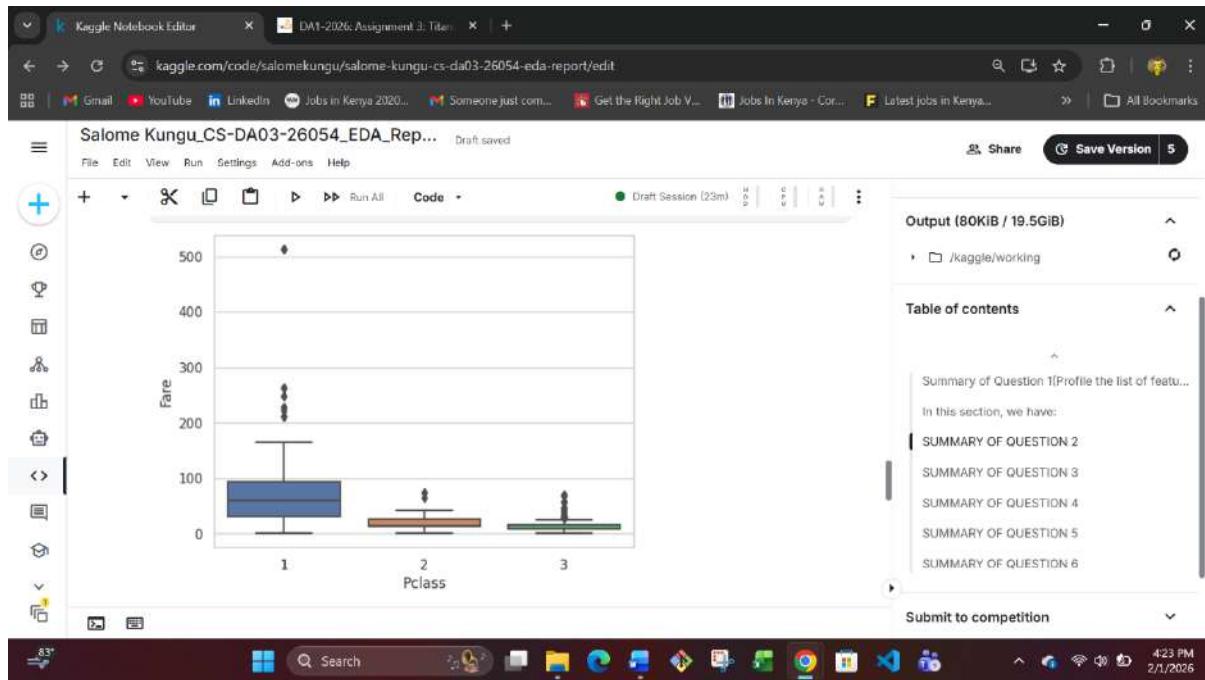
Identify outliers in numerical features such as **Fare** using boxplots and statistical summaries.

Why:

Outliers can skew analysis and model performance. In this case, outliers were retained as they represent real-world passenger wealth differences, which may be important for survival analysis.



The screenshot shows a Kaggle Notebook Editor window with the same layout as the previous one. The notebook content includes code snippets for outlier detection and handling. It discusses different methods like removing, capping, or imputing outliers, and argues for retaining them due to real-world wealth differences. A boxplot visualization is shown for the 'Fare' feature. The right sidebar contains a "Table of contents" with links to other sections.



Question 6: Target Variable Exploration

What:

- Visualize the distribution of the **Survived** variable.
- Assess class balance.
- Analyze how survival varies across age, gender, class, and embarkation point.

Why:

Understanding the target variable is essential for framing analytical insights and preparing the dataset for machine learning tasks.

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[31]: # Question 6
Target Variable Exploration
#Analyze the Target/Dependent Variable Survived and explore:
#1. The distribution of the target variable (Survived) using countplots and bar plots.
#2. How balanced or imbalanced the dataset is.
#3. What factors (like age, gender, class, or embarkation point) may influence survival?
#4. Use combined plots to detect interaction effects

[32]: # Question 6
#1. The distribution of the target variable (Survived) using countplots and bar plots.

```
plt.figure(figsize=(8, 5))
sns.countplot(x='Survived', data=df, palette='Set2')
plt.title('Survival Count')
plt.xlabel('Survived (0 = No, 1 = Yes)')
plt.ylabel('Count')
plt.show()
```

Draft Session (28m)

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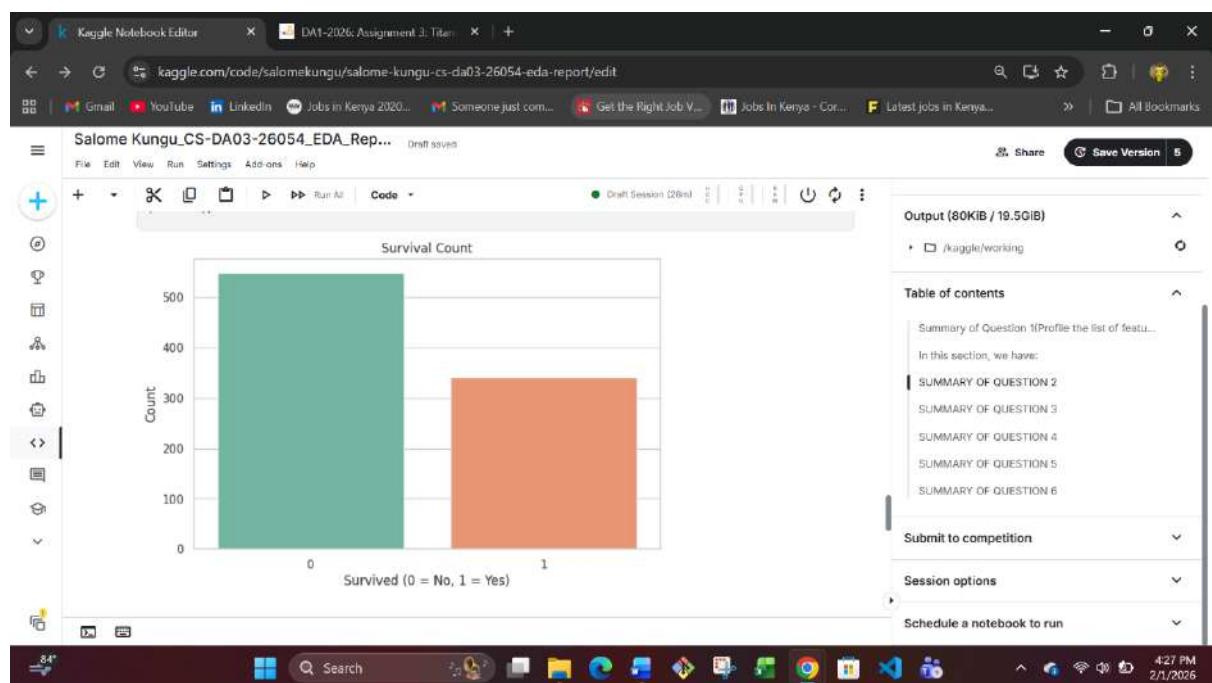
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Code + Run All Run Cell Run Session

```
[77]: # Question 6
#2. How balanced or imbalanced the dataset is.
print("Exact counts:")
print(df['Survived'].value_counts())
print("\nPercentages:")
print(df['Survived'].value_counts(normalize=True) * 100)

plt.figure(figsize=(6, 6))
plt.pie(df['Survived'].value_counts(), labels=['Died (62%)', 'Survived (38%)'],
        autopct='%1.1f%%', colors=['lightcoral', 'lightblue'])
plt.title('Target Variable Imbalance')
plt.show()
```

Exact counts:
Survived
0 548
1 342
Name: count, dtype: int64

Percentages:
Survived
0 61.616162
1 38.383838

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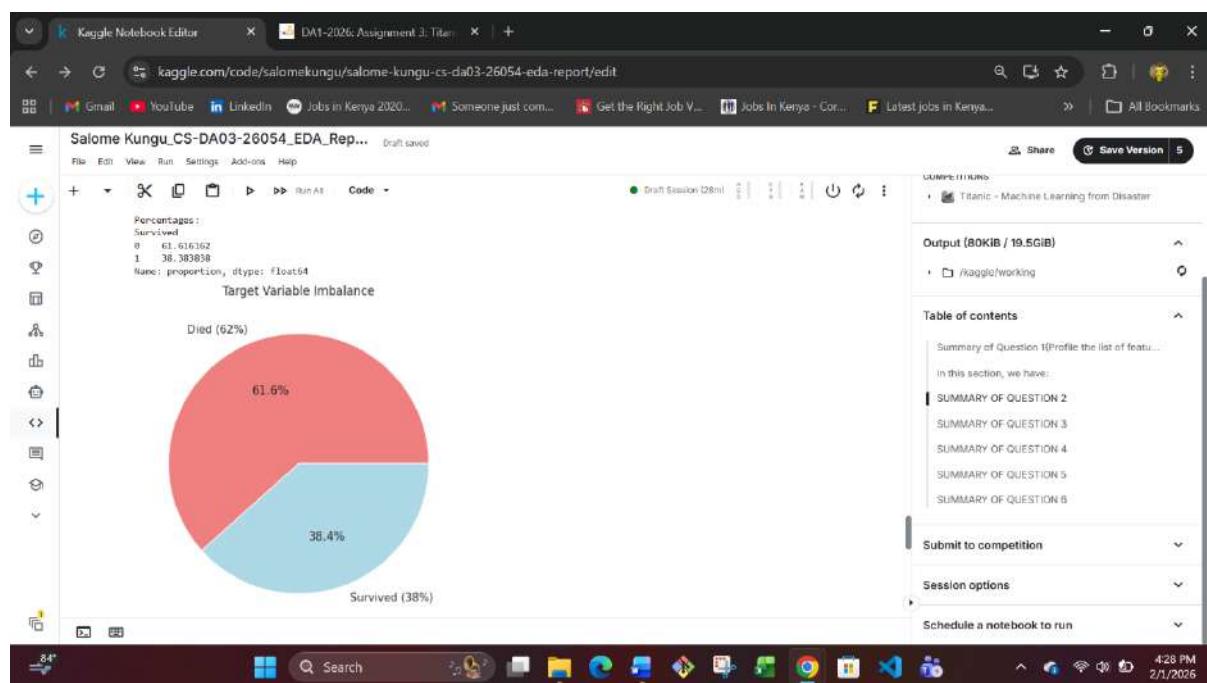
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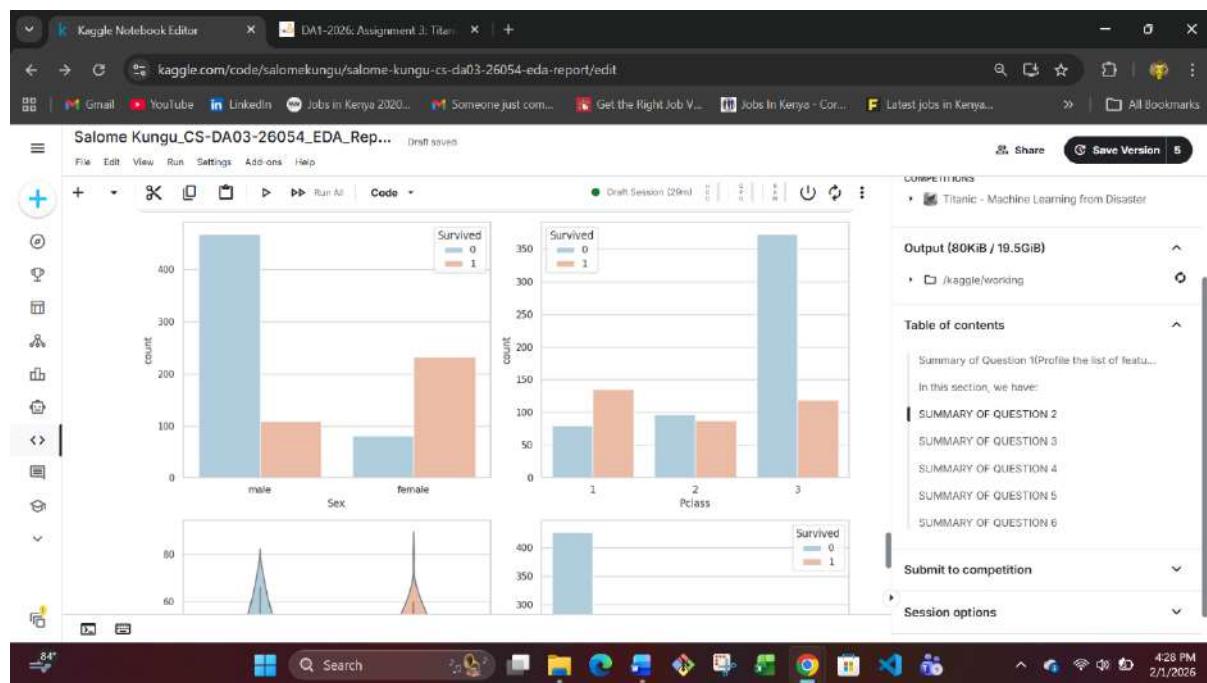
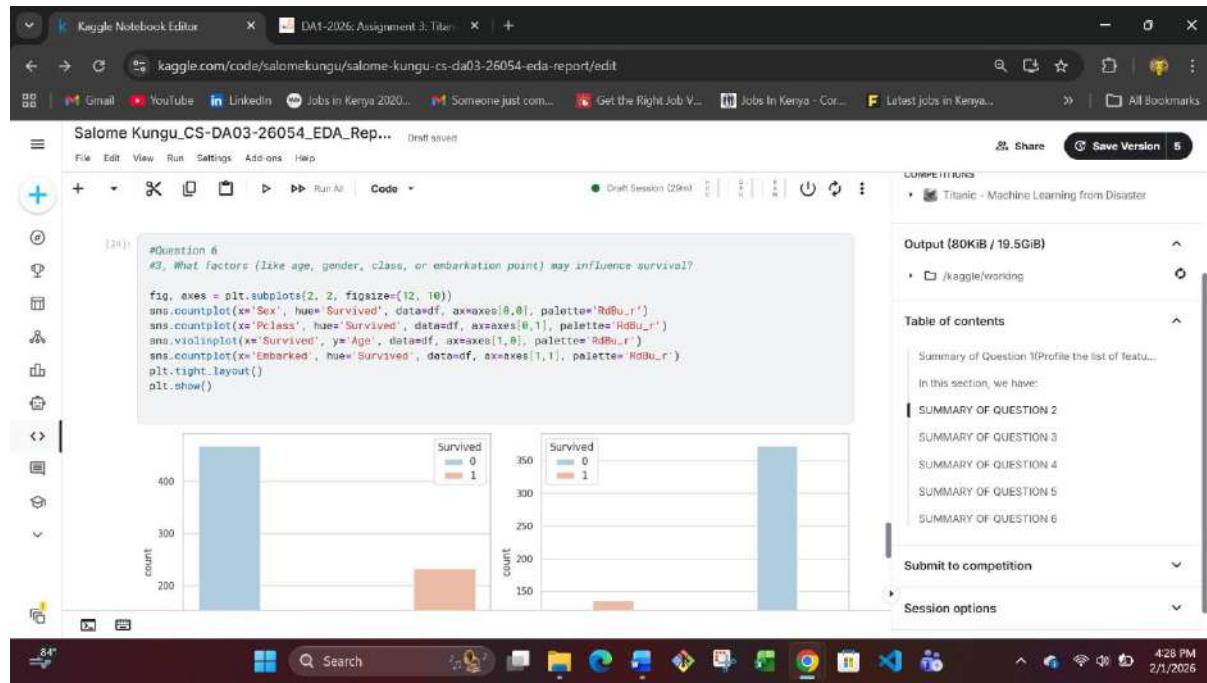
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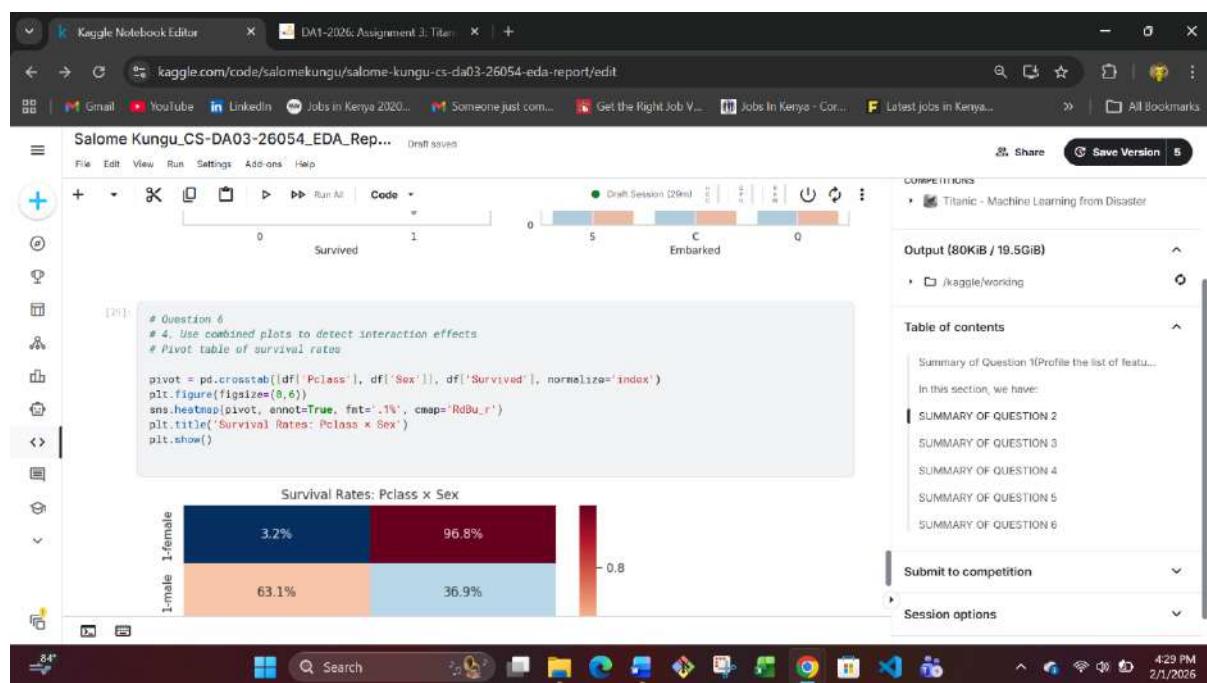
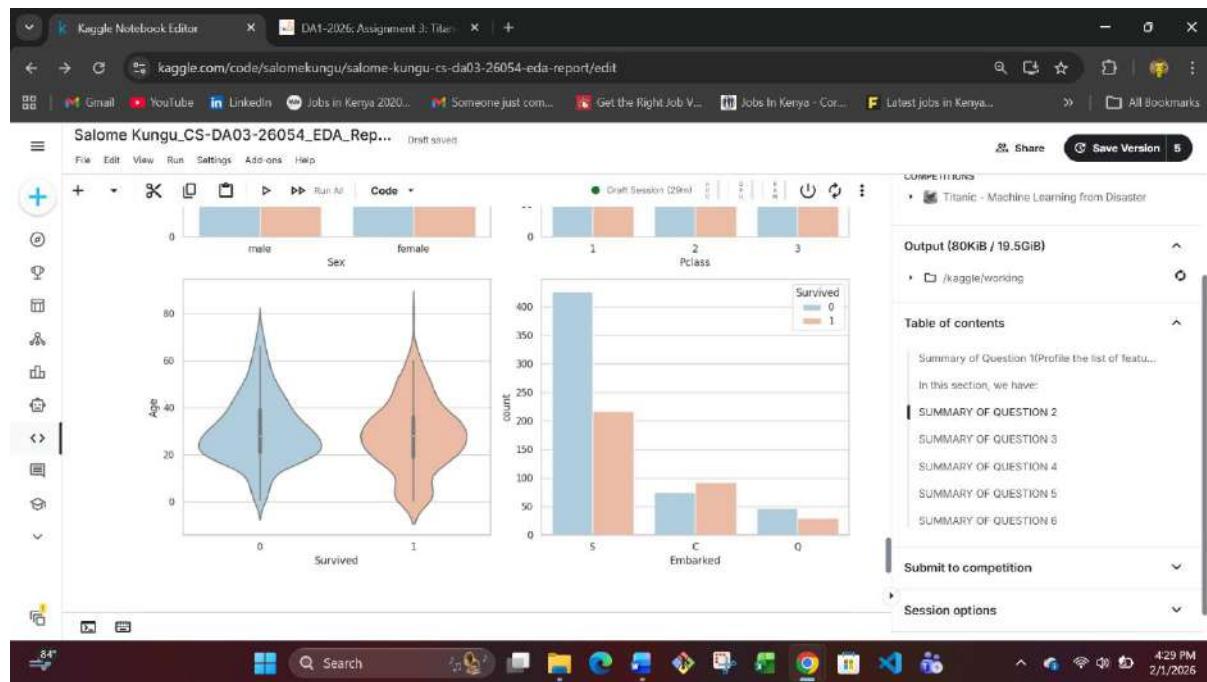
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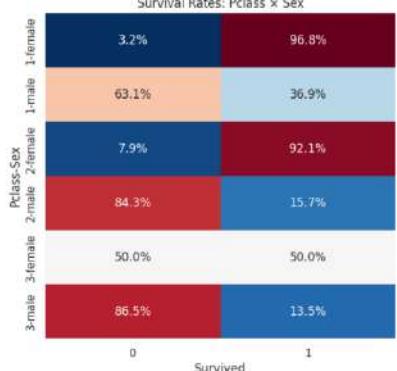
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Survival Rates: Pclass x Sex



Pclass-Sex	0	1
1-female	3.2%	96.8%
1-male	63.1%	36.9%
2-female	7.9%	92.1%
2-male	84.3%	15.7%
3-female	50.0%	50.0%
3-male	86.5%	13.5%

0 Survived

84% 429 PM 2/1/2026

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SUMMARY OF QUESTION 6

- The distribution of the target variable (Survived) using countplots and bar plots.
 - Non-survivors (0): There were approximately 500 people who didn't survive.
 - Survivors (1): There were approximately 300 people who survived.
- How balanced or imbalanced the dataset is.
 - Non-survivors (0): The majority of passengers died, with 61.6 %.
 - Survivors (1): Accounts for the remaining 38.4 % survived.
- What factors (like age, gender, class, or embarkation point) may influence survival?
 - Sex vs Survival: There were more male passengers overall than female passengers. A higher number of male passengers didn't survive compared to those who did. Female passengers had a higher survival rate than male passengers.
 - Pclass vs Survival: The majority of passengers were in the third class (Pclass 3). The second class (Pclass 2) had the fewest passengers. Most non-survivors were from Pclass 3. Passengers in Pclass 1 had the highest proportion of survivors relative to non-survivors among the classes.

84% 429 PM 2/1/2026

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Pclass vs Survival: The majority of passengers were in the third class (Pclass 3). The second class (Pclass 2) had the fewest passengers. Most non-survivors were from Pclass 3. Passengers in Pclass 1 had the highest proportion of survivors relative to non-survivors among the classes.

Age vs Survival: The distribution of age for those who didn't survive (0) is wider and more spread out. There is a higher concentration of individuals in the 20 - 40 age range, and it extends to older ages. The distribution for those who survived (1) is narrower and more concentrated among younger individuals, mainly those in their 20s and 30s. The younger people had a higher survival rate compared to the older individuals.

Embarked vs survived: The count shows that the majority of people embarked from location S. For the embarkation point S, a larger number of people didn't survive (0) compared to those who did (1). For the embarkation point C, the number of survivors (1) and non-survivors (0) appears more balanced, with slightly more survivors. This indicated that the survival rate varied depending on the embarkation location.

4. Use combined plots to detect interaction effects

Overall Trend: Survival rates (1) vary significantly across different groups.

Highest survival: First-class females have the highest survival rate at 96.8 %.

Lower survival: Third-class males have the lowest survival rate at 13.5 %.

Gender disparity: Females generally have much higher survival rates than males within the same class, eg Third-class females have a 50 % survival rate compared to 13.5 % for third-class males.

Class disparity: Survival rates decrease as the passenger class goes from 1st to 3rd.