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21BCE7334 (VIT-AP)

import libraries

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

load dataset

In [2]:
```
dataset=pd.read_csv("Titanic-Dataset.csv")
dataset
```

Out[2]:

	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
...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0000	NaN	S
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0000	B42	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4500	NaN	S
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0000	C148	C
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7500	NaN	Q

891 rows × 12 columns

In [3]:
```
dataset.head()
```

Out[3]:

	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 [4]:
```
dataset.shape
```

Out[4]:
```
(891, 12)
```

In [5]:
```
dataset.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
```

In [6]:
```
dataset.describe()
```

Out[6]:

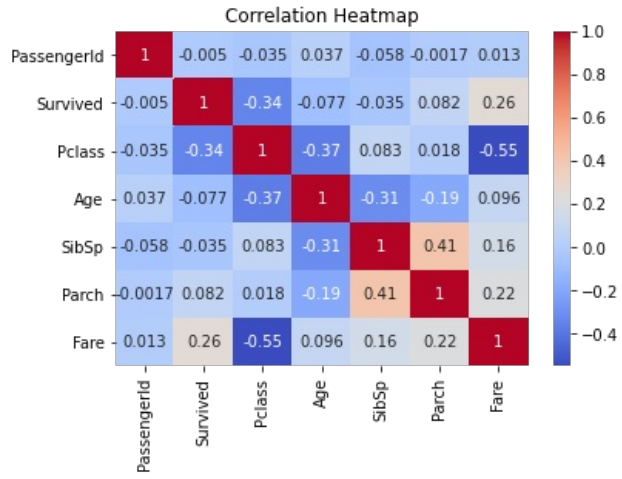
	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

In [7]:
```
corr=dataset.corr()
corr
```

Out[7]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
PassengerId	1.000000	-0.005007	-0.035144	0.036847	-0.057527	-0.001652	0.012658
Survived	-0.005007	1.000000	-0.338481	-0.077221	-0.035322	0.081629	0.257307
Pclass	-0.035144	-0.338481	1.000000	-0.369226	0.083081	0.018443	-0.549500
Age	0.036847	-0.077221	-0.369226	1.000000	-0.308247	-0.189119	0.096067
SibSp	-0.057527	-0.035322	0.083081	-0.308247	1.000000	0.414838	0.159651
Parch	-0.001652	0.081629	0.018443	-0.189119	0.414838	1.000000	0.216225
Fare	0.012658	0.257307	-0.549500	0.096067	0.159651	0.216225	1.000000

In [8]:
```
corr_matrix = dataset.corr()
sns.heatmap(corr_matrix, annot=True,cmap='coolwarm')
plt.title('Correlation Heatmap')
plt.show()
```



In [9]:
```
dataset.Survived.value_counts()
```

Out[9]:
```
0    549
1    342
Name: Survived, dtype: int64
```

handling null values

In [10]:
```
dataset.isnull().any()
```

Out[10]:
```
PassengerId    False
Survived       False
Pclass         False
Name           False
Sex            False
Age             True
SibSp          False
Parch          False
Ticket         False
Fare           False
Cabin           True
Embarked        True
dtype: bool
```

In [11]:
```
dataset.isnull().sum()
```

Out[11]:
```
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
```

Null values are present is age, cabin and in embarked that we have to handle.

In [12]:
```
#median method
dataset['Age'].fillna(dataset['Age'].median(), inplace=True)
```

In [13]:
```
#imputing data
dataset['Cabin'].fillna('Unknown', inplace=True)
```

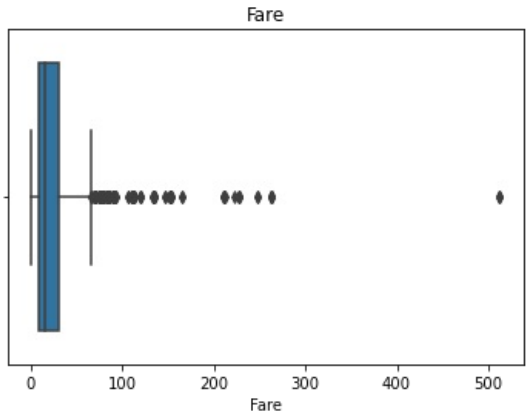
In [14]:
```
#mode method
dataset['Embarked'].fillna(dataset['Embarked'].mode()[0], inplace=True)
```

In [15]:
```
dataset.isnull().sum()    # null values are handled successfully
```

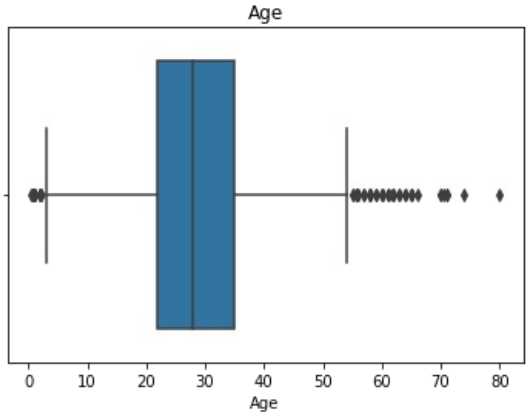
Out[15]:
```
PassengerId    0
Survived       0
Pclass         0
Name           0
Sex            0
Age            0
SibSp          0
Parch          0
Ticket         0
Fare           0
Cabin          0
Embarked       0
dtype: int64
```

outlier detection and handling

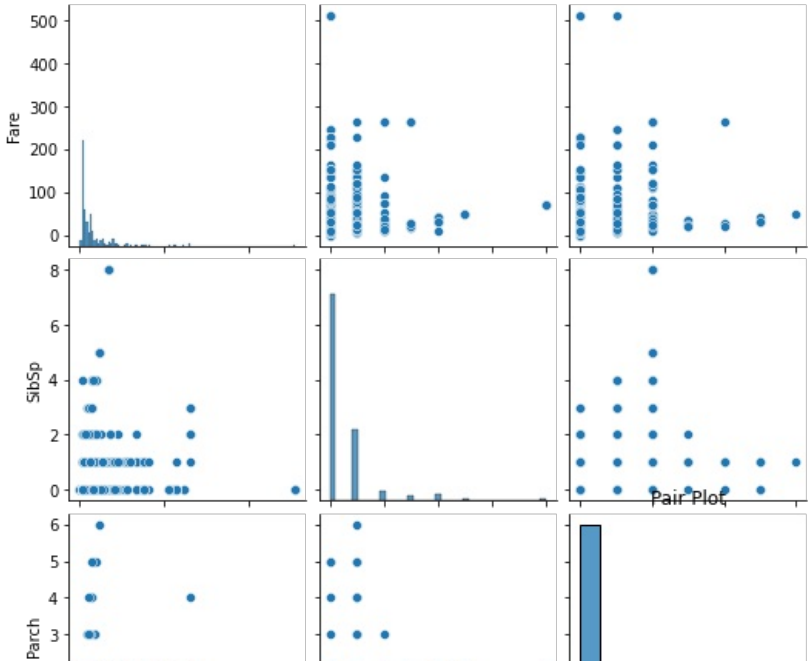
In [16]:
```
sns.boxplot(data=dataset, x='Fare')
plt.title("Fare")
plt.show()
```

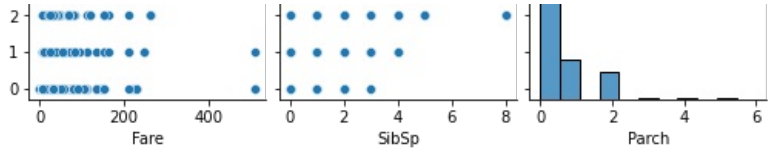


In [17]:
```
sns.boxplot(data=dataset, x='Age')
plt.title("Age")
plt.show()
```



In [18]:
```
#Pair plot for selected numerical columns
sns.pairplot(data=dataset[['Fare', 'SibSp', 'Parch']])
plt.title('Pair Plot')
plt.show()
```





In [19]:
```
from scipy import stats
```

In [20]:
```
z_scores = np.abs(stats.zscore(dataset['Age']))
max_threshold=3
outliers = dataset['Age'][z_scores > max_threshold]

# Print and visualize the outliers
print("Outliers detected using Z-Score:")
print(outliers)
```

```
Outliers detected using Z-Score:
96     71.0
116    70.5
493    71.0
630    80.0
672    70.0
745    70.0
851    74.0
Name: Age, dtype: float64
```

In [21]:
```
z_scores = np.abs(stats.zscore(dataset['Fare']))
max_threshold=3
outliers = dataset['Fare'][z_scores > max_threshold]

# Print and visualize the outliers
print("Outliers detected using Z-Score:")
print(outliers)
```

```
Outliers detected using Z-Score:
27     263.0000
88     263.0000
118    247.5208
258    512.3292
299    247.5208
311    262.3750
341    263.0000
377    211.5000
380    227.5250
438    263.0000
527    221.7792
557    227.5250
679    512.3292
689    211.3375
700    227.5250
716    227.5250
730    211.3375
737    512.3292
742    262.3750
779    211.3375
Name: Fare, dtype: float64
```

Seperate dependent and independent variables

In [22]:
```
x=dataset.iloc[:,2:13]
y = dataset['Survived']
```

In [23]:
```
x.head()
```

Out[23]:

	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	Unknown	S
1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	Unknown	S

3	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	Unknown	S

In [24]:
```
y.head()
```

Out[24]:
```
0    0
1    1
2    1
3    1
4    0
Name: Survived, dtype: int64
```

In [25]:
```
type(x)
```

Out[25]:
```
pandas.core.frame.DataFrame
```

In [26]:
```
type(y)
```

Out[26]:
```
pandas.core.series.Series
```

encoding

In [27]:
```
from sklearn.preprocessing import LabelEncoder
```

In [28]:
```
le=LabelEncoder()
```

In [29]:
```
x['Sex'] = le.fit_transform(x['Sex'])
```

In [30]:
```
x['Sex']
```

Out[30]:
```
0      1
1      0
2      0
3      0
4      1
      ..
886    1
887    0
888    0
889    1
890    1
Name: Sex, Length: 891, dtype: int32
```

In [31]:
```
x["Sex"].value_counts()
```

Out[31]:
```
1    577
0    314
Name: Sex, dtype: int64
```

In [32]:
```
x["Sex"].nunique()
```

Out[32]:
```
2
```

In [33]:
```
x.head()
```

Out[33]:

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

one hot encoding

In [34]:
```
print(x.columns)
```

```
Index(['Pclass', 'Name', 'Sex', 'Age', 'SibSp', 'Parch', 'Ticket', 'Fare',
       'Cabin', 'Embarked'],
      dtype='object')
```

In [35]:
```
x.head()
```

Out[35]:

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

In [36]:
```
x.shape
```

Out[36]:
```
(891, 10)
```

In [37]:
```
Embarked=pd.get_dummies(x["Embarked"])
```

In [38]:
```
Embarked
```

Out[38]:

	C	Q	S
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

891 rows × 3 columns

In [39]:
```
#concat
x=pd.concat([x,Embarked],axis=1)
```

In [40]:
```
x.head()
```

Out[40]:

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

In [41]:
```
#dropping Embarked  column
x.drop(["Embarked"],axis=1,inplace=True)
```

In [42]:
```
x.head(10)
```

Out[42]:

	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	C	Q	S
0	3	Braund, Mr. Owen Harris	1	22.0	1	0	A/5 21171	7.2500	Unknown	0	0	1
1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	0	38.0	1	0	PC 17599	71.2833	C85	1	0	0
2	3	Heikkinen, Miss. Laina	0	26.0	0	0	STON/O2. 3101282	7.9250	Unknown	0	0	1
3	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	0	35.0	1	0	113803	53.1000	C123	0	0	1
4	3	Allen, Mr. William Henry	1	35.0	0	0	373450	8.0500	Unknown	0	0	1
5	3	Moran, Mr. James	1	28.0	0	0	330877	8.4583	Unknown	0	1	0
6	1	McCarthy, Mr. Timothy J	1	54.0	0	0	17463	51.8625	E46	0	0	1
7	3	Palsson, Master. Gosta Leonard	1	2.0	3	1	349909	21.0750	Unknown	0	0	1
8	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	0	27.0	0	2	347742	11.1333	Unknown	0	0	1
9	2	Nasser, Mrs. Nicholas (Adele Achem)	0	14.0	1	0	237736	30.0708	Unknown	1	0	0

In [43]:
```
x.shape
```

Out[43]:
```
(891, 12)
```

splitting into training and testing set

In [44]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3,random_state=0)
```

In [45]:
```
x_train.shape,x_test.shape,y_train.shape,y_test.shape
```

Out[45]:
```
((623, 12), (268, 12), (623,), (268,))
```

In [46]:
```
x_train
```

Out[46]:

	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	C	Q	S
857	1	Daly, Mr. Peter Denis	1	51.0	0	0	113055	26.5500	E17	0	0	1
52	1	Harper, Mrs. Henry Sleeper (Myna Haxtun)	0	49.0	1	0	PC 17572	76.7292	D33	1	0	0
386	3	Goodwin, Master. Sidney Leonard	1	1.0	5	2	CA 2144	46.9000	Unknown	0	0	1
124	1	White, Mr. Percival Wayland	1	54.0	0	1	35281	77.2875	D26	0	0	1
578	3	Caram, Mrs. Joseph (Maria Elias)	0	28.0	1	0	2689	14.4583	Unknown	1	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
835	1	Compton, Miss. Sara Rebecca	0	39.0	1	1	PC 17756	83.1583	E49	1	0	0
192	3	Andersen-Jensen, Miss. Carla Christine Nielsine	0	19.0	1	0	350046	7.8542	Unknown	0	0	1
629	3	O'Connell, Mr. Patrick D	1	28.0	0	0	334912	7.7333	Unknown	0	1	0
559	3	de Messemaeker, Mrs. Guillaume Joseph (Emma)	0	36.0	1	0	345572	17.4000	Unknown	0	0	1

684	2	Brown, Mr. Thomas William Solomon	1	60.0	1	1	29750	39.0000	Unknown	0	0	1

623 rows × 12 columns

In [47]:
```
x_test
```

Out[47]:

	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	C	Q	S
495	3	Youseff, Mr. Gerious	1	28.0	0	0	2627	14.4583	Unknown	1	0	0
648	3	Willey, Mr. Edward	1	28.0	0	0	S.O./P.P. 751	7.5500	Unknown	0	0	1
278	3	Rice, Master. Eric	1	7.0	4	1	382652	29.1250	Unknown	0	1	0
31	1	Spencer, Mrs. William Augustus (Marie Eugenie)	0	28.0	1	0	PC 17569	146.5208	B78	1	0	0
255	3	Touma, Mrs. Darwis (Hanne Youssef Razi)	0	29.0	0	2	2650	15.2458	Unknown	1	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...
263	1	Harrison, Mr. William	1	40.0	0	0	112059	0.0000	B94	0	0	1
718	3	McEvoy, Mr. Michael	1	28.0	0	0	36568	15.5000	Unknown	0	1	0
620	3	Yasbeck, Mr. Antoni	1	27.0	1	0	2659	14.4542	Unknown	1	0	0
786	3	Sjoblom, Miss. Anna Sofia	0	18.0	0	0	3101265	7.4958	Unknown	0	0	1
64	1	Stewart, Mr. Albert A	1	28.0	0	0	PC 17605	27.7208	Unknown	1	0	0

268 rows × 12 columns

In [48]:
```
y_train
```

Out[48]:
```
857    1
52     1
386    0
124    0
578    0
      ..
835    1
192    1
629    0
559    1
684    0
Name: Survived, Length: 623, dtype: int64
```

In [49]:
```
y_test
```

Out[49]:
```
495    0
648    0
278    0
31     1
255    1
      ..
263    0
718    0
620    0
786    1
64     0
Name: Survived, Length: 268, dtype: int64
```

feature scaling

In [55]:
```
from sklearn.preprocessing import StandardScaler
```

In [56]:
```
scale = StandardScaler()
x[['Age', 'Fare']] = scale.fit_transform(x[['Age', 'Fare']])
```

In [58]:
```
x.head()
```

Out[58]:

	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	C	Q	S
0	3	Braund, Mr. Owen Harris	1	-0.565736	1	0	A/5 21171	-0.502445	Unknown	0	0	1
1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	0	0.663861	1	0	PC 17599	0.786845	C85	1	0	0
2	3	Heikkinen, Miss. Laina	0	-0.258337	0	0	STON/O2. 3101282	-0.488854	Unknown	0	0	1
3	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	0	0.433312	1	0	113803	0.420730	C123	0	0	1
4	3	Allen, Mr. William Henry	1	0.433312	0	0	373450	-0.486337	Unknown	0	0	1

In [ ]: