project_4

July 10, 2023

[2]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
#Imported all libraries which are used in EDA.
```

[3]:
```
train = pd.read_csv('titanic.csv')
train
#Here we readed the titanic dataset and displayed the tabular dataset.
```

[3]:
```
     Unnamed: 0  PassengerId  Survived  Pclass  \
0             0            1         0       3
1             1            2         1       1
2             2            3         1       3
3             3            4         1       1
4             4            5         0       3
..          …          …       …     …
886         886          887         0       2
887         887          888         1       1
888         888          889         0       3
889         889          890         1       1
890         890          891         0       3

                                                 Name     Sex   Age  SibSp  \
0                             Braund, Mr. Owen Harris    male  22.0      1
1    Cumings, Mrs. John Bradley (Florence Briggs Th…  female  38.0      1
2                              Heikkinen, Miss. Laina  female  26.0      0
3        Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
4                            Allen, Mr. William Henry    male  35.0      0
..                                                 …     …   …    …
886                            Montvila, Rev. Juozas    male  27.0      0
887                     Graham, Miss. Margaret Edith  female  19.0      0
888         Johnston, Miss. Catherine Helen "Carrie"  female   NaN      1
889                            Behr, Mr. Karl Howell    male  26.0      0
890                              Dooley, Mr. Patrick    male  32.0      0

     Parch            Ticket     Fare Cabin Embarked
```

```
0        0         A/5 21171   7.2500   NaN        S
1        0          PC 17599  71.2833   C85        C
2        0  STON/O2. 3101282   7.9250   NaN        S
3        0            113803  53.1000  C123        S
4        0            373450   8.0500   NaN        S
..     …               …      …   …      …
886      0            211536  13.0000   NaN        S
887      0            112053  30.0000   B42        S
888      2        W./C. 6607  23.4500   NaN        S
889      0            111369  30.0000  C148        C
890      0            370376   7.7500   NaN        Q

[891 rows x 13 columns]
```

[4]:
```
train.head()
```

[4]:
```
   Unnamed: 0  PassengerId  Survived  Pclass  \
0           0            1         0       3
1           1            2         1       1
2           2            3         1       3
3           3            4         1       1
4           4            5         0       3

                                                Name     Sex   Age  SibSp  \
0                            Braund, Mr. Owen Harris    male  22.0      1
1  Cumings, Mrs. John Bradley (Florence Briggs Th…  female  38.0      1
2                             Heikkinen, Miss. Laina  female  26.0      0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
4                           Allen, Mr. William Henry    male  35.0      0

   Parch            Ticket     Fare Cabin Embarked
0      0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```

[5]:
```
train.info() #Here we displayed the whole information about the dataset.
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 13 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   Unnamed: 0   891 non-null    int64
 1   PassengerId  891 non-null    int64
 2   Survived     891 non-null    int64
 3   Pclass       891 non-null    int64
```

```
 4   Name         891 non-null    object
 5   Sex          891 non-null    object
 6   Age          714 non-null    float64
 7   SibSp        891 non-null    int64
 8   Parch        891 non-null    int64
 9   Ticket       891 non-null    object
 10  Fare         891 non-null    float64
 11  Cabin        204 non-null    object
 12  Embarked     889 non-null    object
dtypes: float64(2), int64(6), object(5)
memory usage: 90.6+ KB
```

[6]:
```
train.isnull() #It is used to identify the null or NA values in the dataset, NA values displayed as 'True'.
```

[6]:

	Unnamed: 0	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	\
0	False	False	False	False	False	False	False	False	
1	False	False	False	False	False	False	False	False	
2	False	False	False	False	False	False	False	False	
3	False	False	False	False	False	False	False	False	
4	False	False	False	False	False	False	False	False	
..	…	…	…	…	…	…	…	…	
886	False	False	False	False	False	False	False	False	
887	False	False	False	False	False	False	False	False	
888	False	False	False	False	False	False	True	False	
889	False	False	False	False	False	False	False	False	
890	False	False	False	False	False	False	False	False	

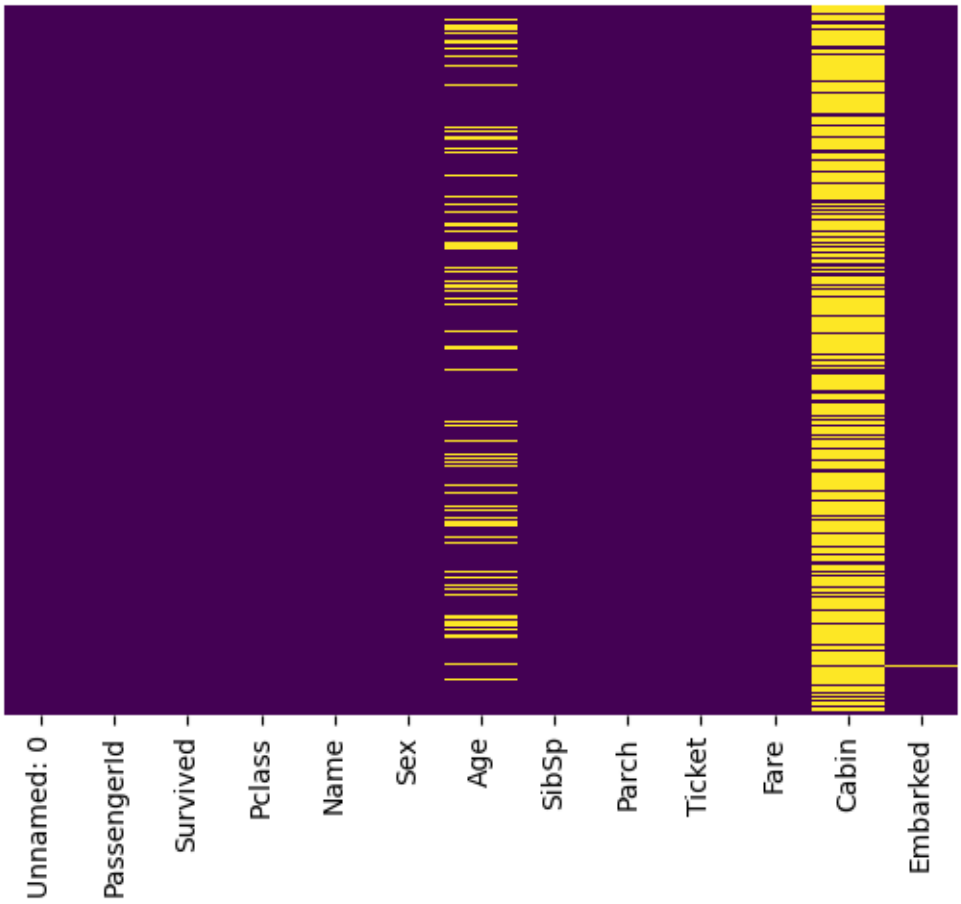
	Parch	Ticket	Fare	Cabin	Embarked
0	False	False	False	True	False
1	False	False	False	False	False
2	False	False	False	True	False
3	False	False	False	False	False
4	False	False	False	True	False
..	…	…	…	…	…
886	False	False	False	True	False
887	False	False	False	False	False
888	False	False	False	True	False
889	False	False	False	False	False
890	False	False	False	True	False

[891 rows x 13 columns]

[7]:
```
sns.heatmap(train.isnull(),yticklabels=False,cbar=False,cmap='viridis')
#Here it display the Heatmap grap which describe NA values present in the individual columns.
#Yticklabels=False is used to hide the row numbers 891 in the yaxis.
```

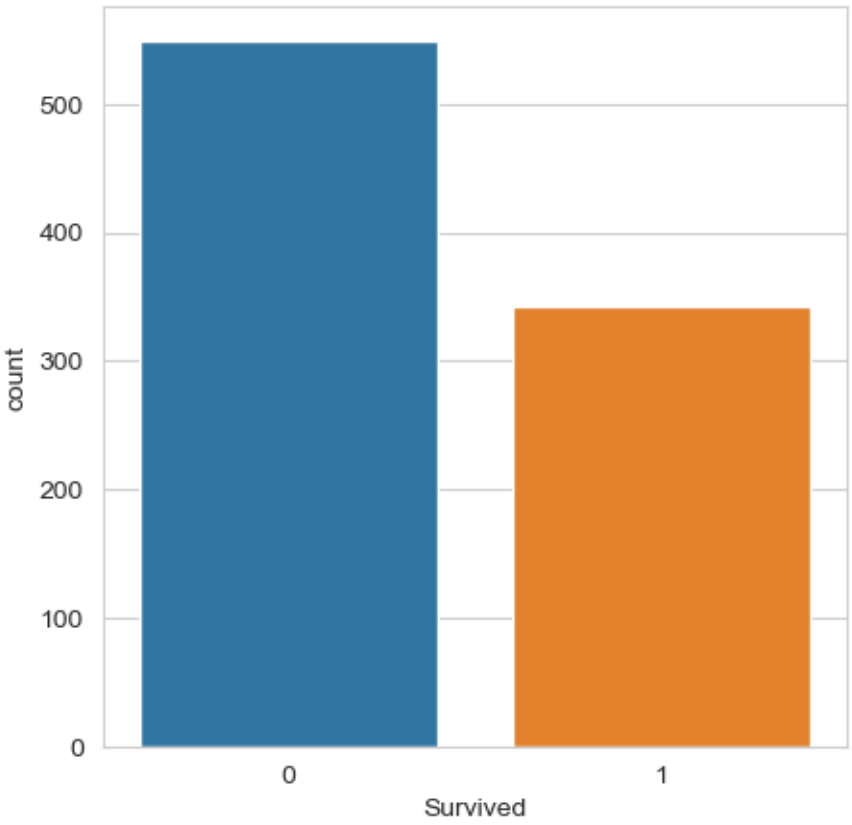
```
#cbar gives a colour to the whole graph(here it is violet).
#cmap gives a colour to the NA values represented as yellow colour below.
```

[7]: <AxesSubplot:>



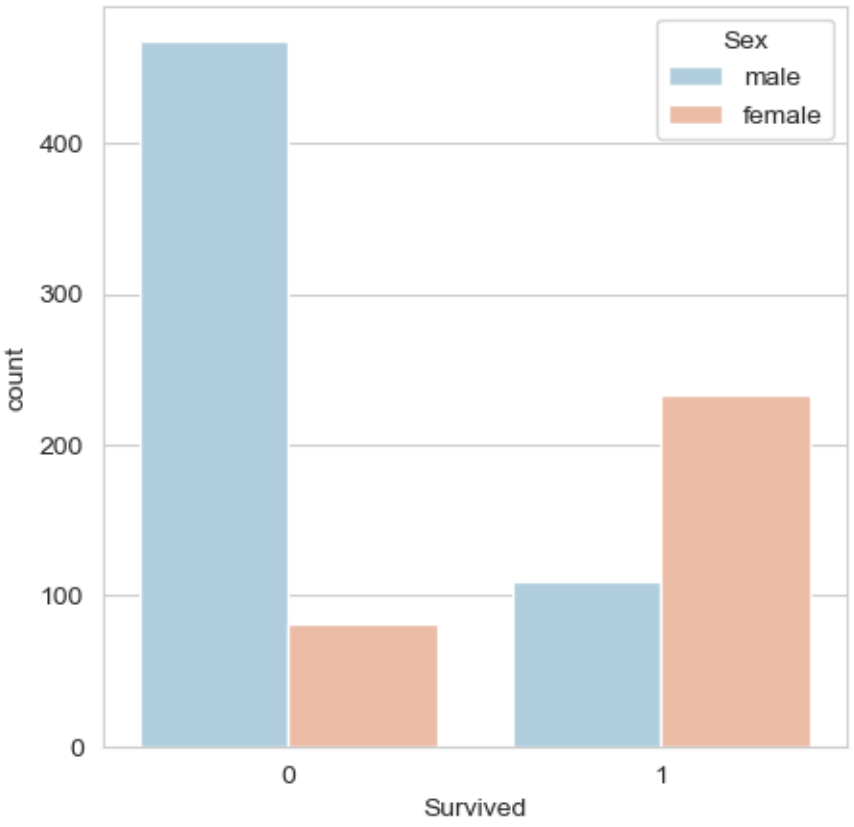
[8]:
```
plt.figure(figsize=(5,5))
sns.set_style('whitegrid')
sns.countplot(x = 'Survived', data = train)
#Here we displyed a countplot graph which shows the (1=survived people) and␣
 ↪(0=dead people).
```

[8]: <AxesSubplot:xlabel='Survived', ylabel='count'>



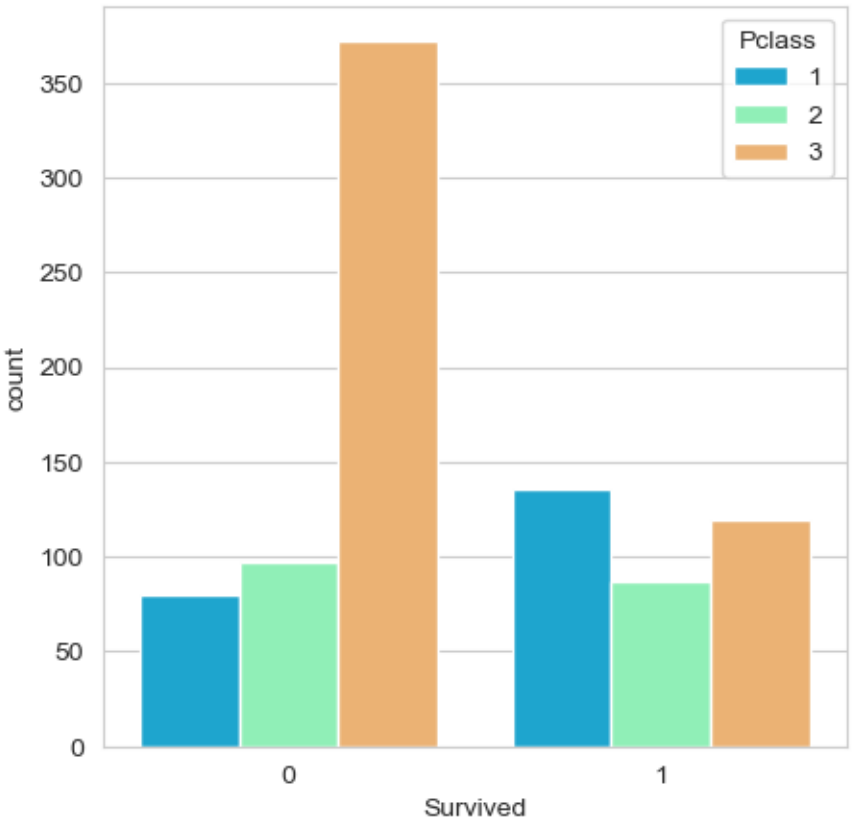
[9]:
```
plt.figure(figsize=(5,5))
sns.set_style('whitegrid')
sns.countplot(x = 'Survived', hue = 'Sex', data = train, palette = 'RdBu_r')
#Here we displyed a countplot graph which shows the (1=survived people) and␣
 ↪(0=dead people) according to (sex = male and female).
```

[9]:
```
<AxesSubplot:xlabel='Survived', ylabel='count'>
```



[10]:
```
plt.figure(figsize=(5,5))
sns.set_style('whitegrid')
sns.countplot(x = 'Survived', hue = 'Pclass', data = train, palette = 'rainbow')
#Here we displyed a countplot graph which shows the (1=survived people) and␣
 ↪(0=dead people) according to (Pclass)
#(Pclass = 1,).
```

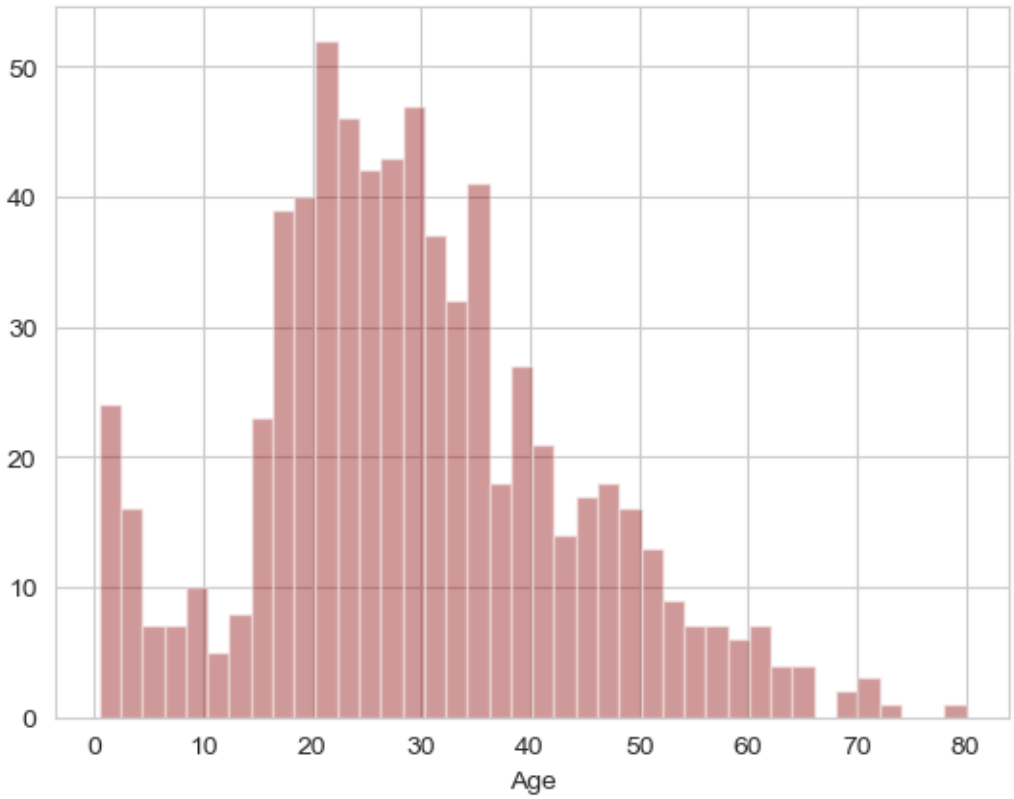
[10]: <AxesSubplot:xlabel='Survived', ylabel='count'>



[11]:
```
sns.distplot(train['Age'].dropna(),kde=False,color='darkred',bins=40)
#This graph(distogram) show the how many people are at the range of same age.
```

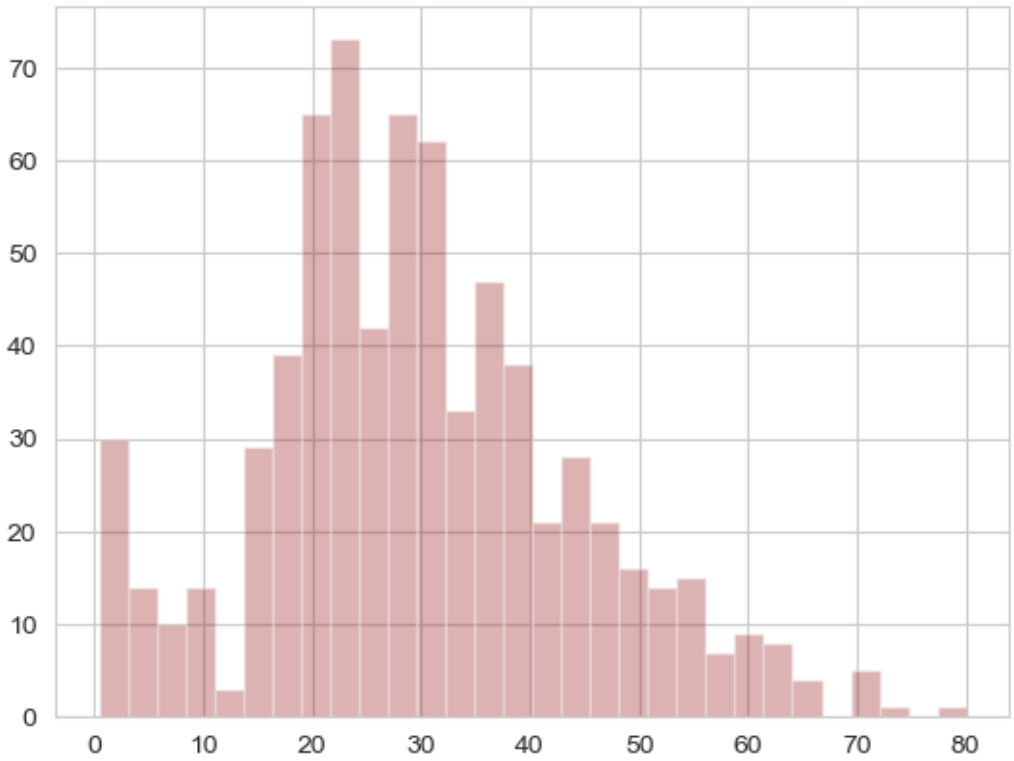
```
D:\Anaconda files\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

[11]:
```
<AxesSubplot:xlabel='Age'>
```



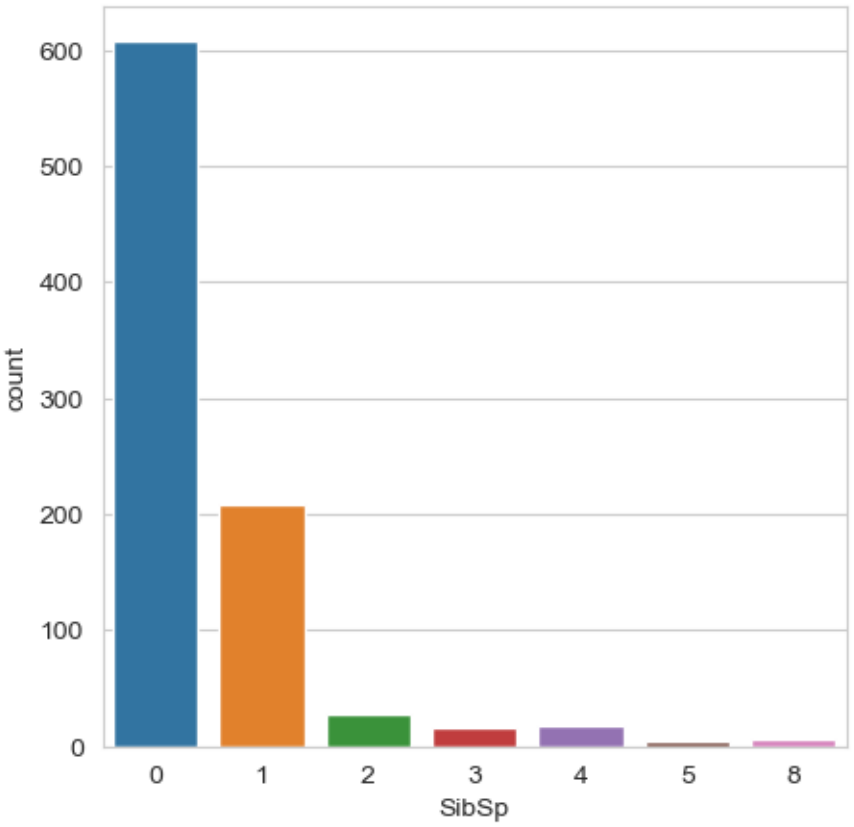
[12]:
```
train['Age'].hist(bins=30,color='darkred',alpha=0.3)
#This graph(histogram) show the how many people are at the range of same age.
```

[12]: <AxesSubplot:>



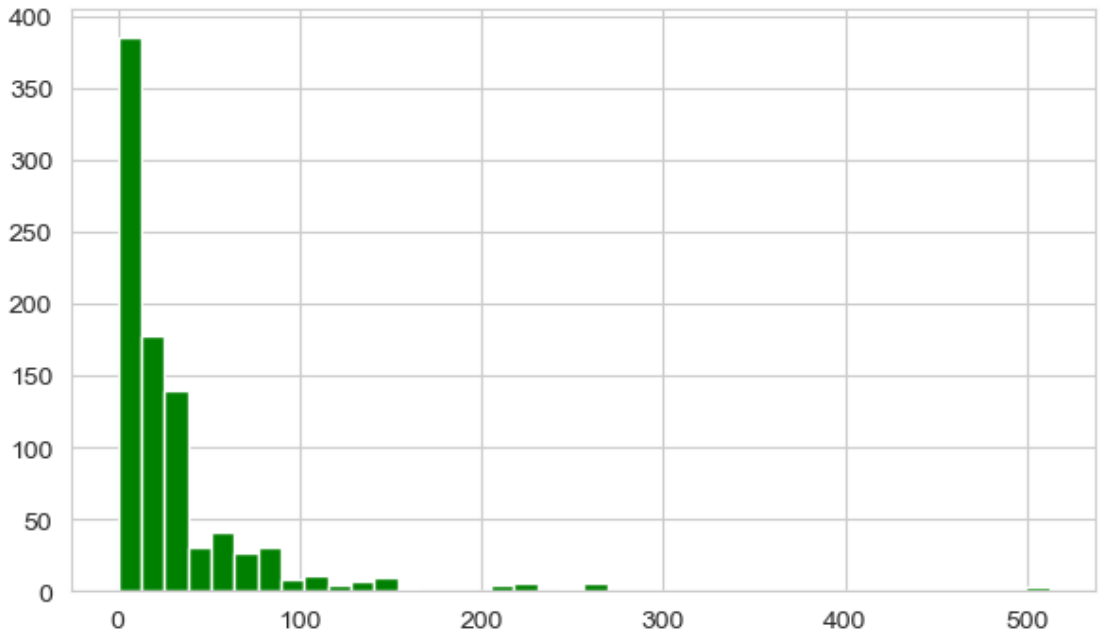
[13]:
```
plt.figure(figsize=(5,5))
sns.countplot(x = 'SibSp', data = train)
#Here we displayed a countplot of how many people have no.of (Siblings = SibSp).
#most of the people doesn't have siblings
```

[13]: <AxesSubplot:xlabel='SibSp', ylabel='count'>



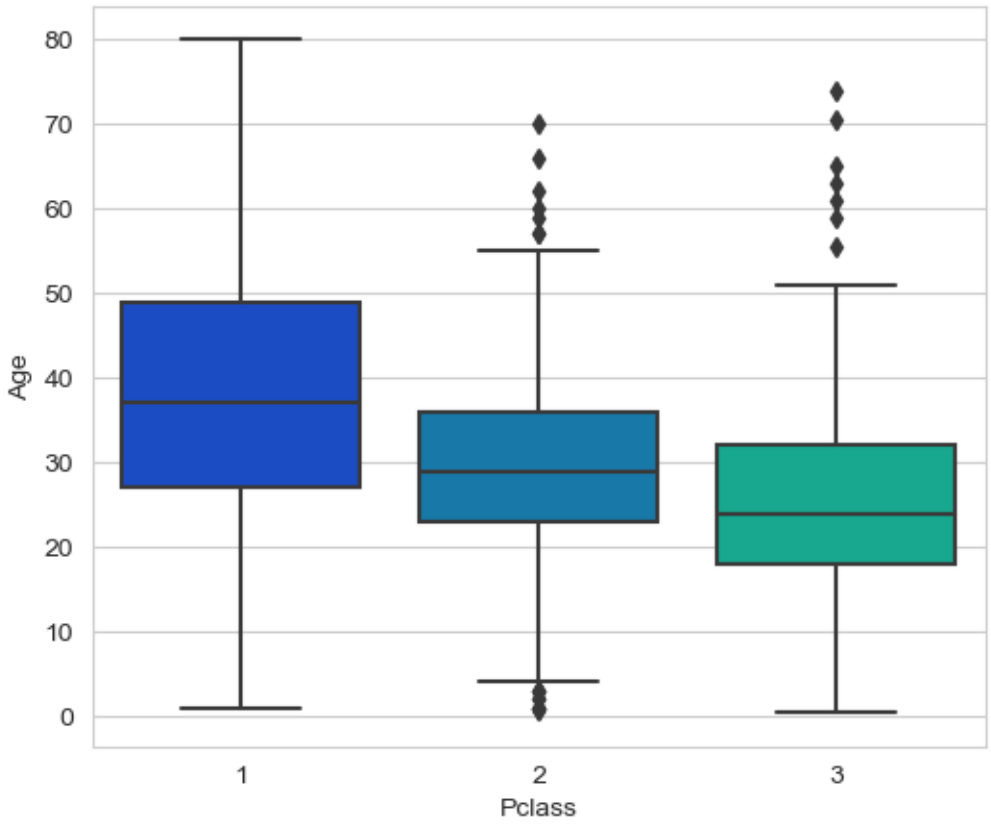
[14]:
```
train['Fare'].hist(color='green',bins=40,figsize=(7,4))
#The graph shows that how many members are paying ticket prize.
```

[14]: <AxesSubplot:>



[15]:
```
plt.figure(figsize=(6,5))
sns.boxplot(x = 'Pclass',y ='Age',data = train, palette = 'winter')
#Here we displayed a boxplot about different Age groups in Pclass=(1,2,3)
#The boxplot shows the avegere of the Ages in Pclass=(1,2,3)
#Avg Age of Pclass(1)= approx(37)
#Avg Age of Pclass(2)= approx(29)
#Avg Age of Pclass(3)= approx(24)
```

[15]: <AxesSubplot:xlabel='Pclass', ylabel='Age'>

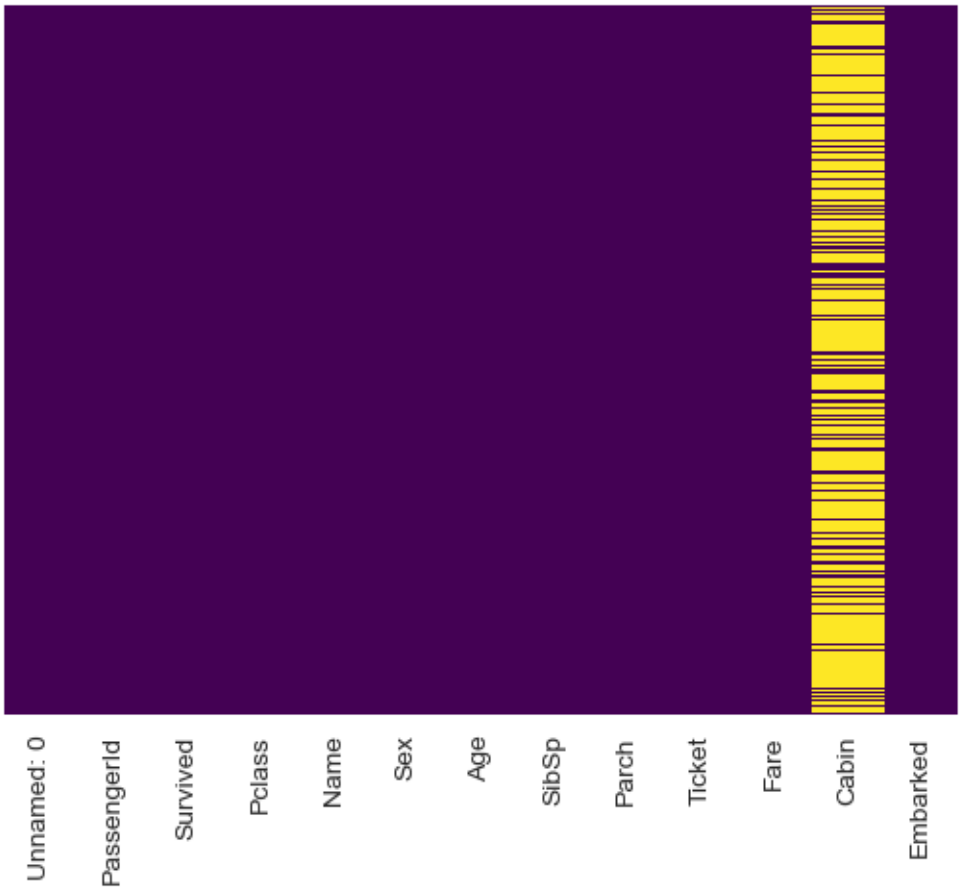


[16]:
```
def impute_age(cols):
    Age = cols[0]
    Pclass = cols[1]

    if pd.isnull(Age):

        if Pclass == 1:
            return 37.0
        if Pclass == 2:
            return 29.0
        else:
            return 24.0
    else:
        return Age
     #Here we wrote a small if condition code to fill the NA values in␣
 ↪(Age-col) using avg Age of (Pclass-col)
```

[17]:
```
train['Age'] = train[['Age','Pclass']].apply(impute_age,axis = 1)
```

[18]:
```
sns.heatmap(train.isnull(),yticklabels=False,cbar=False,cmap='viridis')
```

[18]: <AxesSubplot:>



[19]:
```
train = train.drop(['Ticket','Name','Cabin'],axis=1) #Droping unwanted columns.
```

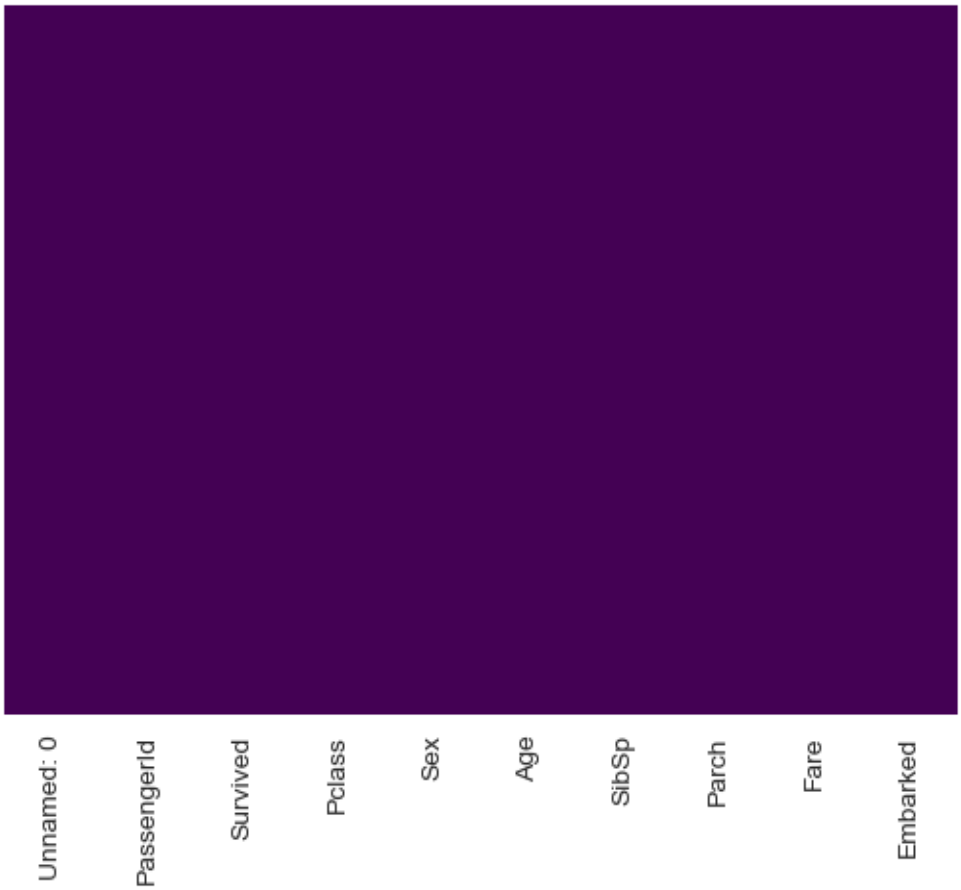
[20]:
```
train.head()
```

[20]:

	Unnamed: 0	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0	1	0	3	male	22.0	1	0	7.2500	S
1	1	2	1	1	female	38.0	1	0	71.2833	C
2	2	3	1	3	female	26.0	0	0	7.9250	S
3	3	4	1	1	female	35.0	1	0	53.1000	S
4	4	5	0	3	male	35.0	0	0	8.0500	S

[21]:
```
sns.heatmap(train.isnull(),yticklabels=False,cbar=False,cmap='viridis')
```

[21]:
```
<AxesSubplot:>
```



[22]:
```
train.isnull().sum()
```

[22]:
```
Unnamed: 0      0
PassengerId     0
Survived        0
Pclass          0
Sex             0
Age             0
SibSp           0
Parch           0
Fare            0
Embarked        2
dtype: int64
```

[23]:
```
train['Embarked'].value_counts()
```

[23]:
```
S    644
C    168
Q     77
Name: Embarked, dtype: int64
```

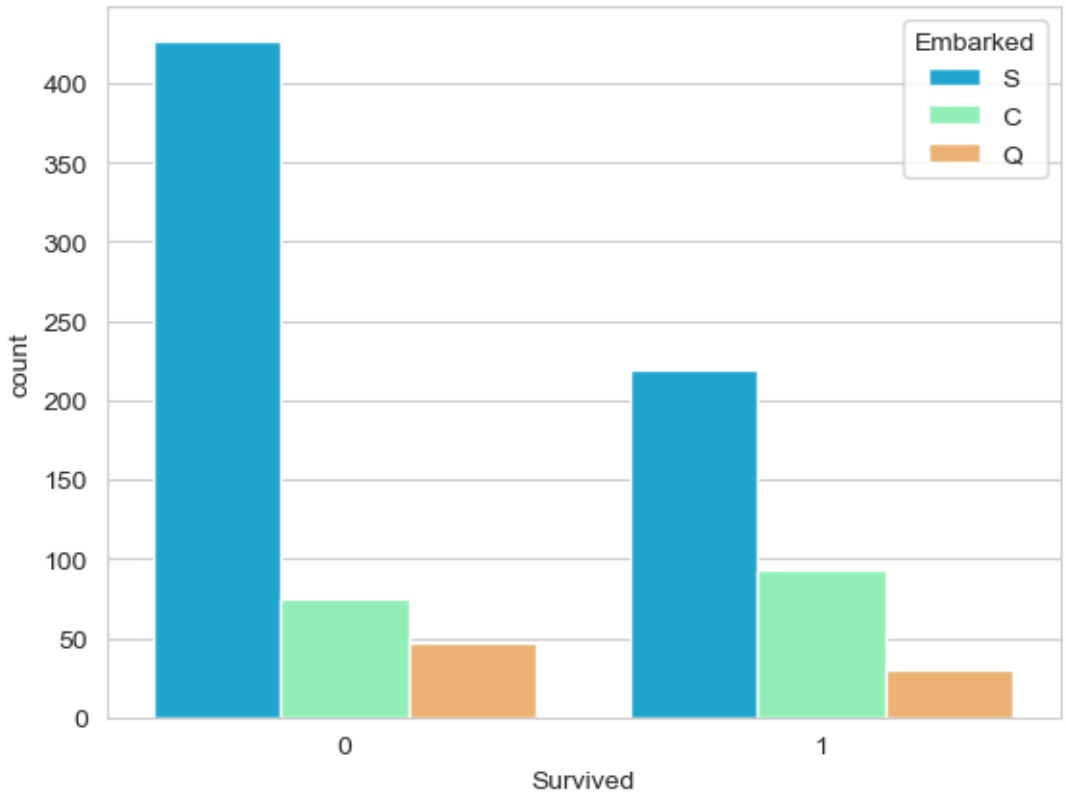
[24]:
```
train['Embarked'] = train['Embarked'].fillna(value = 'S') #Here we filled NA␣
 ↪values in (Embarked) with most called value ('S')
```

[25]:
```
train.isnull().sum()
```

[25]:
```
Unnamed: 0     0
PassengerId    0
Survived       0
Pclass         0
Sex            0
Age            0
SibSp          0
Parch          0
Fare           0
Embarked       0
dtype: int64
```

[26]:
```
sns.countplot(x = 'Survived', hue = 'Embarked', data = train, palette =␣
 ↪'rainbow')
#Here we displyed a countplot graph which shows the (1=survived people) and␣
 ↪(0=dead people) according to (Embarked)
```

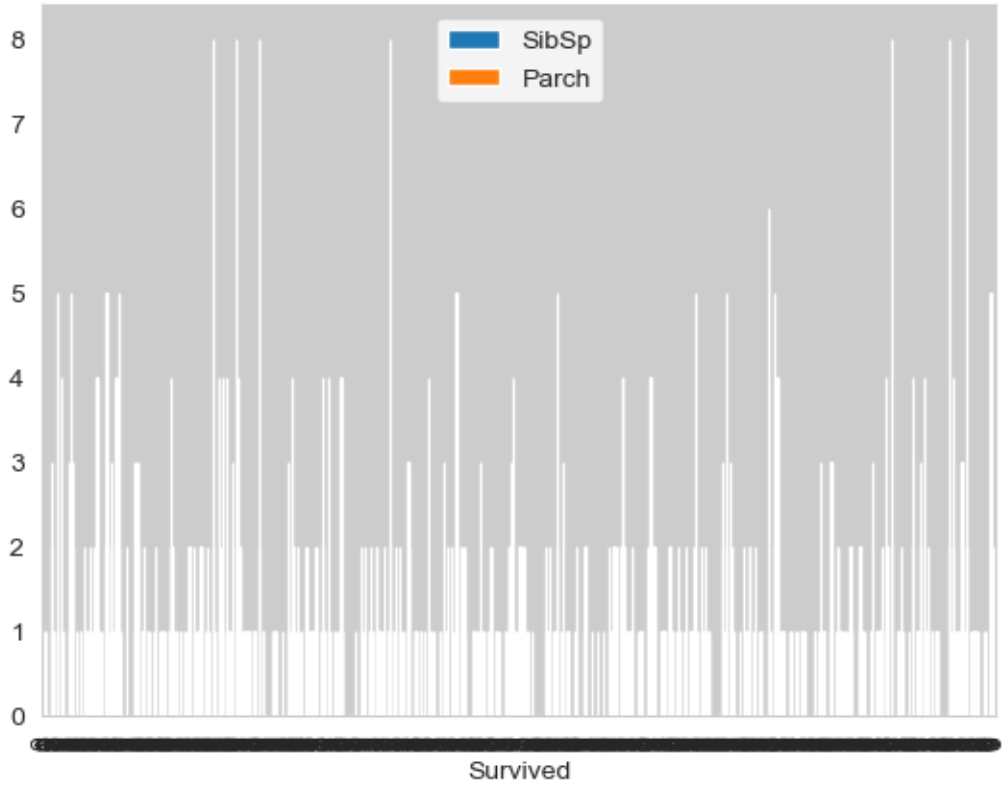
[26]:
```
<AxesSubplot:xlabel='Survived', ylabel='count'>
```



[27]:
```
train.corr()
```

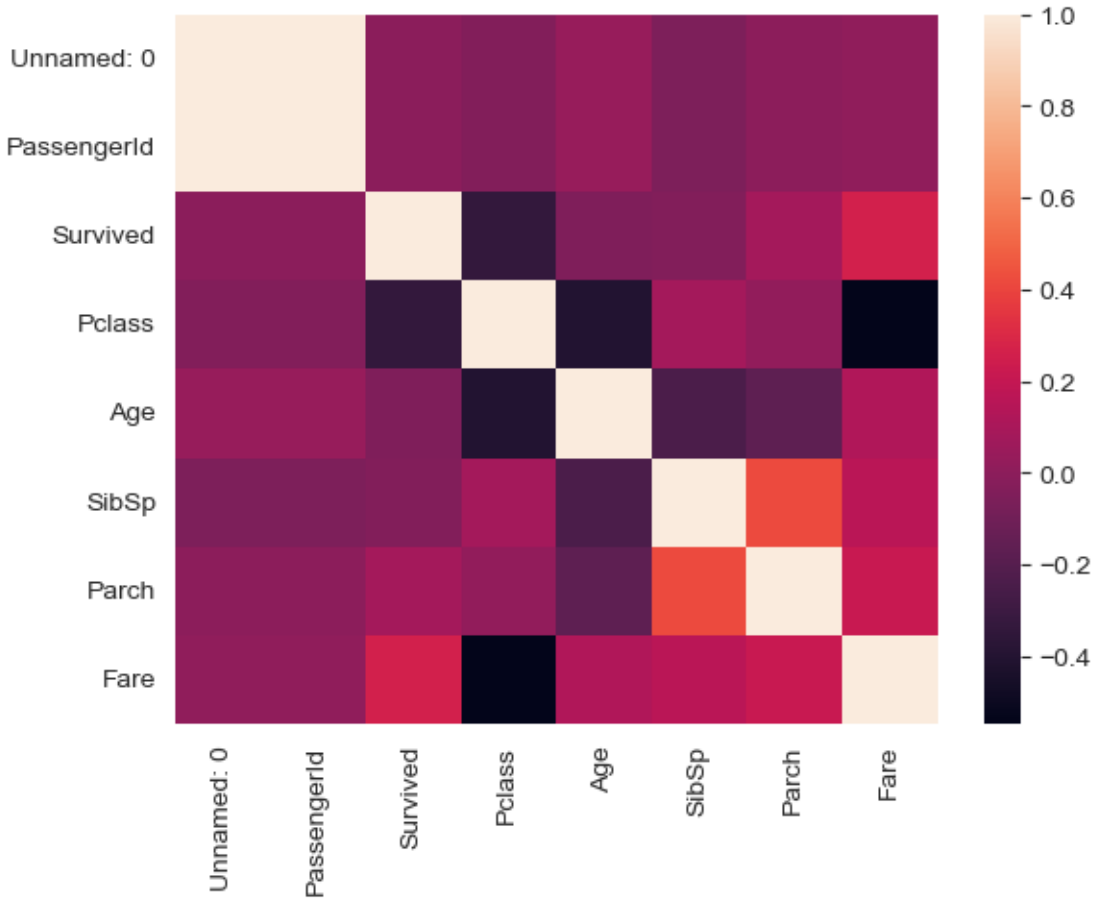
[27]:
```
             Unnamed: 0  PassengerId  Survived    Pclass       Age     SibSp  \
Unnamed: 0     1.000000     1.000000 -0.005007 -0.035144  0.035840 -0.057527
PassengerId    1.000000     1.000000 -0.005007 -0.035144  0.035840 -0.057527
Survived      -0.005007    -0.005007  1.000000 -0.338481 -0.047255 -0.035322
Pclass        -0.035144    -0.035144 -0.338481  1.000000 -0.408487  0.083081
Age            0.035840     0.035840 -0.047255 -0.408487  1.000000 -0.243526
SibSp         -0.057527    -0.057527 -0.035322  0.083081 -0.243526  1.000000
Parch         -0.001652    -0.001652  0.081629  0.018443 -0.171095  0.414838
Fare           0.012658     0.012658  0.257307 -0.549500  0.123784  0.159651

                Parch      Fare
Unnamed: 0  -0.001652  0.012658
PassengerId -0.001652  0.012658
Survived     0.081629  0.257307
Pclass       0.018443 -0.549500
Age         -0.171095  0.123784
SibSp        0.414838  0.159651
Parch        1.000000  0.216225
Fare         0.216225  1.000000
```

[28]:
```
train.plot(x = 'Survived', y = ['SibSp','Parch'], kind='bar')
plt.show()
```



[29]:
```
sns.heatmap(train.corr())
```

[29]: <AxesSubplot:>



[30]:
```
#Import label encoder
from sklearn import preprocessing

#label_encoder object knows how to understand word labels.
label_encoder = preprocessing.LabelEncoder()

#Encode labels in columns 'Gender'
train['Sex'] = label_encoder.fit_transform(train['Sex'])
train['Sex'].value_counts() #Converting male as 1 and female as 0
```

[30]:
```
1    577
0    314
Name: Sex, dtype: int64
```

[31]:
```
train.head()
```

[31]:
```
   Unnamed: 0  PassengerId  Survived  Pclass  Sex   Age  SibSp  Parch  \
0           0            1         0       3    1  22.0      1      0
```

```
1           1            2         1       1    0  38.0      1      0
2           2            3         1       3    0  26.0      0      0
3           3            4         1       1    0  35.0      1      0
4           4            5         0       3    1  35.0      0      0

      Fare Embarked
0   7.2500        S
1  71.2833        C
2   7.9250        S
3  53.1000        S
4   8.0500        S
```

[32]:
```
train = train.drop('Embarked',axis=1)
```

[33]:
```
train
```

[33]:
```
     Unnamed: 0  PassengerId  Survived  Pclass  Sex   Age  SibSp  Parch  \
0             0            1         0       3    1  22.0      1      0
1             1            2         1       1    0  38.0      1      0
2             2            3         1       3    0  26.0      0      0
3             3            4         1       1    0  35.0      1      0
4             4            5         0       3    1  35.0      0      0
..          …          …       …     …  …    …    …  …                 
886         886          887         0       2    1  27.0      0      0
887         887          888         1       1    0  19.0      0      0
888         888          889         0       3    0  24.0      1      2
889         889          890         1       1    1  26.0      0      0
890         890          891         0       3    1  32.0      0      0

        Fare
0     7.2500
1    71.2833
2     7.9250
3    53.1000
4     8.0500
..       …
886  13.0000
887  30.0000
888  23.4500
889  30.0000
890   7.7500

[891 rows x 9 columns]
```

[34]:
```
train.drop('Survived',axis=1).head()
```

[34]:

	Unnamed: 0	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare
0	0	1	3	1	22.0	1	0	7.2500
1	1	2	1	0	38.0	1	0	71.2833
2	2	3	3	0	26.0	0	0	7.9250
3	3	4	1	0	35.0	1	0	53.1000
4	4	5	3	1	35.0	0	0	8.0500

[35]:
```
train['Survived'].head()
```

[35]:
```
0    0
1    1
2    1
3    1
4    0
Name: Survived, dtype: int64
```

[36]:
```
from sklearn.model_selection import train_test_split
```

[37]:
```
X_train,X_test,Y_train,Y_test = train_test_split(train.drop('Survived',axis=1).
  ↪values,train['Survived'].values,test_size=0.3,random_state = 100)
```

[38]:
```
from sklearn.metrics import accuracy_score
from sklearn.linear_model import LogisticRegression
```

[39]:
```
lr = LogisticRegression()
lr.fit(X_train,Y_train) #Seding data to train 70%
lrpred = lr.predict(X_test)
```

```
D:\Anaconda files\lib\site-packages\sklearn\linear_model\_logistic.py:814:
ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-
regression
  n_iter_i = _check_optimize_result(
```

[40]:
```
accuracy_score(Y_test,lrpred)
```

[40]:
```
0.7686567164179104
```

[41]:
```
from sklearn.model_selection import GridSearchCV

#Creating the hyperparameter grid
```

```python
c_space = np.logspace(-5,8,15)
param_grid = {'C':c_space}

#Instantiating the GridSearchCV object
logreg_cv = GridSearchCV(lr,param_grid,cv = 5)
logreg_cv.fit(X_train,Y_train)

#Print the tuned parameters and score
print("Tuned Logistic Regression Parameters: {}".format(logreg_cv.best_params_))
print("Best Score is {}".format(logreg_cv.best_score_))
```

```
D:\Anaconda files\lib\site-packages\sklearn\linear_model\_logistic.py:814:
ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-
regression
  n_iter_i = _check_optimize_result(
D:\Anaconda files\lib\site-packages\sklearn\linear_model\_logistic.py:814:
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regression
  n_iter_i = _check_optimize_result(
D:\Anaconda files\lib\site-packages\sklearn\linear_model\_logistic.py:814:
ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
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```
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```

```
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  n_iter_i = _check_optimize_result(

Tuned Logistic Regression Parameters: {'C': 268.2695795279727}
Best Score is 0.7961677419354839

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ConvergenceWarning: lbfgs failed to converge (status=1):
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    https://scikit-learn.org/stable/modules/linear_model.html#logistic-
regression
  n_iter_i = _check_optimize_result(
```

[42]:
```
train
```

[42]:

	Unnamed: 0	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	\
0	0	1	0	3	1	22.0	1	0	
1	1	2	1	1	0	38.0	1	0	
2	2	3	1	3	0	26.0	0	0	
3	3	4	1	1	0	35.0	1	0	
4	4	5	0	3	1	35.0	0	0	

```
..          …           …       …     …  …   …    …    …
886         886         887         0     2    1  27.0     0     0
887         887         888         1     1    0  19.0     0     0
888         888         889         0     3    0  24.0     1     2
889         889         890         1     1    1  26.0     0     0
890         890         891         0     3    1  32.0     0     0

        Fare
0     7.2500
1    71.2833
2     7.9250
3    53.1000
4     8.0500
..       …
886  13.0000
887  30.0000
888  23.4500
889  30.0000
890   7.7500

[891 rows x 9 columns]
```

[47]:
```
train.to_csv('trained.csv')
```

[48]:
```
pip install nbconvert
```

```
Requirement already satisfied: nbconvert in d:\anaconda files\lib\site-packages
(6.4.4)
Requirement already satisfied: pandocfilters>=1.4.1 in d:\anaconda
files\lib\site-packages (from nbconvert) (1.5.0)
Requirement already satisfied: traitlets>=5.0 in d:\anaconda files\lib\site-
packages (from nbconvert) (5.1.1)
Requirement already satisfied: jupyter-core in d:\anaconda files\lib\site-
packages (from nbconvert) (4.11.1)
Requirement already satisfied: jupyterlab-pygments in d:\anaconda
files\lib\site-packages (from nbconvert) (0.1.2)
Requirement already satisfied: testpath in d:\anaconda files\lib\site-packages
(from nbconvert) (0.6.0)
Requirement already satisfied: entrypoints>=0.2.2 in d:\anaconda files\lib\site-
packages (from nbconvert) (0.4)
Requirement already satisfied: defusedxml in d:\anaconda files\lib\site-packages
(from nbconvert) (0.7.1)
Requirement already satisfied: beautifulsoup4 in d:\anaconda files\lib\site-
packages (from nbconvert) (4.11.1)
Requirement already satisfied: nbclient<0.6.0,>=0.5.0 in d:\anaconda
files\lib\site-packages (from nbconvert) (0.5.13)
Requirement already satisfied: jinja2>=2.4 in d:\anaconda files\lib\site-
packages (from nbconvert) (2.11.3)
```

```
Requirement already satisfied: nbformat>=4.4 in d:\anaconda files\lib\site-
packages (from nbconvert) (5.5.0)
Requirement already satisfied: mistune<2,>=0.8.1 in d:\anaconda files\lib\site-
packages (from nbconvert) (0.8.4)
Requirement already satisfied: bleach in d:\anaconda files\lib\site-packages
(from nbconvert) (4.1.0)
Requirement already satisfied: pygments>=2.4.1 in d:\anaconda files\lib\site-
packages (from nbconvert) (2.11.2)
Requirement already satisfied: MarkupSafe>=0.23 in d:\anaconda files\lib\site-
packages (from jinja2>=2.4->nbconvert) (2.0.1)
Requirement already satisfied: jupyter-client>=6.1.5 in d:\anaconda
files\lib\site-packages (from nbclient<0.6.0,>=0.5.0->nbconvert) (7.3.4)
Requirement already satisfied: nest-asyncio in d:\anaconda files\lib\site-
packages (from nbclient<0.6.0,>=0.5.0->nbconvert) (1.5.5)
Requirement already satisfied: jsonschema>=2.6 in d:\anaconda files\lib\site-
packages (from nbformat>=4.4->nbconvert) (4.16.0)
Requirement already satisfied: fastjsonschema in d:\anaconda files\lib\site-
packages (from nbformat>=4.4->nbconvert) (2.16.2)
Requirement already satisfied: soupsieve>1.2 in d:\anaconda files\lib\site-
packages (from beautifulsoup4->nbconvert) (2.3.1)
Requirement already satisfied: six>=1.9.0 in d:\anaconda files\lib\site-packages
(from bleach->nbconvert) (1.16.0)
Requirement already satisfied: packaging in d:\anaconda files\lib\site-packages
(from bleach->nbconvert) (21.3)
Requirement already satisfied: webencodings in d:\anaconda files\lib\site-
packages (from bleach->nbconvert) (0.5.1)
Requirement already satisfied: pywin32>=1.0 in d:\anaconda files\lib\site-
packages (from jupyter-core->nbconvert) (302)
Requirement already satisfied: pyrsistent!=0.17.0,!=0.17.1,!=0.17.2,>=0.14.0 in
d:\anaconda files\lib\site-packages (from
jsonschema>=2.6->nbformat>=4.4->nbconvert) (0.18.0)
Requirement already satisfied: attrs>=17.4.0 in d:\anaconda files\lib\site-
packages (from jsonschema>=2.6->nbformat>=4.4->nbconvert) (21.4.0)
Requirement already satisfied: pyzmq>=23.0 in d:\anaconda files\lib\site-
packages (from jupyter-client>=6.1.5->nbclient<0.6.0,>=0.5.0->nbconvert)
(23.2.0)
Requirement already satisfied: python-dateutil>=2.8.2 in d:\anaconda
files\lib\site-packages (from jupyter-
client>=6.1.5->nbclient<0.6.0,>=0.5.0->nbconvert) (2.8.2)
Requirement already satisfied: tornado>=6.0 in d:\anaconda files\lib\site-
packages (from jupyter-client>=6.1.5->nbclient<0.6.0,>=0.5.0->nbconvert) (6.1)
Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in d:\anaconda
files\lib\site-packages (from packaging->bleach->nbconvert) (3.0.9)
Note: you may need to restart the kernel to use updated packages.

[notice] A new release of pip is available: 23.0.1 -> 23.1.2
[notice] To update, run: python.exe -m pip install --upgrade pip
```

[ ]: