Case Study on Titanic dataset

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```
#importing of required modules
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from scipy import stats
#allow plots and visualisations to be displayed in the report
%pylab inline
```

```
     Populating the interactive namespace from numpy and matplotlib
```

```
# Read csv into Pandas Dataframe and store in dataset variable
titanic_df = pd.read_csv('titanic_data.csv')
```

```
# print out information about the data
titanic_df.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)
     memory usage: 83.7+ KB
```

After printing out the dataset information above, we can see that the Age, Cabin and Embarked columns are missing entries.

Missing Values in Data

```
total_miss = titanic_df.isnull().sum()
percent_miss = (total_miss/titanic_df.isnull().count()*100)

# Creating dataframe from dictionary
missing_data = pd.DataFrame({'Total missing':total_miss,'% missing':percent_miss})

missing_data.sort_values(by='Total missing',ascending=False).head()
```

	Total missing	% missing
Cabin	687	77.104377
Age	177	19.865320
Embarked	2	0.224467
PassengerId	0	0.000000
Survived	0	0.000000

```
# Visualizing Missing Data
import missingno as msno

missing_data = msno.bar(titanic_df, figsize=(6,4))
print(titanic_df.info())
print('------'* 20 , '\n\n')
print(titanic_df.isnull().sum())
print('------'* 20 , '\n\n')
print(missing_data)
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
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 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)
memory usage: 83.7+ KB
None
------------------------------------------------------------------------------------


PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age            177
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          687
```

Dropping Missing Data

```
df = titanic_df.dropna()
print('origional shape: ',titanic_df.shape, '----->', 'New Shape',df.shape)
```

```
origional shape:  (891, 12) -----> New Shape (183, 12)
```

```
#women survival
women = df[df.Sex == 'female']["Survived"]
#men survival
men = df[df.Sex == 'male']["Survived"]
print("Survival rate for women is {:.2f} and for men is {:.2f}".format((sum(women)/len(wom
```

```
Survival rate for women is 93.18 and for men is 43.16
```

```
df
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket
449	450	1	1	Peuchen, Major. Arthur Godfrey	male	52.0	0	0	113786
587	588	1	1	Frolicher-Stehli, Mr. Maxmillian	male	60.0	1	1	13567
630	631	1	1	Barkworth, Mr. Algernon Henry Wilson	male	80.0	0	0	27042
647	648	1	1	Simonius-Blumer, Col. Oberst Alfons	male	56.0	0	0	13213
857	858	1	1	Daly, Mr. Peter Denis	male	51.0	0	0	113055
11	12	1	1	Bonnell, Miss. Elizabeth	female	58.0	0	0	113783
195	196	1	1	Lurette, Miss. Elise	female	58.0	0	0	PC 17569
268	269	1	1	Graham, Mrs. William Thompson (Edith	female	58.0	0	1	PC 17582

```
data = df
```

Andrews.

There were 8 decks: the upperdeck - for lifeboats, other 7 were under it and had letter symbols:

1. A: it did not run the entire length of the vessel (i.e. it did not reach from the stern to the bow of the vessel), and was intended for passengers of the 1st class.
2. B: it did not run the entire length of the ship (it was interrupted by 37 meters above the C deck, and served as a place for anchors in the front).
3. C: in the front part of the galley, dining room for the crew, as well as a walking area for passengers of the 3rd class.
4. D: a walking area for passengers .
5. E: cabins of the 1st and 2nd class.
6. F: part of the passenger cabins of the 2nd class, most of the cabins of the 3rd class.
7. G: did not run the entire length of the ship, the boiler rooms were located in the center.
8. T - boat deck ? To the passengers without deck information I will imput U letter (as unknown).

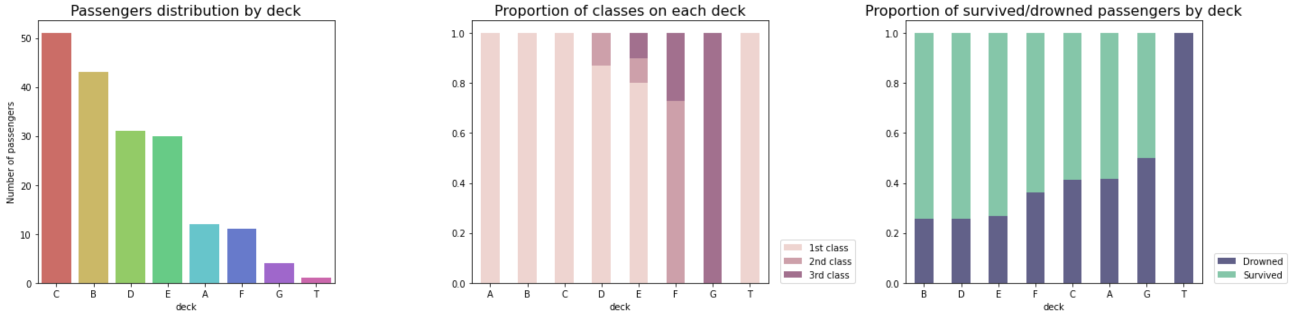
```
data['deck'] = data['Cabin'].str.split('', expand = True)[1]
data.loc[data['deck'].isna(), 'deck'] = 'U'
print('Unique deck letters from the cabin numbers:', data['deck'].unique())
```

```
    Unique deck letters from the cabin numbers: ['C' 'E' 'G' 'D' 'A' 'B' 'F' 'T']
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: SettingWithCopyWarni


A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/u

/usr/local/lib/python3.7/dist-packages/pandas/core/indexing.py:1763: SettingWithCopy


A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/u
```

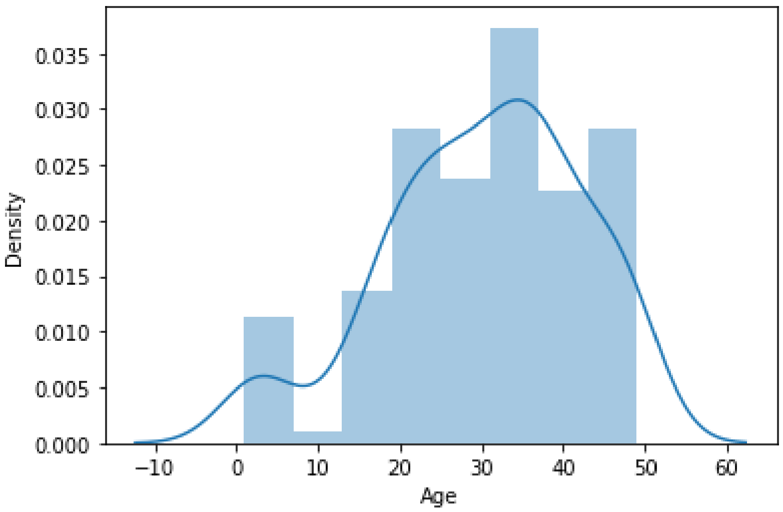
EDA

```
fig = plt.figure(figsize=(20, 5))

ax1 = fig.add_subplot(131)
sns.countplot(x = 'deck', data = data, palette = "hls", order = data['deck'].value_counts(
plt.title('Passengers distribution by deck',fontsize= 16)
plt.ylabel('Number of passengers')

ax2 = fig.add_subplot(132)
deck_by_class = data.groupby('deck')['Pclass'].value_counts(normalize = True).unstack()
deck_by_class.plot(kind='bar', stacked='True',color = ['#eed4d0', '#cda0aa', '#a2708e'], a
plt.legend(('1st class', '2nd class', '3rd class'), loc=(1.04,0))
plt.title('Proportion of classes on each deck',fontsize= 16)
plt.xticks(rotation = False)

ax3 = fig.add_subplot(133)
deck_by_survived = data.groupby('deck')['Survived'].value_counts(normalize = True).unstack
deck_by_survived = deck_by_survived.sort_values(by = 1, ascending = False)
deck_by_survived.plot(kind='bar', stacked='True', color=["#3f3e6fd1", "#85c6a9"], ax = ax3
plt.title('Proportion of survived/drowned passengers by deck',fontsize= 16)
plt.legend(( 'Drowned', 'Survived'), loc=(1.04,0))
plt.xticks(rotation = False)
plt.tight_layout()

plt.show()
```



```
sns.distplot(data[(data["Age"] < 50)].Age )#, kde_kws={"lw": 3}, bins = 50)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2557: FutureWarning:
`distplot` is a deprecated function and will be removed in a future version. Please
<matplotlib.axes._subplots.AxesSubplot at 0x7f48e323bed0>
```



kde graph distribution of the passanger present with an age of 50 and less

```
data[data['Age'] < 50 ]
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	7

list of passenger with age less than 50

Mrs.

```
df_filtered = df[(data.Survived == 1) & (data.Age >= 50)]
print(df_filtered)
```

```
     PassengerId  Survived  Pclass  ...    Cabin Embarked  deck
11            12         1       1  ...     C103        S     C
195          196         1       1  ...      B80        C     B
268          269         1       1  ...     C125        S     C
275          276         1       1  ...       D7        S     D
299          300         1       1  ...  B58 B60        C     B
366          367         1       1  ...      D37        C     D
449          450         1       1  ...     C104        S     C
496          497         1       1  ...      D20        C     D
571          572         1       1  ...     C101        S     C
587          588         1       1  ...      B41        C     B
591          592         1       1  ...      D20        C     D
630          631         1       1  ...      A23        S     A
647          648         1       1  ...      A26        C     A
765          766         1       1  ...      D11        S     D
820          821         1       1  ...      B69        S     B
857          858         1       1  ...      E17        S     E
879          880         1       1  ...      C50        C     C

[17 rows x 13 columns]
```

list of passenger who survived with an age less than 50

```
df_men = df[(data.Survived  == 1) & (data.Age >= 50) & (data.Sex == 'male')] #contains mer
print(df_men) # 5 Men survived with an age less than 50
df_female = df[(data.Survived == 1) & (data.Age >= 50) & (data.Sex == 'female')] #contains
print(df_female) # 12 female survived with an age less than 50
```

```
     PassengerId  Survived  Pclass  ... Cabin Embarked  deck
449          450         1       1  ...  C104        S     C
587          588         1       1  ...   B41        C     B
630          631         1       1  ...   A23        S     A
647          648         1       1  ...   A26        C     A
857          858         1       1  ...   E17        S     E

[5 rows x 13 columns]
     PassengerId  Survived  Pclass  ...    Cabin Embarked  deck
11            12         1       1  ...     C103        S     C
195          196         1       1  ...      B80        C     B
268          269         1       1  ...     C125        S     C
275          276         1       1  ...       D7        S     D
299          300         1       1  ...  B58 B60        C     B
366          367         1       1  ...      D37        C     D
496          497         1       1  ...      D20        C     D
```

```
571          572         1       1  ...     C101         S     C
591          592         1       1  ...      D20         C     D
765          766         1       1  ...      D11         S     D
820          821         1       1  ...      B69         S     B
879          880         1       1  ...      C50         C     C

[12 rows x 13 columns]
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning:

Boolean Series key will be reindexed to match DataFrame index.

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:3: UserWarning:

Boolean Series key will be reindexed to match DataFrame index.
```

```
frames = [df_men, df_female] #concatenating the two final data

#concatenate dataframes
df_new = pd.concat(frames, sort=False)
```

```
df_new
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket
449	450	1	1	Peuchen, Major. Arthur Godfrey	male	52.0	0	0	113786
587	588	1	1	Frolicher-Stehli, Mr. Maxmillian	male	60.0	1	1	13567
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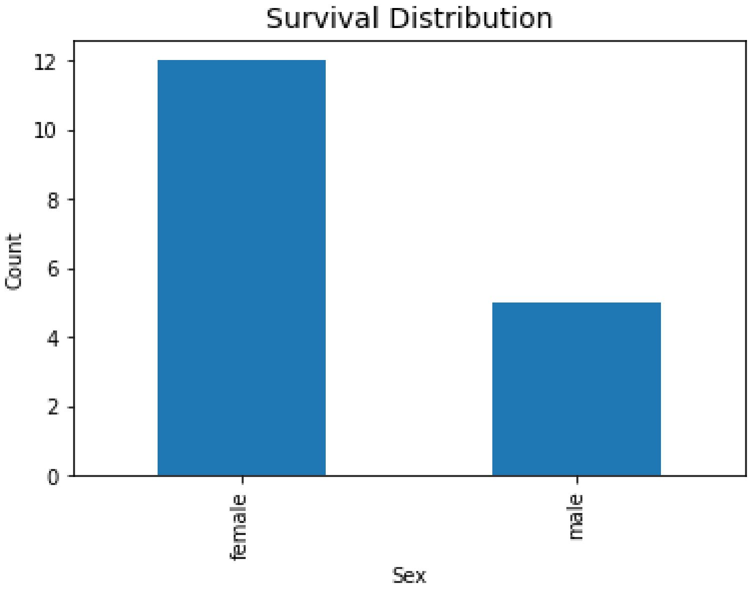
11	12	1	1	Bonnell, Miss. Elizabeth	female	58.0	0	0	113783
195	196	1	1	Lurette, Miss. Elise	female	58.0	0	0	PC 17569
268	269	1	1	Graham, Mrs. William Thompson (Edith Junkins)	female	58.0	0	1	PC 17582
275	276	1	1	Andrews, Miss. Kornelia	female	63.0	1	0	13502

```
# Survival Distribution VS Sex plot
```

```
df_new.groupby(['Sex']).size().plot(kind='bar',stacked=True)
plt.title("Survival Distribution",fontsize=14)
plt.ylabel('Count')
plt.xlabel('Sex');
```



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