# SMART BRIDGE_APPLIED DATA SCIENCE ASSIGNMENT - 1

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## Titanic Ship Case Study

Problem Description: On April 15, 1912, during her maiden voyage, the Titanic sank after colliding with an iceberg, killing 1502 out of 2224 passengers and crew. Translated 32% survival rate.

- One of the reasons that the shipwreck led to such loss of life was that there were not enough lifeboats for the passengers and crew.
- Although there was some element of luck involved in surviving the sinking, some groups of people were more likely to survive than others, such as women, children, and the upper-class.

The problem associated with the Titanic dataset is to predict whether a passenger survived the disaster or not. The dataset contains various features such as passenger class, age, gender, cabin, fare, and whether the passenger had any siblings or spouses on board. These features can be used to build a predictive model to determine the likelihood of a passenger surviving the disaster. The dataset offers opportunities for feature engineering, data visualization, and model selection, making it a valuable resource for developing and testing data analysis and machine learning skills.

Perform Below Tasks to complete the assignment:-

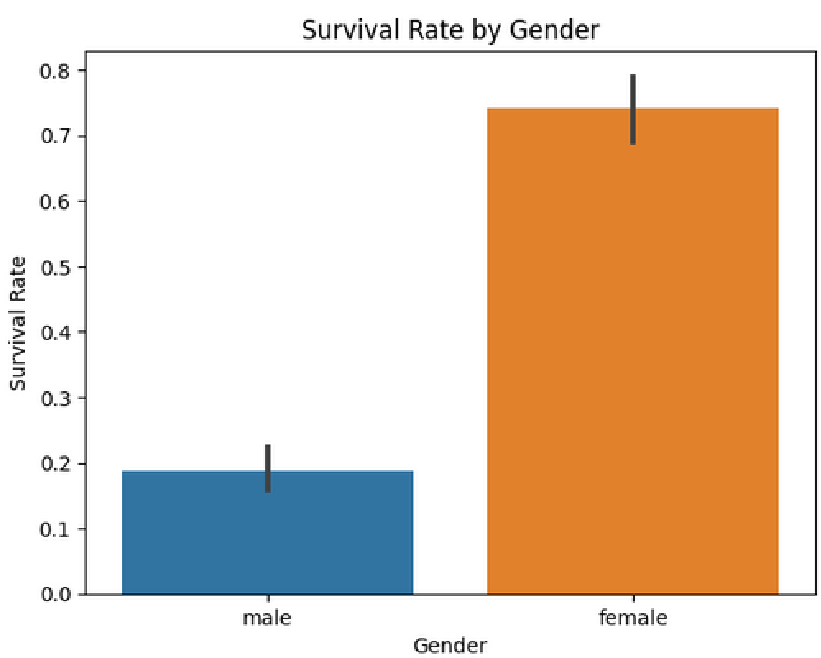
1. Download the dataset: Dataset

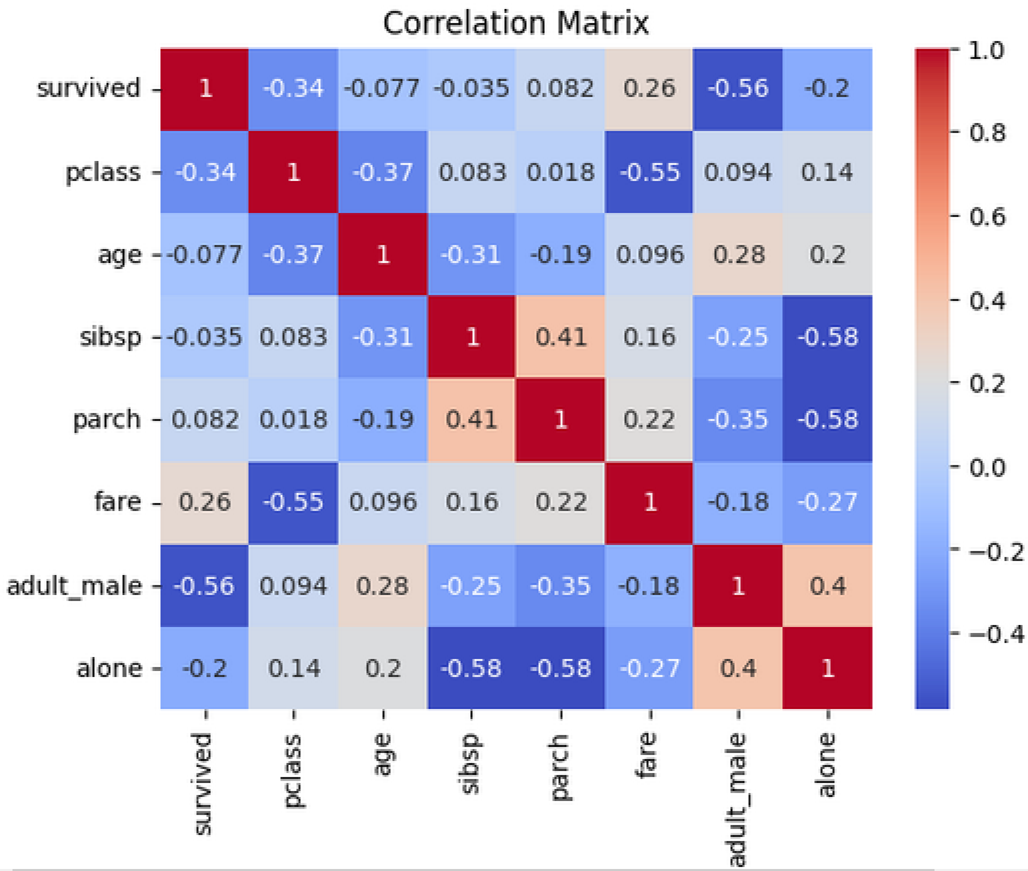
2. Load the dataset.

3. Perform Below Visualizations.

   - Univariate Analysis
   - Bi - Variate Analysis
   - Multi - Variate Analysis

```python
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

# Load the dataset
df = pd.read_csv('titanic.csv')

# Univariate Analysis
# Example: Histogram of Age
plt.hist(df['age'].dropna(), bins=30)
plt.xlabel('age')
plt.ylabel('Frequency')
plt.title('Distribution of Age')
plt.show()

# Bi-Variate Analysis
# Example: Bar plot of Survival Rate by Gender
sns.barplot(x='sex', y='survived', data=df)
plt.xlabel('Gender')
plt.ylabel('Survival Rate')
plt.title('Survival Rate by Gender')
plt.show()

# Multi-Variate Analysis
# Example: Heatmap of Correlations between Variables
corr_matrix = df.corr()
sns.heatmap(corr_matrix, annot=True, cmap='coolwarm')
plt.title('Correlation Matrix')
plt.show()
```






Perform descriptive statistics on the dataset

[5]

```
# Calculate descriptive statistics
descriptive_stats = df.describe()

# Display the descriptive statistics
print(descriptive_stats)
```

```
         survived      pclass         age       sibsp       parch        fare
count  891.000000  891.000000  714.000000  891.000000  891.000000  891.000000
mean     0.383838    2.308642   29.699118    0.523008    0.381594   32.204208
std      0.486592    0.836071   14.526497    1.102743    0.806057   49.693429
min      0.000000    1.000000    0.420000    0.000000    0.000000    0.000000
25%      0.000000    2.000000   20.125000    0.000000    0.000000    7.910400
50%      0.000000    3.000000   28.000000    0.000000    0.000000   14.454200
75%      1.000000    3.000000   38.000000    1.000000    0.000000   31.000000
max      1.000000    3.000000   80.000000    8.000000    6.000000  512.329200
```

Handle the Mising Values

```
[6] # Impute missing values with the mean of the column
    df['age'].fillna(df['age'].mean(), inplace=True)

    # Impute missing values with the mode of the column
    df['embarked'].fillna(df['embarked'].mode()[0], inplace=True)
```

Find the outliers and replace the outliers

```
[7] import numpy as np
    from scipy.stats import zscore

    # Calculate z-scores for numerical columns
    numeric_columns = ['age', 'fare']
    z_scores = np.abs(zscore(df[numeric_columns]))

    # Set a threshold for identifying outliers
    threshold = 3

    # Find indices of outliers based on z-scores
    outlier_indices = np.where(z_scores > threshold)

    # Replace outliers with the median of the column
    df[numeric_columns] = np.where(z_scores > threshold, df[numeric_columns].median(), df[numeric_columns])
```

Check for Categorical columns and perform encoding

```
# Identify categorical columns
categorical_columns = df.select_dtypes(include='object').columns

# Perform one-hot encoding
encoded_df = pd.get_dummies(df, columns=categorical_columns)

# Display the encoded DataFrame
print(encoded_df)
```

```
     survived  pclass        age  sibsp  parch     fare  adult_male  alone  \
0           0       3  22.000000      1      0   7.2500        True  False
1           1       1  38.000000      1      0  71.2833       False  False
2           1       3  26.000000      0      0   7.9250       False   True
3           1       1  35.000000      1      0  53.1000       False  False
4           0       3  35.000000      0      0   8.0500        True   True
..        ...     ...        ...    ...    ...      ...         ...    ...
886         0       2  27.000000      0      0  13.0000        True   True
887         1       1  19.000000      0      0  30.0000       False   True
888         0       3  29.699118      1      2  23.4500       False  False
889         1       1  26.000000      0      0  30.0000        True   True
890         0       3  32.000000      0      0   7.7500        True   True
```

```
     sex_female  sex_male  ...  deck_C  deck_D  deck_E  deck_F  deck_G  \
0             0         1  ...       0       0       0       0       0
1             1         0  ...       1       0       0       0       0
2             1         0  ...       0       0       0       0       0
3             1         0  ...       1       0       0       0       0
4             0         1  ...       0       0       0       0       0
..          ...       ...  ...     ...     ...     ...     ...     ...
886           0         1  ...       0       0       0       0       0
887           1         0  ...       0       0       0       0       0
888           1         0  ...       0       0       0       0       0
889           0         1  ...       1       0       0       0       0
890           0         1  ...       0       0       0       0       0

     embark_town_Cherbourg  embark_town_Queenstown  embark_town_Southampton  \
0                        0                       0                        1
1                        1                       0                        0
2                        0                       0                        1
3                        0                       0                        1
4                        0                       0                        1
..                     ...                     ...                      ...
886                      0                       0                        1
887                      0                       0                        1
888                      0                       0                        1
889                      1                       0                        0
890                      0                       1                        0

     alive_no  alive_yes
0           1          0
1           0          1
2           0          1
3           0          1
4           1          0
..        ...        ...
886         1          0
887         0          1
888         1          0
889         0          1
890         1          0

[891 rows x 31 columns]
```

Split the data into dependent and independent variables

[9]

```
# Split into dependent (target) variable and independent variables
X = df.drop('survived', axis=1)  # Independent variables
y = df['survived']  # Dependent (target) variable

# Display the independent variables
print(X.head())

# Display the dependent variable
print(y.head())
```

[9]

```
   pclass     sex   age  sibsp  parch     fare embarked  class    who  \
0       3    male  22.0      1      0   7.2500        S  Third    man
1       1  female  38.0      1      0  71.2833        C  First  woman
2       3  female  26.0      0      0   7.9250        S  Third  woman
3       1  female  35.0      1      0  53.1000        S  First  woman
4       3    male  35.0      0      0   8.0500        S  Third    man

   adult_male deck  embark_town alive  alone
0        True  NaN  Southampton    no  False
1       False    C    Cherbourg   yes  False
2       False  NaN  Southampton   yes   True
3       False    C  Southampton   yes  False
4        True  NaN  Southampton    no   True
0    0
1    1
2    1
3    1
4    0
Name: survived, dtype: int64
```

Scale the independent variables

[10]

```
import pandas as pd
from sklearn.preprocessing import StandardScaler
```

[10]

```
# Split into dependent (target) variable and independent variables
X = df.drop('survived', axis=1)  # Independent variables
y = df['survived']  # Dependent (target) variable

# Perform one-hot encoding on categorical variables
X_encoded = pd.get_dummies(X)

# Perform scaling
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X_encoded)

# Display the scaled independent variables
scaled_df = pd.DataFrame(X_scaled, columns=X_encoded.columns)
print(scaled_df.head())
```

```
    pclass       age     sibsp     parch      fare  adult_male     alone  \
0  0.827377 -0.592704  0.432793 -0.473674 -0.654170    0.811922 -1.231645
1 -1.566107  0.695087  0.432793 -0.473674  1.549441   -1.231645 -1.231645
2  0.827377 -0.270757 -0.474545 -0.473674 -0.630941   -1.231645  0.811922
3 -1.566107  0.453626  0.432793 -0.473674  0.923690   -1.231645 -1.231645
4  0.827377  0.453626 -0.474545 -0.473674 -0.626639    0.811922  0.811922

   sex_female  sex_male  embarked_C  ...    deck_C    deck_D    deck_E  \
0   -0.737695  0.737695   -0.482043  ... -0.266296 -0.196116 -0.193009
1    1.355574 -1.355574    2.074505  ...  3.755222 -0.196116 -0.193009
2    1.355574 -1.355574   -0.482043  ... -0.266296 -0.196116 -0.193009
3    1.355574 -1.355574   -0.482043  ...  3.755222 -0.196116 -0.193009
4   -0.737695  0.737695   -0.482043  ... -0.266296 -0.196116 -0.193009

     deck_F    deck_G  embark_town_Cherbourg  embark_town_Queenstown  \
0 -0.121681 -0.067153              -0.482043               -0.307562
1 -0.121681 -0.067153               2.074505               -0.307562
2 -0.121681 -0.067153              -0.482043               -0.307562
3 -0.121681 -0.067153              -0.482043               -0.307562
4 -0.121681 -0.067153              -0.482043               -0.307562

   embark_town_Southampton  alive_no  alive_yes
0                 0.619306  0.789272  -0.789272
1                -1.614710 -1.266990   1.266990
2                 0.619306 -1.266990   1.266990
3                 0.619306 -1.266990   1.266990
4                 0.619306  0.789272  -0.789272

[5 rows x 30 columns]
```

Split the data into training and testing

```
[11] from sklearn.model_selection import train_test_split

     # Split into dependent (target) variable and independent variables
     X = df.drop('survived', axis=1)  # Independent variables
     y = df['survived']  # Dependent (target) variable

     # Split the data into training and testing sets
     X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

     # Display the shapes of the subsets
     print("Training set shape:", X_train.shape, y_train.shape)
     print("Testing set shape:", X_test.shape, y_test.shape)
```

```
Training set shape: (712, 14) (712,)
Testing set shape: (179, 14) (179,)
```

## GOOGLE COLAB LINK

**https://colab.research.google.com/drive/1VF4_WGjyw053JcAAMzlznke8sYdBb2yD?usp=sharing**