Credentials

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Task

Perform Data preprocessing on Titanic dataset 1.Data Collection. Please download the dataset from https://www.kaggle.com/datasets/yasserh/titanic-dataset 2.Data Preprocessing o Import the Libraries. o Importing the dataset. o Checking for Null Values. o Data Visualization. o Outlier Detection o Splitting Dependent and Independent variables o Perform Encoding o Feature Scaling. o Splitting Data into Train and Test

Importing necessary libraries

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

Importing 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]:
```
#Viewing dataset information
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
```

Checking and handling null values

In [4]:
```
#Checking for null values
dataset.isnull().sum()
```

Out[4]:
```
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 [5]:
```
#Handling null values
dataset["Age"].fillna(dataset["Age"].mean(),inplace=True)
```

In [6]:
```
dataset["Cabin"].fillna(dataset["Cabin"].mode().iloc[0],inplace=True)
```

In [7]:
```
dataset["Embarked"].fillna(dataset["Embarked"].mode().iloc[0],inplace=True)
```

Data visualization

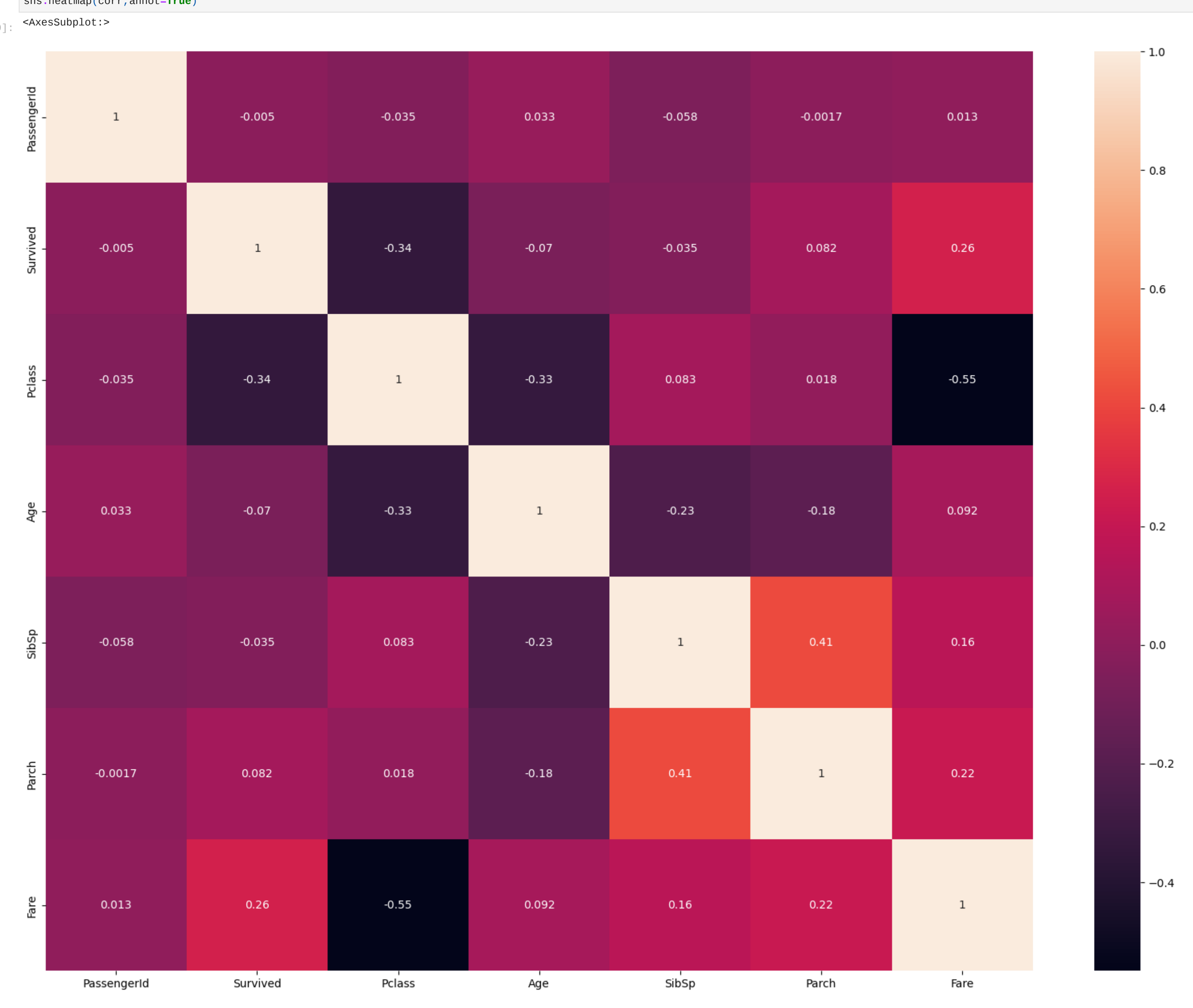
In [8]:
```
#Caluclating correlation
corr=dataset.corr()
corr
```

Out[8]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
PassengerId	1.000000	-0.005007	-0.035144	0.033207	-0.057527	-0.001652	0.012658
Survived	-0.005007	1.000000	-0.338481	-0.069809	-0.035322	0.081629	0.257307
Pclass	-0.035144	-0.338481	1.000000	-0.331339	0.083081	0.018443	-0.549500
Age	0.033207	-0.069809	-0.331339	1.000000	-0.232625	-0.179191	0.091566
SibSp	-0.057527	-0.035322	0.083081	-0.232625	1.000000	0.414838	0.159651
Parch	-0.001652	0.081629	0.018443	-0.179191	0.414838	1.000000	0.216225
Fare	0.012658	0.257307	-0.549500	0.091566	0.159651	0.216225	1.000000

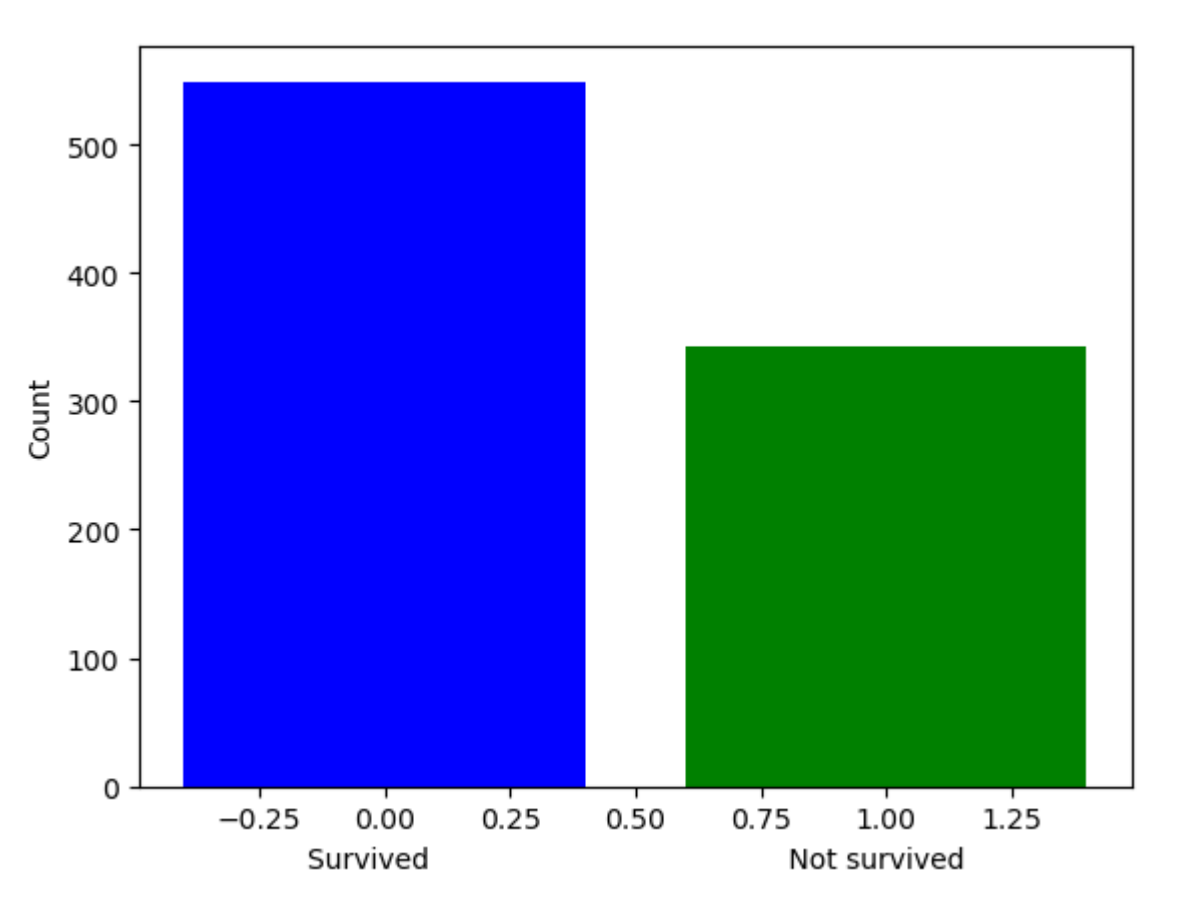
In [9]:
```
#Plotting the correlation heatmap
plt.subplots(figsize=(20,15))
sns.heatmap(corr,annot=True)
```

Out[9]: <AxesSubplot:>



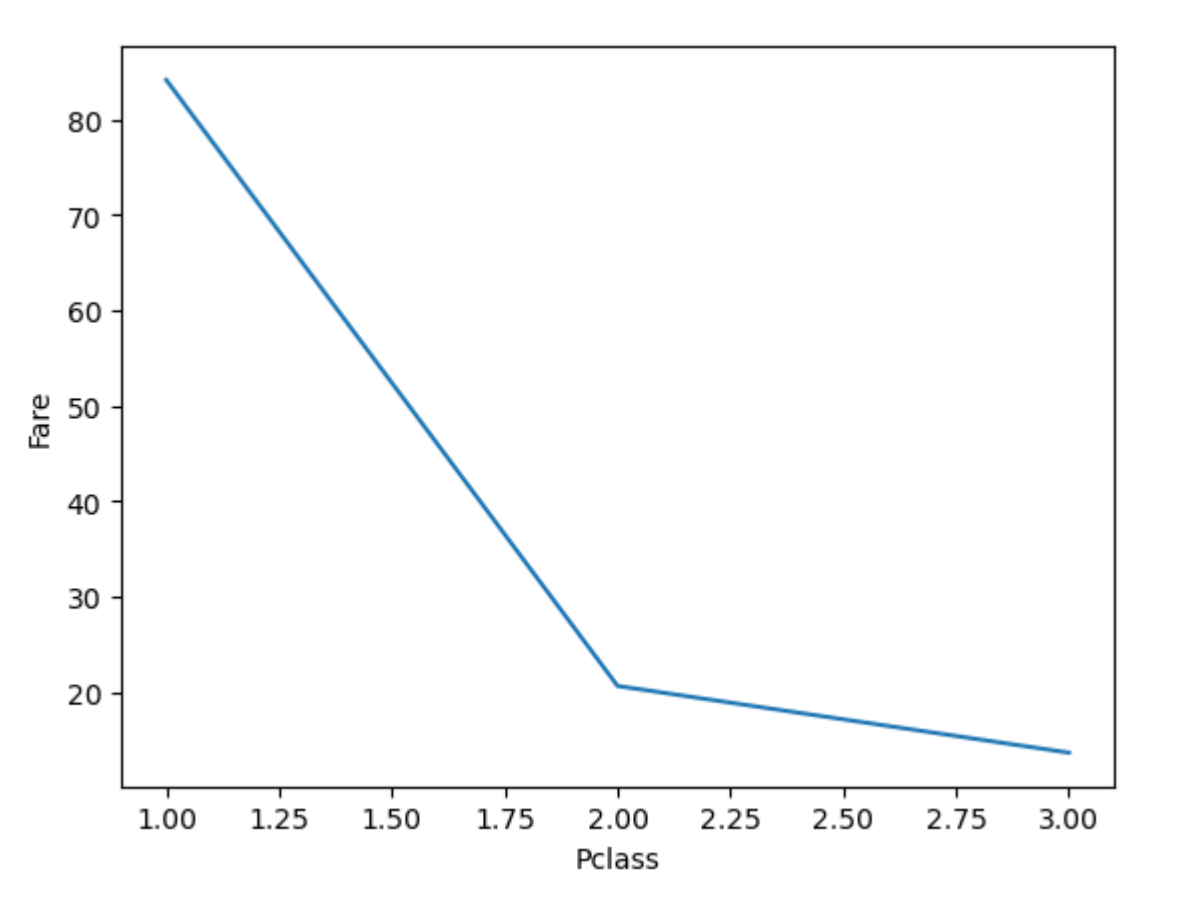
In [10]:
```
#PLotting bar graph representing the number of survivers vs non survivers
value_counts = dataset['Survived'].value_counts()
bar_colors = ['blue', 'green']
plt.bar(value_counts.index, value_counts.values,color=bar_colors)
plt.xlabel('Survived                                        Not survived')
plt.ylabel('Count')
```

Out[10]: Text(0, 0.5, 'Count')



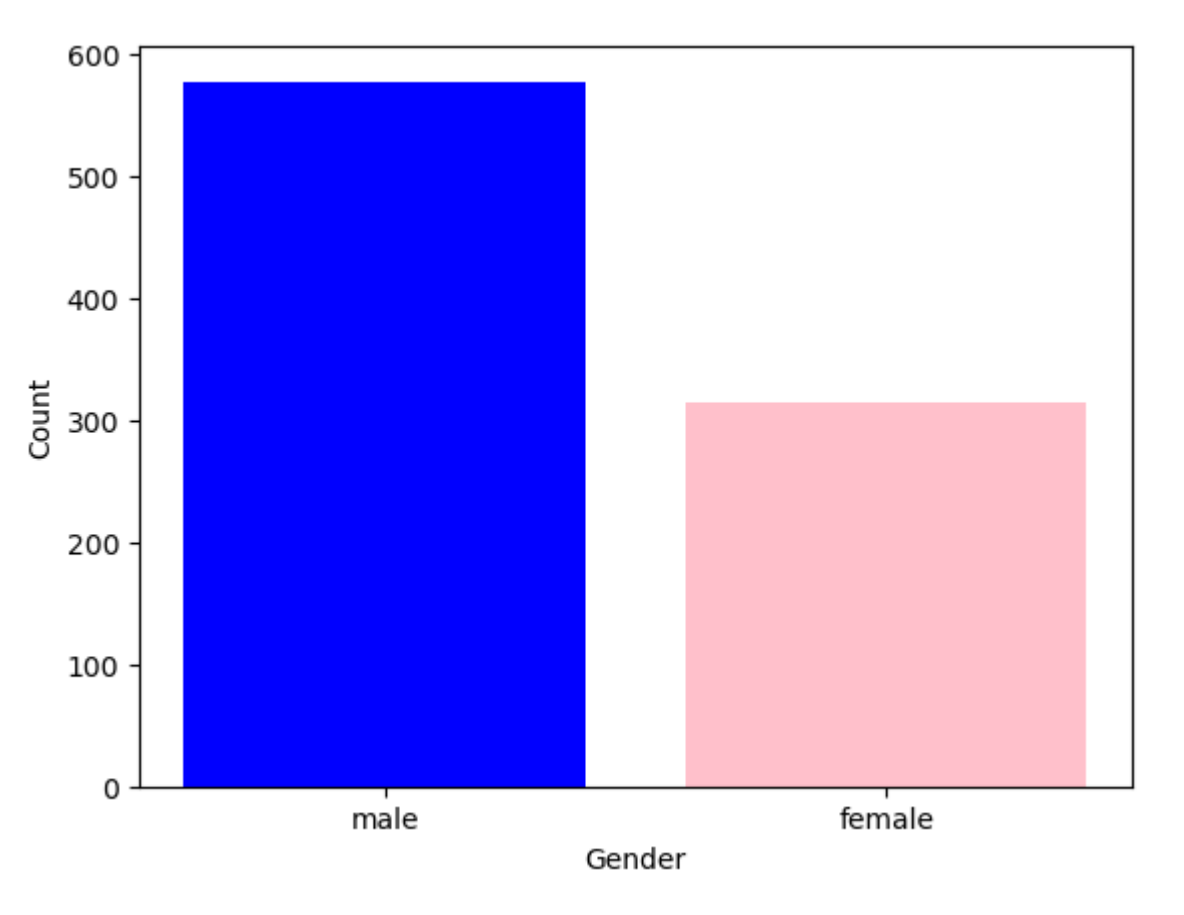
In [11]:
```
#Plotting a line graph denoting the relation between fare and passenger class
sns.lineplot(x="Pclass",y="Fare",data=dataset,ci=None)
```

Out[11]: <AxesSubplot:xlabel='Pclass', ylabel='Fare'>



In [12]:
```
#Plotting bar graph representing the number of male and female passengers
value_counts = dataset['Sex'].value_counts()
bar_colors = ['blue', 'pink']
plt.bar(value_counts.index, value_counts.values,color=bar_colors)
plt.xlabel('Gender')
plt.ylabel('Count')
```

Out[12]: Text(0, 0.5, 'Count')



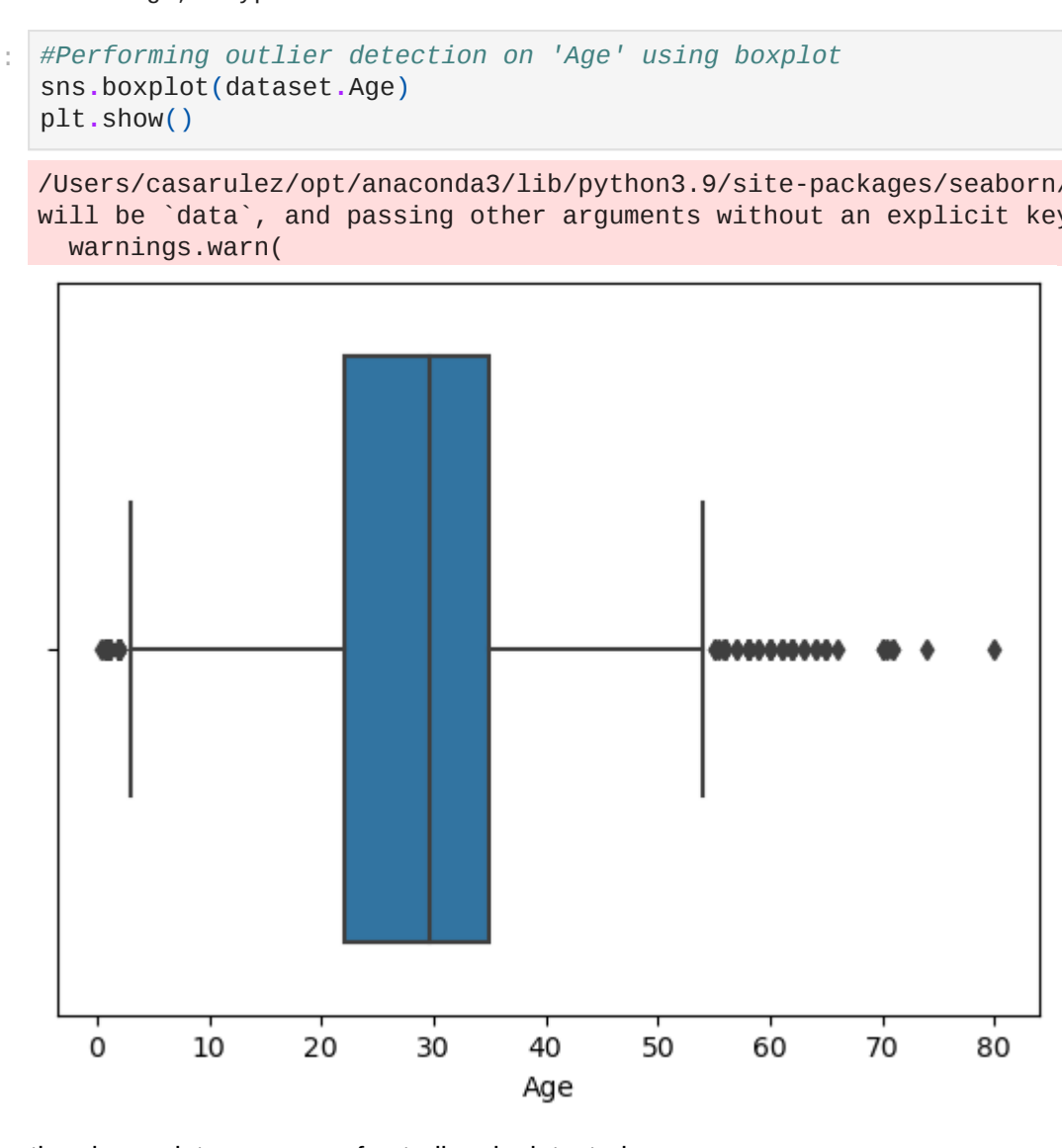
Outlier detection and treatment

In [13]:
```
dataset['Age'].describe()
```

Out[13]:
```
count    891.000000
mean      29.699118
std       13.002015
min        0.420000
25%       22.000000
50%       29.699118
75%       35.000000
max       80.000000
Name: Age, dtype: float64
```

In [14]:
```
#Performing outlier detection on 'Age' using boxplot
sns.boxplot(dataset.Age)
plt.show()
```

```
/Users/casarulez/opt/anaconda3/lib/python3.9/site-packages/seaborn/_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```



Clearly, from the above plot, presence of outerliers is detected.

Encoding

In [15]:
```
#Importing preprocessing
from sklearn import preprocessing
```

In [16]:
```
le = preprocessing.LabelEncoder()
```

In [17]:
```
#Encoding Sex
dataset["Sex"]=le.fit_transform(dataset["Sex"])
dataset
```

Out[17]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	1	22.000000	1	0	A/5 21171	7.2500	B96 B98	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	0	38.000000	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	0	26.000000	0	0	STON/O2. 3101282	7.9250	B96 B98	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	0	35.000000	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	1	35.000000	0	0	373450	8.0500	B96 B98	S
...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	1	27.000000	0	0	211536	13.0000	B96 B98	S
887	888	1	1	Graham, Miss. Margaret Edith	0	19.000000	0	0	112053	30.0000	B42	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	0	29.699118	1	2	W./C. 6607	23.4500	B96 B98	S
889	890	1	1	Behr, Mr. Karl Howell	1	26.000000	0	0	111369	30.0000	C148	C
890	891	0	3	Dooley, Mr. Patrick	1	32.000000	0	0	370376	7.7500	B96 B98	Q

891 rows × 12 columns

In [18]:
```
#Encoding Name
dataset['Title'] = dataset['Name'].str.extract(' ([A-Za-z]+)\.')
```

In [19]:
```
# Map titles to numerical values
title_mapping = {
    'Mr': 0,
    'Miss': 1,
    'Mrs': 2,
    'Master': 3,
    'Dr': 4,
    'Rev': 5,
    'Mlle': 6,
    'Major': 7,
    'Col': 7,
    'Lady': 7,
    'Sir': 7,
    'Countess': 7,
    'Mme': 6,
    'Ms': 1,
    'Jonkheer': 7,
    'Don': 7,
    'Dona': 7
}
dataset['Title'] = dataset['Title'].map(title_mapping)
```

In [20]:
```
dataset
```

Out[20]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked	Title
0	1	0	3	Braund, Mr. Owen Harris	1	22.000000	1	0	A/5 21171	7.2500	B96 B98	S	0.0
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	0	38.000000	1	0	PC 17599	71.2833	C85	C	2.0
2	3	1	3	Heikkinen, Miss. Laina	0	26.000000	0	0	STON/O2. 3101282	7.9250	B96 B98	S	1.0
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	0	35.000000	1	0	113803	53.1000	C123	S	2.0
4	5	0	3	Allen, Mr. William Henry	1	35.000000	0	0	373450	8.0500	B96 B98	S	0.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	1	27.000000	0	0	211536	13.0000	B96 B98	S	5.0
887	888	1	1	Graham, Miss. Margaret Edith	0	19.000000	0	0	112053	30.0000	B42	S	1.0
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	0	29.699118	1	2	W./C. 6607	23.4500	B96 B98	S	1.0
889	890	1	1	Behr, Mr. Karl Howell	1	26.000000	0	0	111369	30.0000	C148	C	0.0
890	891	0	3	Dooley, Mr. Patrick	1	32.000000	0	0	370376	7.7500	B96 B98	Q	0.0

891 rows × 13 columns

In [21]:
```
#Dropping name as it has been encoded
dataset=dataset.drop('Name', axis=1)
dataset
```

Out[21]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked	Title
0	1	0	3	1	22.000000	1	0	A/5 21171	7.2500	B96 B98	S	0.0
1	2	1	1	0	38.000000	1	0	PC 17599	71.2833	C85	C	2.0
2	3	1	3	0	26.000000	0	0	STON/O2. 3101282	7.9250	B96 B98	S	1.0
3	4	1	1	0	35.000000	1	0	113803	53.1000	C123	S	2.0
4	5	0	3	1	35.000000	0	0	373450	8.0500	B96 B98	S	0.0
...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	1	27.000000	0	0	211536	13.0000	B96 B98	S	5.0
887	888	1	1	0	19.000000	0	0	112053	30.0000	B42	S	1.0
888	889	0	3	0	29.699118	1	2	W./C. 6607	23.4500	B96 B98	S	1.0
889	890	1	1	1	26.000000	0	0	111369	30.0000	C148	C	0.0
890	891	0	3	1	32.000000	0	0	370376	7.7500	B96 B98	Q	0.0

891 rows × 12 columns

In [22]:
```
#Encoding cabin
dataset['Cabin_Deck'] = dataset['Cabin'].str.extract('([A-Za-z])')
```

In [23]:
```
dataset = pd.get_dummies(dataset, columns=['Cabin_Deck'], prefix='Cabin')
```

In [24]:
```
dataset
```

Out[24]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked	Title	Cabin_A	Cabin_B	Cabin_C	Cabin_D	Cabin_E	Cabin_F	Cabin_G	Cabin_T
0	1	0	3	1	22.000000	1	0	A/5 21171	7.2500	B96 B98	S	0.0	0	1	0	0	0	0	0	0
1	2	1	1	0	38.000000	1	0	PC 17599	71.2833	C85	C	2.0	0	0	1	0	0	0	0	0
2	3	1	3	0	26.000000	0	0	STON/O2. 3101282	7.9250	B96 B98	S	1.0	0	1	0	0	0	0	0	0
3	4	1	1	0	35.000000	1	0	113803	53.1000	C123	S	2.0	0	0	1	0	0	0	0	0
4	5	0	3	1	35.000000	0	0	373450	8.0500	B96 B98	S	0.0	0	1	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	1	27.000000	0	0	211536	13.0000	B96 B98	S	5.0	0	1	0	0	0	0	0	0
887	888	1	1	0	19.000000	0	0	112053	30.0000	B42	S	1.0	0	1	0	0	0	0	0	0
888	889	0	3	0	29.699118	1	2	W./C. 6607	23.4500	B96 B98	S	1.0	0	1	0	0	0	0	0	0
889	890	1	1	1	26.000000	0	0	111369	30.0000	C148	C	0.0	0	0	1	0	0	0	0	0
890	891	0	3	1	32.000000	0	0	370376	7.7500	B96 B98	Q	0.0	0	1	0	0	0	0	0	0

891 rows × 20 columns

In [26]:
```
#Dropping cabin as it has been encoded
dataset=dataset.drop('Cabin', axis=1)
dataset
```

Out[26]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Ticket	Fare	Embarked	Title	Cabin_A	Cabin_B	Cabin_C	Cabin_D	Cabin_E	Cabin_F	Cabin_G	Cabin_T
0	1	0	3	1	22.000000	1	0	A/5 21171	7.2500	S	0.0	0	1	0	0	0	0	0	0
1	2	1	1	0	38.000000	1	0	PC 17599	71.2833	C	2.0	0	0	1	0	0	0	0	0
2	3	1	3	0	26.000000	0	0	STON/O2. 3101282	7.9250	S	1.0	0	1	0	0	0	0	0	0
3	4	1	1	0	35.000000	1	0	113803	53.1000	S	2.0	0	0	1	0	0	0	0	0
4	5	0	3	1	35.000000	0	0	373450	8.0500	S	0.0	0	1	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	1	27.000000	0	0	211536	13.0000	S	5.0	0	1	0	0	0	0	0	0
887	888	1	1	0	19.000000	0	0	112053	30.0000	S	1.0	0	1	0	0	0	0	0	0
888	889	0	3	0	29.699118	1	2	W./C. 6607	23.4500	S	1.0	0	1	0	0	0	0	0	0
889	890	1	1	1	26.000000	0	0	111369	30.0000	C	0.0	0	0	1	0	0	0	0	0
890	891	0	3	1	32.000000	0	0	370376	7.7500	Q	0.0	0	1	0	0	0	0	0	0

891 rows × 19 columns

In [28]:
```
#Encoding embarked
dataset["Embarked"]=le.fit_transform(dataset["Embarked"])
dataset
```

Out[28]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Ticket	Fare	Embarked	Title	Cabin_A	Cabin_B	Cabin_C	Cabin_D	Cabin_E	Cabin_F	Cabin_G	Cabin_T
0	1	0	3	1	22.000000	1	0	A/5 21171	7.2500	2	0.0	0	1	0	0	0	0	0	0
1	2	1	1	0	38.000000	1	0	PC 17599	71.2833	0	2.0	0	0	1	0	0	0	0	0
2	3	1	3	0	26.000000	0	0	STON/O2. 3101282	7.9250	2	1.0	0	1	0	0	0	0	0	0
3	4	1	1	0	35.000000	1	0	113803	53.1000	2	2.0	0	0	1	0	0	0	0	0
4	5	0	3	1	35.000000	0	0	373450	8.0500	2	0.0	0	1	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	1	27.000000	0	0	211536	13.0000	2	5.0	0	1	0	0	0	0	0	0
887	888	1	1	0	19.000000	0	0	112053	30.0000	2	1.0	0	1	0	0	0	0	0	0
888	889	0	3	0	29.699118	1	2	W./C. 6607	23.4500	2	1.0	0	1	0	0	0	0	0	0
889	890	1	1	1	26.000000	0	0	111369	30.0000	0	0.0	0	0	1	0	0	0	0	0
890	891	0	3	1	32.000000	0	0	370376	7.7500	1	0.0	0	1	0	0	0	0	0	0

891 rows × 19 columns

In [29]:
```
#Dropping Ticket variable as it does not matter to the model
dataset=dataset.drop('Ticket',axis=1)
dataset
```

Out[29]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked	Title	Cabin_A	Cabin_B	Cabin_C	Cabin_D	Cabin_E	Cabin_F	Cabin_G	Cabin_T
0	1	0	3	1	22.000000	1	0	7.2500	2	0.0	0	1	0	0	0	0	0	0
1	2	1	1	0	38.000000	1	0	71.2833	0	2.0	0	0	1	0	0	0	0	0
2	3	1	3	0	26.000000	0	0	7.9250	2	1.0	0	1	0	0	0	0	0	0
3	4	1	1	0	35.000000	1	0	53.1000	2	2.0	0	0	1	0	0	0	0	0
4	5	0	3	1	35.000000	0	0	8.0500	2	0.0	0	1	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	1	27.000000	0	0	13.0000	2	5.0	0	1	0	0	0	0	0	0
887	888	1	1	0	19.000000	0	0	30.0000	2	1.0	0	1	0	0	0	0	0	0
888	889	0	3	0	29.699118	1	2	23.4500	2	1.0	0	1	0	0	0	0	0	0
889	890	1	1	1	26.000000	0	0	30.0000	0	0.0	0	0	1	0	0	0	0	0
890	891	0	3	1	32.000000	0	0	7.7500	1	0.0	0	1	0	0	0	0	0	0

891 rows × 18 columns

Sperating dependent and independent variables

In [30]:
```
#Seperating dependent variables
x=dataset['Survived']
x
```

Out[30]:
```
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 [31]:
```
#Seperting independent variables
y=dataset.drop('Survived',axis=1)
y
```

Out[31]:

	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked	Title	Cabin_A	Cabin_B	Cabin_C	Cabin_D	Cabin_E	Cabin_F	Cabin_G	Cabin_T
0	1	3	1	22.000000	1	0	7.2500	2	0.0	0	1	0	0	0	0	0	0
1	2	1	0	38.000000	1	0	71.2833	0	2.0	0	0	1	0	0	0	0	0
2	3	3	0	26.000000	0	0	7.9250	2	1.0	0	1	0	0	0	0	0	0
3	4	1	0	35.000000	1	0	53.1000	2	2.0	0	0	1	0	0	0	0	0
4	5	3	1	35.000000	0	0	8.0500	2	0.0	0	1	0	0	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	2	1	27.000000	0	0	13.0000	2	5.0	0	1	0	0	0	0	0	0
887	888	1	0	19.000000	0	0	30.0000	2	1.0	0	1	0	0	0	0	0	0
888	889	3	0	29.699118	1	2	23.4500	2	1.0	0	1	0	0	0	0	0	0
889	890	1	1	26.000000	0	0	30.0000	0	0.0	0	0	1	0	0	0	0	0
890	891	3	1	32.000000	0	0	7.7500	1	0.0	0	1	0	0	0	0	0	0

891 rows × 17 columns

splitting into training and testing set

In [32]:
```
from sklearn.model_selection import train_test_split
```

In [35]:
```
#Defining training and testing variables
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3,random_state=0)
```

In [34]:
```
#Checking shape of training and testing variables
x_train.shape,x_test.shape,y_train.shape,y_test.shape
```

Out[34]: ((623,), (268,), (623, 17), (268, 17))

Feature scaling

In [37]:
```
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
```

In [42]:
```
#Transforming training variables to a standard scale
y_train=sc.fit_transform(y_train)
y_train
```

Out[42]:
```
array([[ 1.59014094, -1.5325562 ,  0.72592065, ..., -0.12107015,
        -0.05675044, -0.04009635],
       [-1.52952238, -1.5325562 , -1.37756104, ..., -0.12107015,
        -0.05675044, -0.04009635],
       [-0.23515275,  0.84844757,  0.72592065, ..., -0.12107015,
        -0.05675044, -0.04009635],
       ...,
       [ 0.70655928,  0.84844757,  0.72592065, ..., -0.12107015,
        -0.05675044, -0.04009635],
       [ 0.43528421,  0.84844757, -1.37756104, ..., -0.12107015,
        -0.05675044, -0.04009635],
       [ 0.91970398, -0.34205431,  0.72592065, ..., -0.12107015,
        -0.05675044, -0.04009635]])
```

In [43]:
```
#Transforming testing variables to a standard scale
y_test=sc.fit_transform(y_test)
y_test
```

Out[43]:
```
array([[ 0.21119888,  0.77963055,  0.76537495, ..., -0.12309149,
        -0.086711  ,  0.        ],
       [ 0.8106727 ,  0.77963055,  0.76537495, ..., -0.12309149,
        -0.086711  ,  0.        ],
       [-0.63903523,  0.77963055,  0.76537495, ..., -0.12309149,
        -0.086711  ,  0.        ],
       ...,
       [ 0.70096507,  0.77963055,  0.76537495, ..., -0.12309149,
        -0.086711  ,  0.        ],
       [ 1.35137458,  0.77963055, -1.30654916, ..., -0.12309149,
        -0.086711  ,  0.        ],
       [-1.47751496, -1.64991582,  0.76537495, ..., -0.12309149,
        -0.086711  ,  0.        ]])
```

In [ ]: