Titanic

February 27, 2022

1 Library

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

import warnings
warnings.filterwarnings("ignore")
```

2 Dataset

[2]:
```
df = pd.read_csv('titanic_data.csv')
```

[3]:
```
# row 891 coloum 12
df.shape
```

[3]:
```
(891, 12)
```

[4]:
```
# data
df.head()
```

[4]:
```
   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
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]:
```
# showing first coloum all row title
df.columns.values
```

[5]:
```
array(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'], dtype=object)
```

[6]:
```
# missing values
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
```

[7]:
```
# null value add
df.isnull().sum()
```

[7]:
```
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
```

[8]:

```python
# row dropped
df.drop(columns =['Cabin'], inplace=True)

# or
# df = df.drop(['Id'], axis=1)
```

[9]:

```python
# age er missing gulo mean dea replace kora holo
df['Age'].fillna(df['Age'].mean(), inplace = True)
```

[10]:

```python
# embarked er values add kora holo
df["Embarked"].value_counts()
```

[10]:

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

[11]:

```python
# Cabis S sobche beshi tai missing gulo S dea replace kora holo
df["Embarked"].fillna('S', inplace = True)
```

[12]:

```python
# sibsp er values add kora holo
df["SibSp"].value_counts()
```

[12]:

```
0    608
1    209
2     28
4     18
3     16
8      7
5      5
Name: SibSp, dtype: int64
```

[13]:

```python
# parch er values add kora holo
# parents with child
df["Parch"].value_counts()
```

[13]:

```
0    678
1    118
2     80
5      5
3      5
4      4
6      1
Name: Parch, dtype: int64
```

[14]:

```
df['Survived'] = df ['Survived'].astype('category')
df['Pclass'] = df ['Pclass'].astype('category')
df['Sex'] = df ['Sex'].astype('category')
df['Age'] = df ['Age'].astype('int')
df['Embarked'] = df ['Embarked'].astype('category')
```

[15]:

```
# no missing value + category change all
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 11 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  891 non-null    int64
 1   Survived     891 non-null    category
 2   Pclass       891 non-null    category
 3   Name         891 non-null    object
 4   Sex          891 non-null    category
 5   Age          891 non-null    int32
 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  Embarked     891 non-null    category
dtypes: category(4), float64(1), int32(1), int64(3), object(2)
memory usage: 49.4+ KB
```

[16]:

```
df.describe()
```

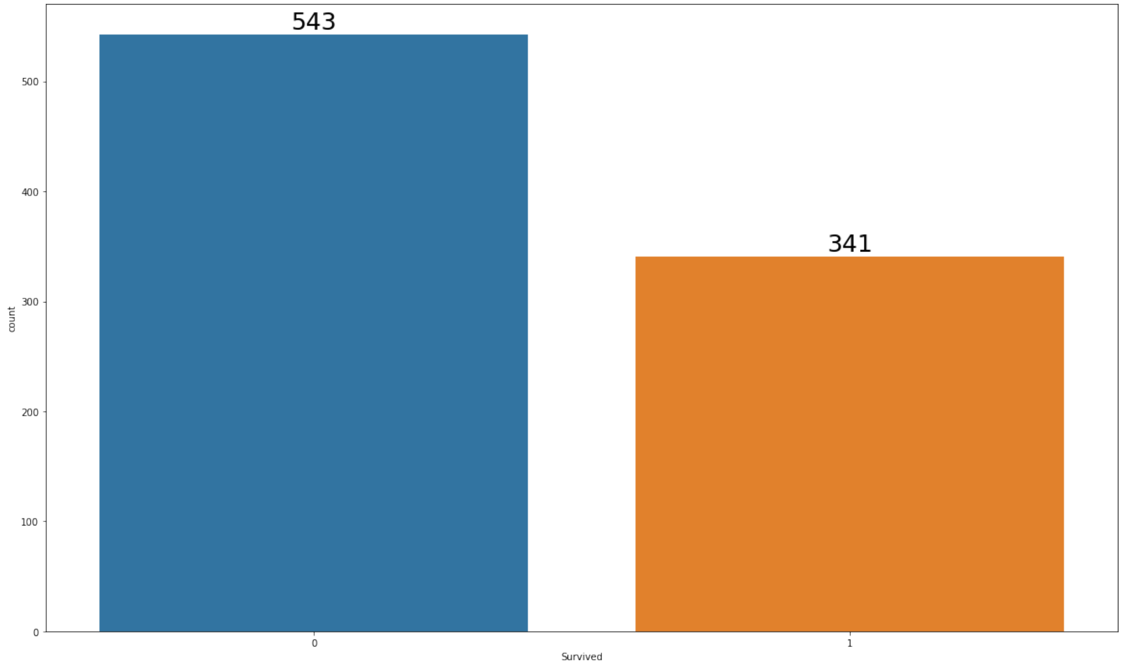
[16]:

```
       PassengerId         Age       SibSp       Parch        Fare
count   891.000000  891.000000  891.000000  891.000000  891.000000
mean    446.000000   29.544332    0.523008    0.381594   32.204208
std     257.353842   13.013778    1.102743    0.806057   49.693429
min       1.000000    0.000000    0.000000    0.000000    0.000000
25%     223.500000   22.000000    0.000000    0.000000    7.910400
50%     446.000000   29.000000    0.000000    0.000000   14.454200
75%     668.500000   35.000000    1.000000    0.000000   31.000000
max     891.000000   80.000000    8.000000    6.000000  512.329200
```

3 Visualization

[56]:

```
plt.figure(figsize=(20, 12))
sns.countplot(x="Survived", data=df)
ax = plt.gca()
for i in ax.patches:
    ax.text(i.get_x() + i.get_width()/2 , i.get_height(), '%d' %int(i.
 ↪get_height()), color='black', fontsize=25, ha='center', va='bottom')
plt.show()
```



[19]:

```
death_percent = round((df['Survived'].value_counts().values[0]/891)*100)
```

[20]:

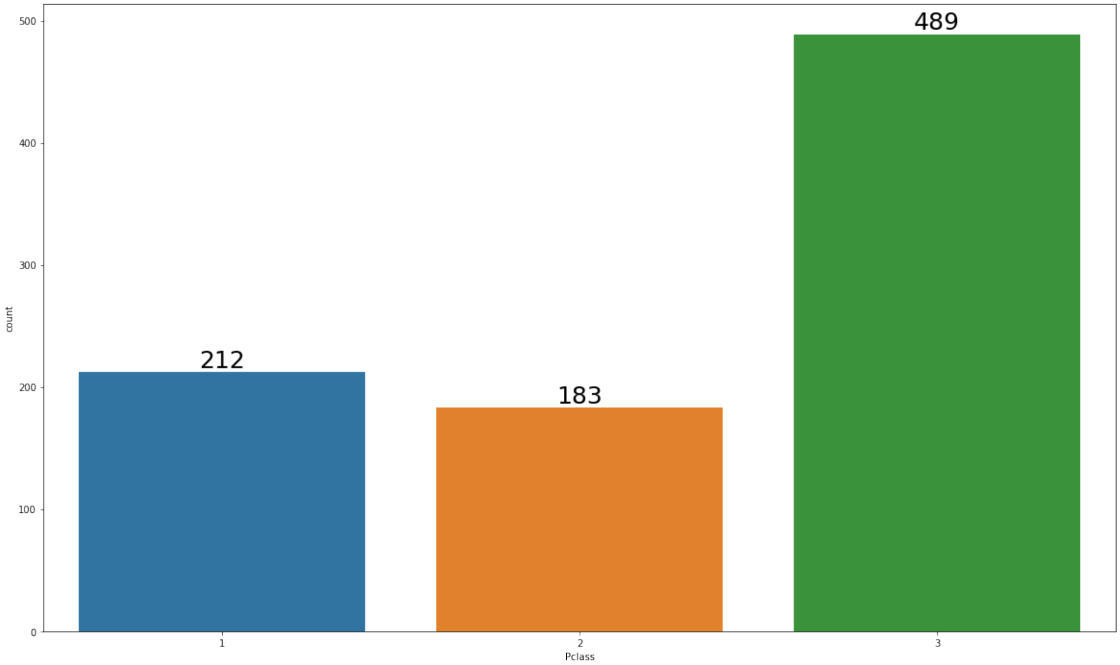
```
print('Out of 891 only {} people died in the accident'.format(death_percent))
```

```
Out of 891 only 62 people died in the accident
```

[58]:

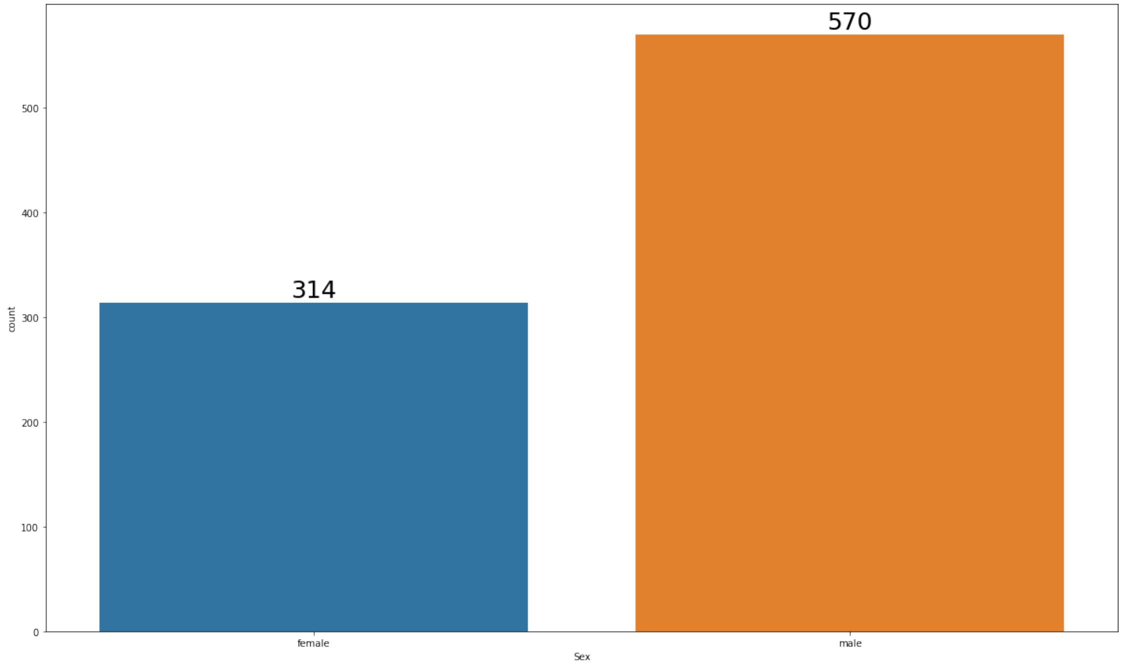
```
print((df['Pclass'].value_counts()/891)*100)
plt.figure(figsize=(20, 12))
sns.countplot(df['Pclass'])
ax = plt.gca()
for i in ax.patches:
    ax.text(i.get_x() + i.get_width()/2 , i.get_height(), '%d' %int(i.
 ↪get_height()), color='black', fontsize=25, ha='center', va='bottom')
plt.show()
```

```
3    54.882155
1    23.793490
2    20.538721
Name: Pclass, dtype: float64
```



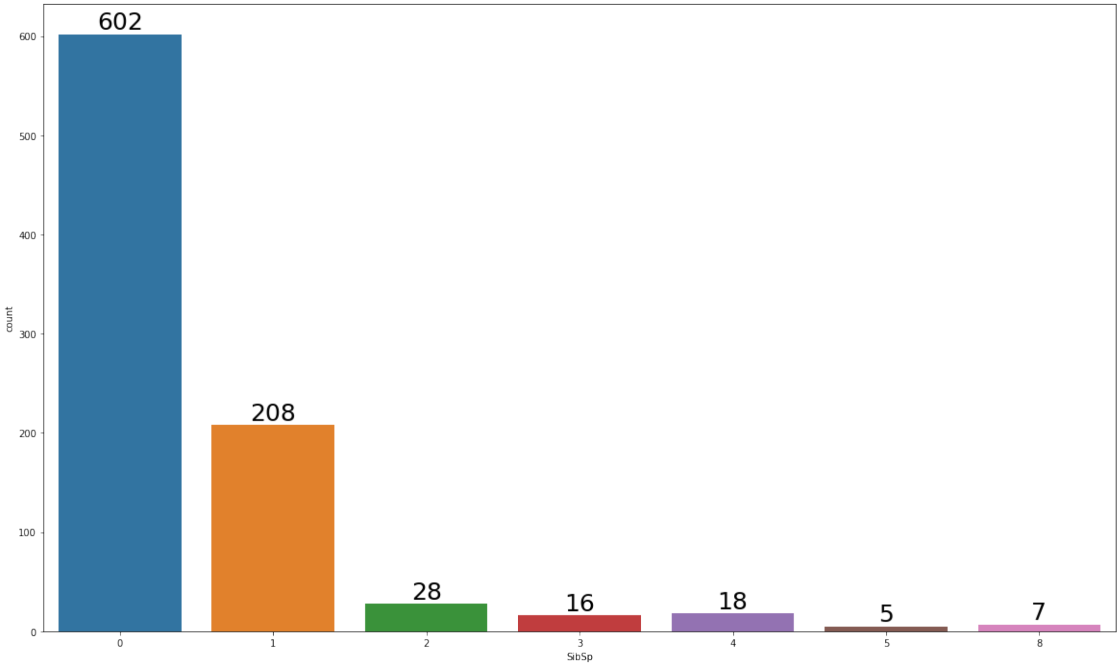
```
[59]: plt.figure(figsize=(20, 12))
      print((df['Sex'].value_counts()/891)*100)
      sns.countplot(df['Sex'])
      ax = plt.gca()
      for i in ax.patches:
          ax.text(i.get_x() + i.get_width()/2 , i.get_height(), '%d' %int(i.
       ↪get_height()), color='black', fontsize=25, ha='center', va='bottom')
      plt.show()
```

```
male      63.973064
female    35.241302
Name: Sex, dtype: float64
```



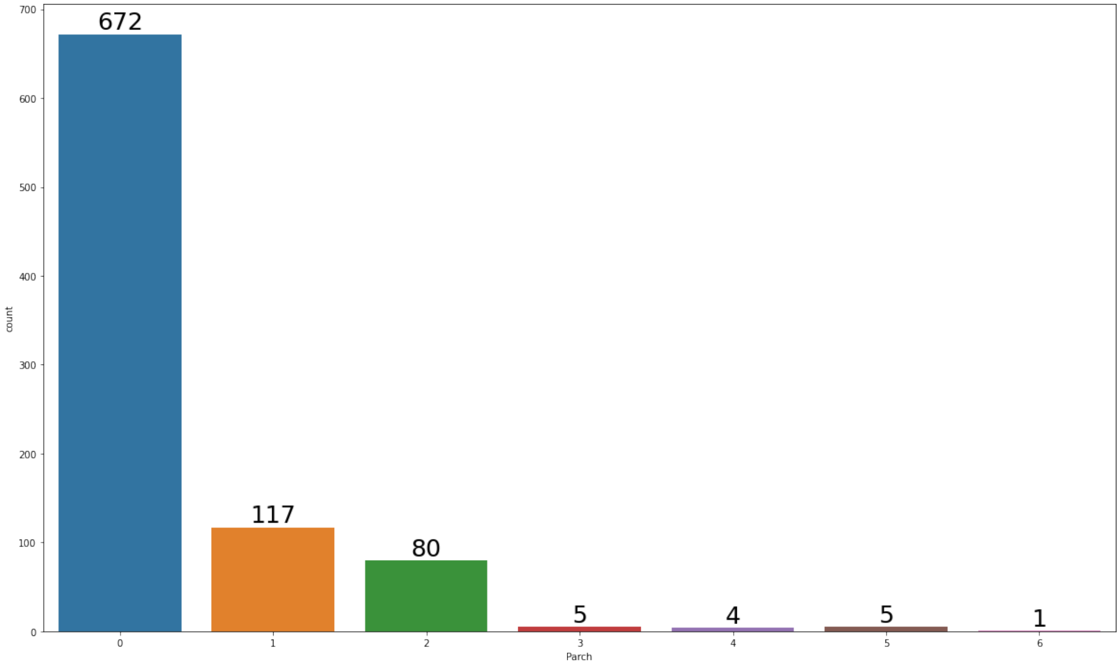
```
[60]: plt.figure(figsize=(20, 12))
      print((df['SibSp'].value_counts()/891)*100)
      sns.countplot(df['SibSp'])
      ax = plt.gca()
      for i in ax.patches:
          ax.text(i.get_x() + i.get_width()/2 , i.get_height(), '%d' %int(i.
       ↪get_height()), color='black', fontsize=25, ha='center', va='bottom')
      plt.show()
```

```
0    67.564534
1    23.344557
2     3.142536
4     2.020202
3     1.795735
8     0.785634
5     0.561167
Name: SibSp, dtype: float64
```



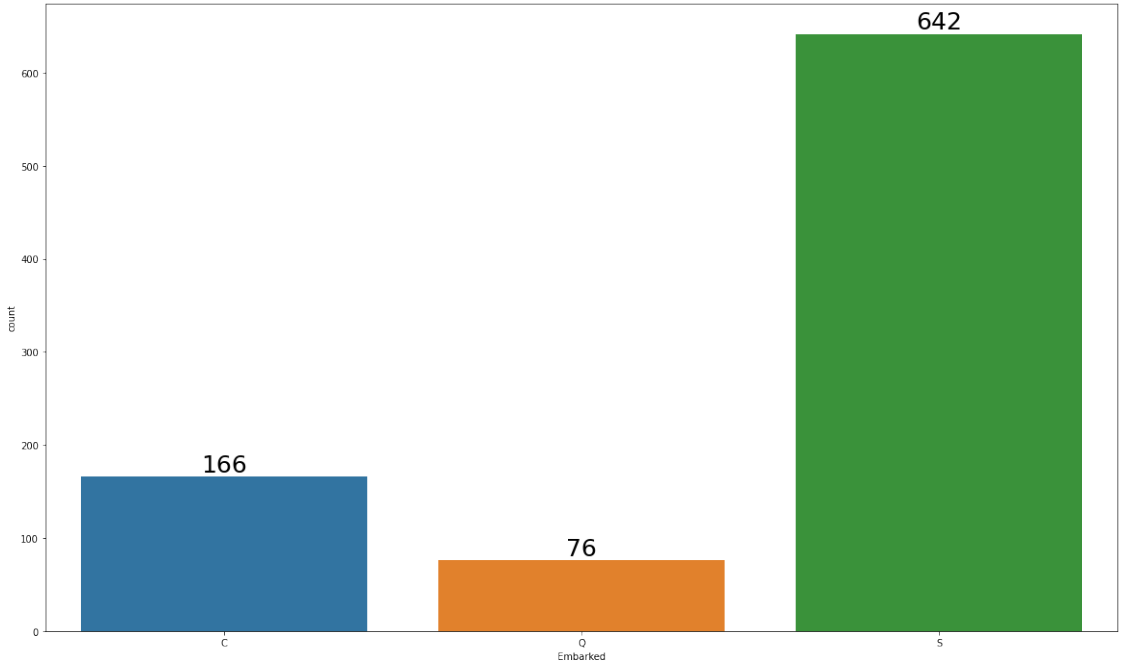
[62]:
```
plt.figure(figsize=(20, 12))
print((df['Parch'].value_counts()/891)*100)
sns.countplot(df['Parch'])
ax = plt.gca()
for i in ax.patches:
    ax.text(i.get_x() + i.get_width()/2 , i.get_height(), '%d' %int(i.
 ↪get_height()), color='black', fontsize=25, ha='center', va='bottom')
plt.show()
```

```
0    75.420875
1    13.131313
2     8.978676
5     0.561167
3     0.561167
4     0.448934
6     0.112233
Name: Parch, dtype: float64
```



[64]:
```
plt.figure(figsize=(20, 12))
print((df['Embarked'].value_counts()/891)*100)
sns.countplot(df['Embarked'])
ax = plt.gca()
for i in ax.patches:
    ax.text(i.get_x() + i.get_width()/2 , i.get_height(), '%d' %int(i.
 ↪get_height()), color='black', fontsize=25, ha='center', va='bottom')
plt.show()
```

```
S    72.053872
C    18.630752
Q     8.529742
Name: Embarked, dtype: float64
```



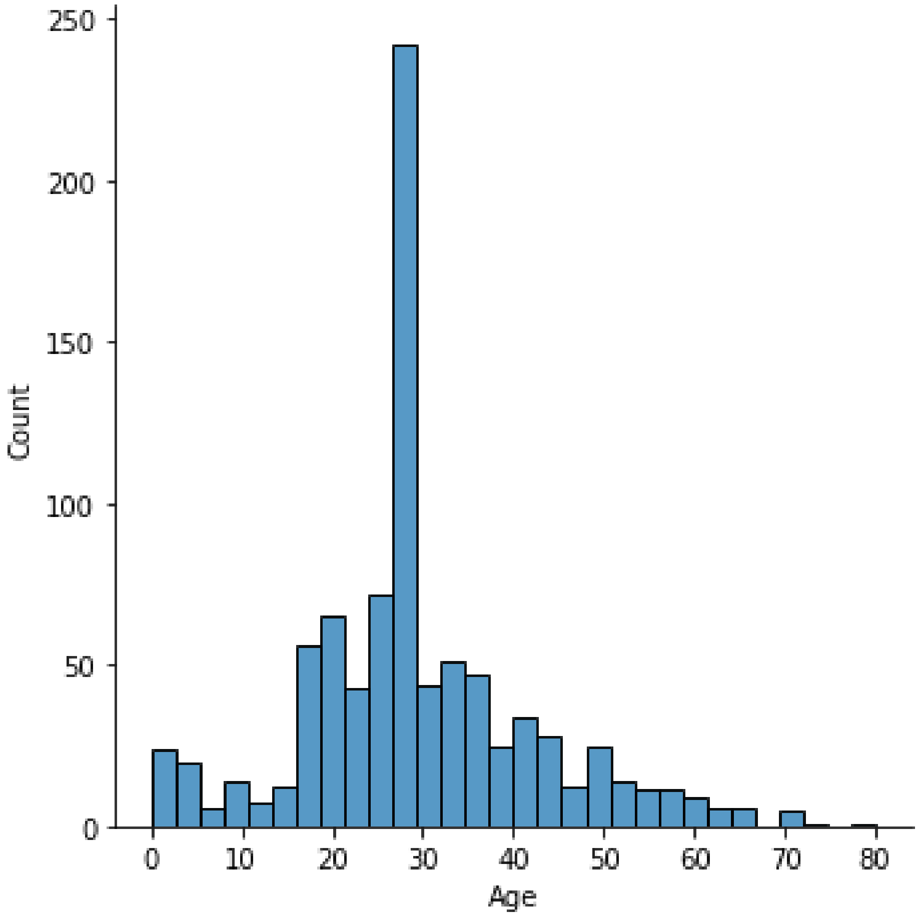
[26]:
```
print(df['Embarked'].value_counts())
```

```
S    646
C    168
Q     77
Name: Embarked, dtype: int64
```

[27]:
```
age = sns.displot(df['Age'])
print('skew', df['Age'].skew())  # -.5 to .5 normal
print('kurt', df['Age'].kurt())
```

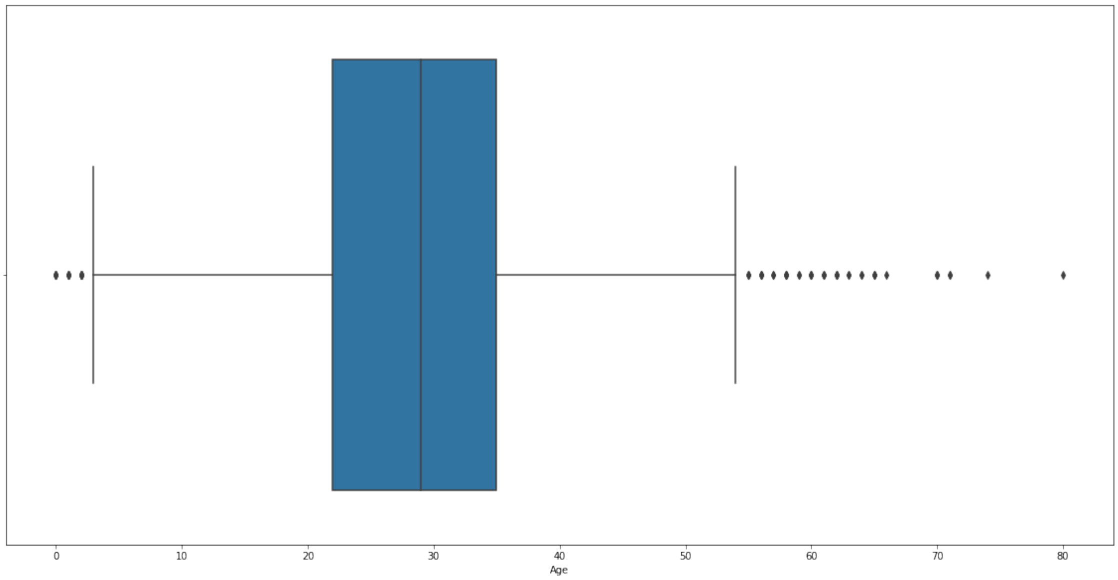
```
skew 0.45956263424701577
kurt 0.9865867453652877
```

```
<Figure size 1440x720 with 0 Axes>
```



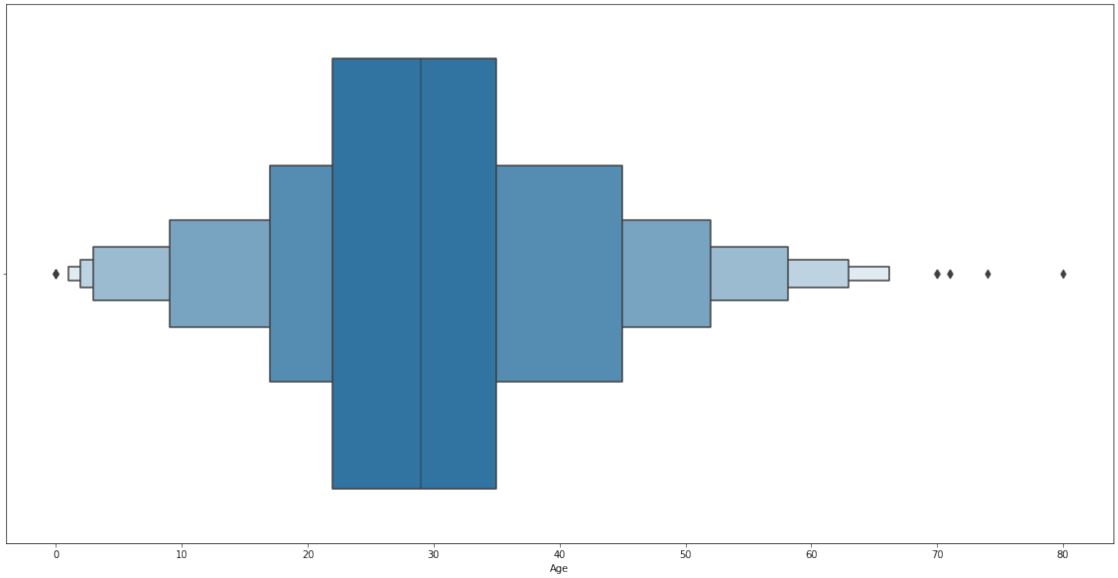
```
[28]: plt.figure(figsize=(20, 10))
      box_plot1 = sns.boxplot(df['Age'])
      print(box_plot1)
```

```
AxesSubplot(0.125,0.125;0.775x0.755)
```



[29]:
```
plt.figure(figsize=(20, 10))
box_plot = sns.boxenplot(df['Age'])
print(box_plot)
```

```
AxesSubplot(0.125,0.125;0.775x0.755)
```



[30]:
```
print('People with age between 60 and 70 are', df[(df['Age'] > 60) & (df['Age']␣
 ↪< 70) & (df['Age'] <= 75)].shape[0])
```

```
People with age between 60 and 70 are 15
```

```
[31]: print('People with age between 60 and 70 are', df[df['Age']>=70 &␣
       ↪(df['Age']<=75)].shape[0])
```

```
People with age between 60 and 70 are 891
```

```
[32]: print('People with age between 60 and 70 are', df[df['Age']>75].shape[0])
```

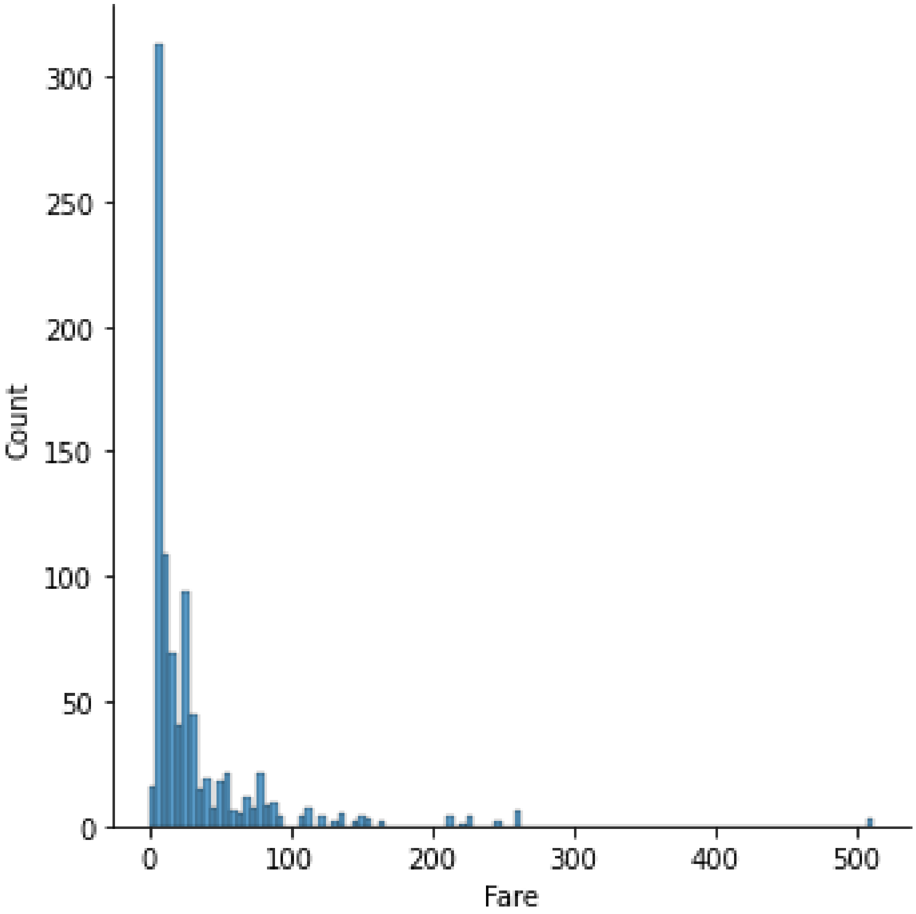
```
People with age between 60 and 70 are 1
```

```
[33]: print('People with age between 0 to 1 is', df[df['Age']<1].shape[0])
```

```
People with age between 0 to 1 is 7
```

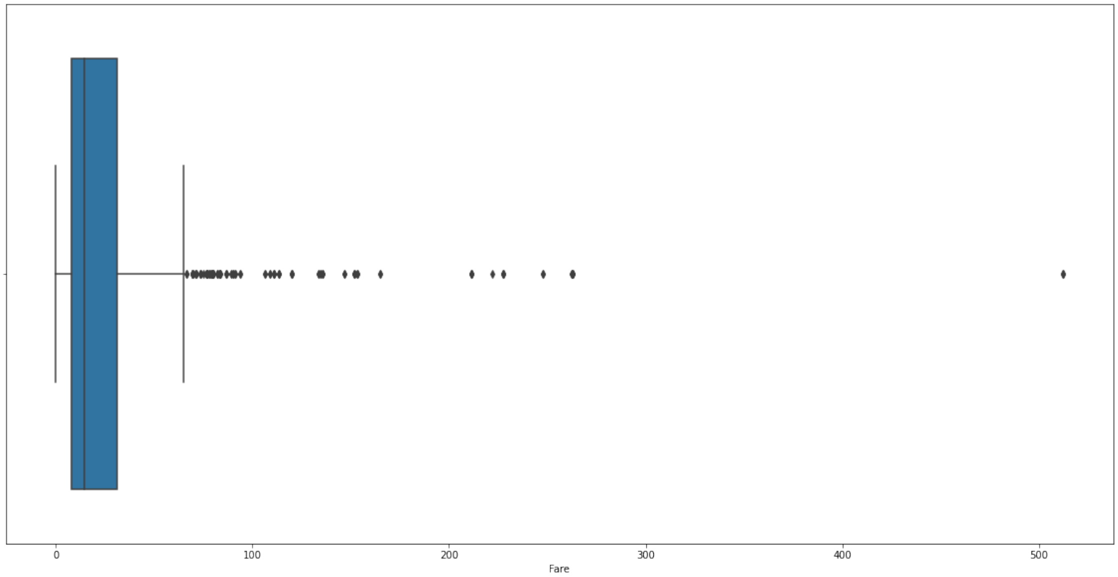
```
[34]: print((df['Fare'].value_counts()/891)*100)
      fare = sns.displot(df['Fare'])
      print(fare)
      print()
      print('skew', df['Fare'].skew())
      print('kurt', df['Fare'].kurt())
```

```
8.0500     4.826038
13.0000    4.713805
7.8958     4.264871
7.7500     3.815937
26.0000    3.479237
             …
35.0000    0.112233
28.5000    0.112233
6.2375     0.112233
14.0000    0.112233
10.5167    0.112233
Name: Fare, Length: 248, dtype: float64
<seaborn.axisgrid.FacetGrid object at 0x0000024395386130>

skew 4.787316519674893
kurt 33.39814088089868
```



[35]:
```
plt.figure(figsize=(20, 10))
fare_box = sns.boxplot(df['Fare'])
print(fare_box)
```

```
AxesSubplot(0.125,0.125;0.775x0.755)
```



```
[36]: print('People with fare between 200$ and 300$ are', df[(df['Fare'] > 200) &␣
       ↪(df['Fare'] < 300)].shape[0])
```

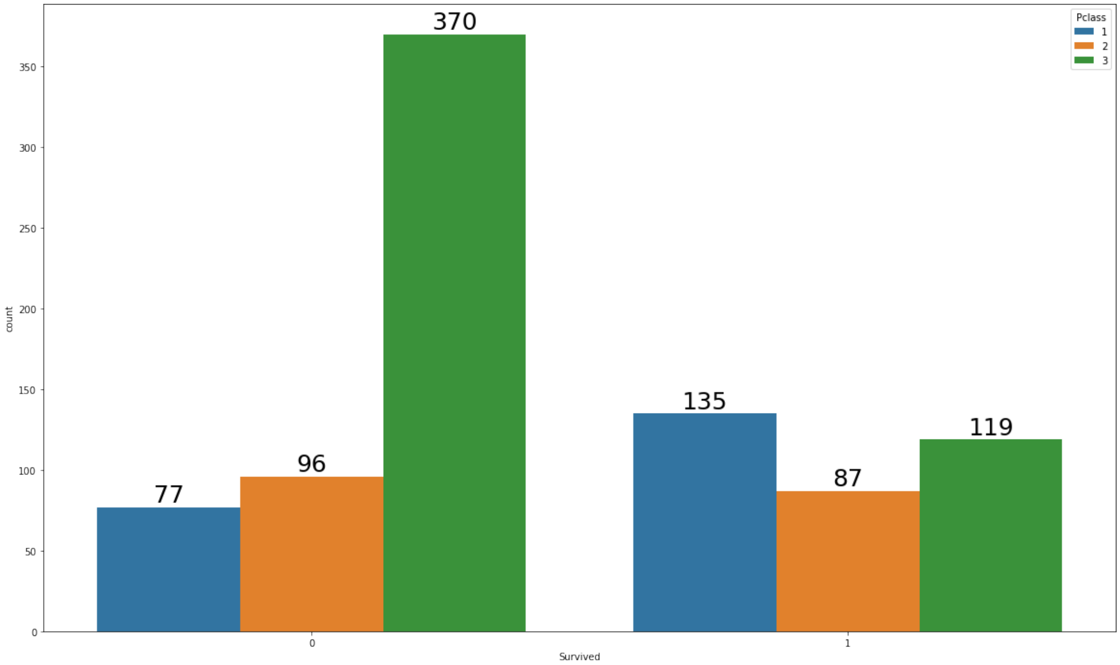
```
People with fare between 200$ and 300$ are 17
```

```
[37]: print('People with fare greater than 300$ is', df[(df['Fare']>300)].shape[0])
```

```
People with fare greater than 300$ is 3
```

4 Survival with Pclass

```
[66]: plt.figure(figsize=(20, 12))
      survival_with_pclass = sns.countplot(df['Survived'], hue = df['Pclass'])
      pd.crosstab(df['Pclass'], df['Survived']).apply(lambda r: round((r/r.
       ↪sum())*100, 1), axis = 1)

      ax = plt.gca()
      for i in ax.patches:
          ax.text(i.get_x() + i.get_width()/2 , i.get_height(), '%d' %int(i.
       ↪get_height()), color='black', fontsize=25, ha='center', va='bottom')
      plt.show()
```

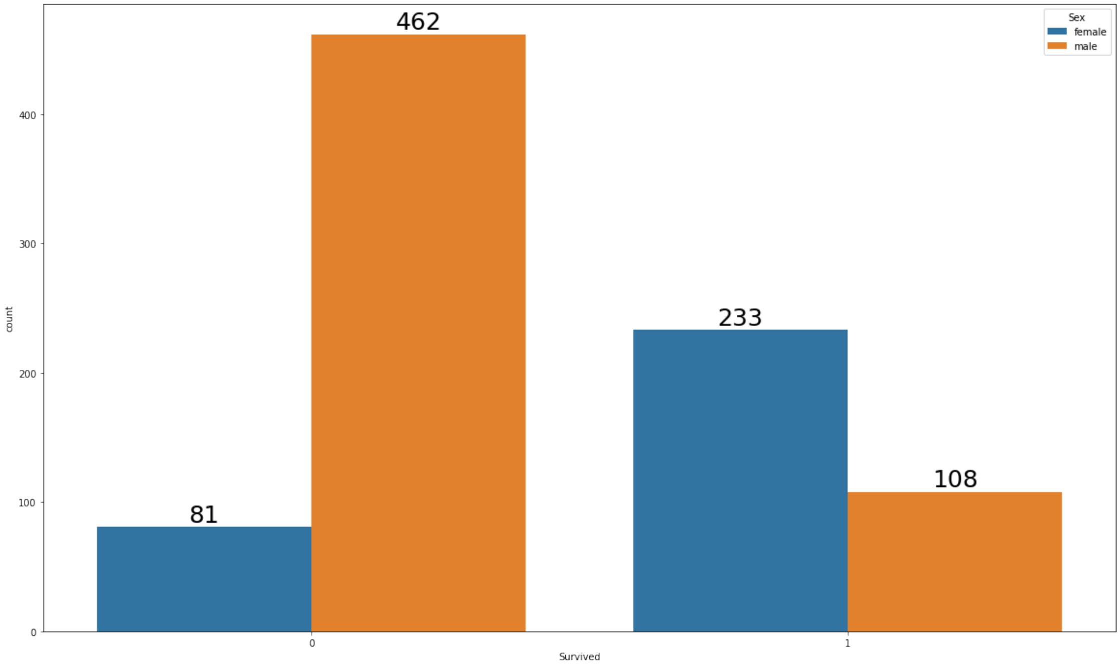


[39]:
```
pd.crosstab(df['Pclass'], df['Survived'])
```

[39]:
```
Survived    0    1
Pclass
1          80  136
2          97   87
3         372  119
```

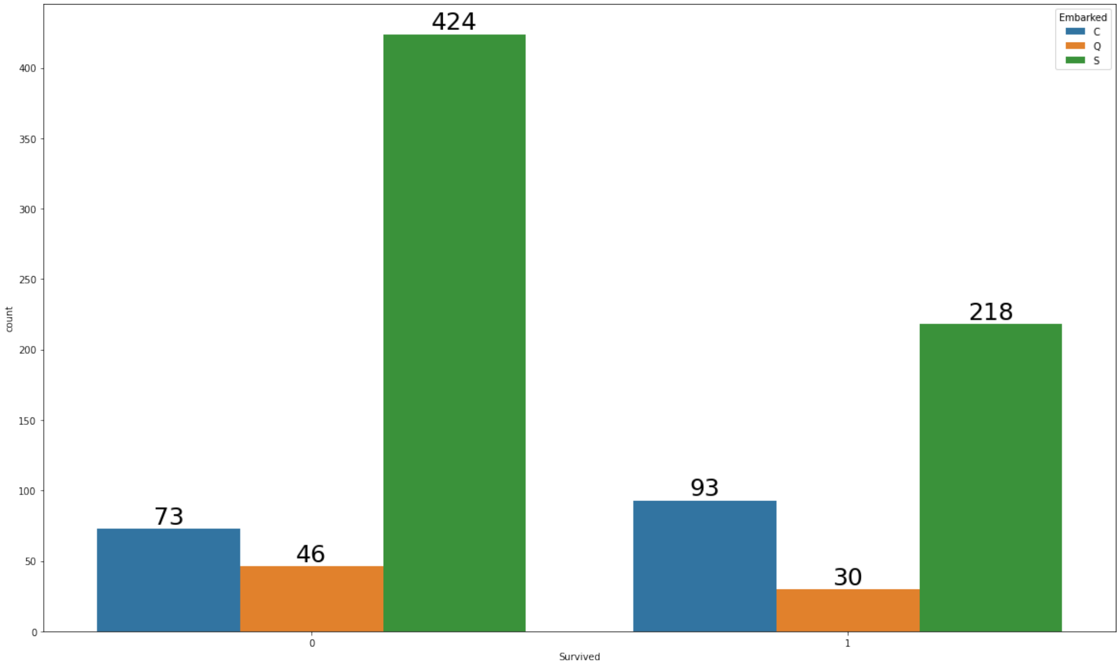
5 Survival with Sex

[68]:
```
plt.figure(figsize=(20, 12))
survival_with_sex = sns.countplot(df['Survived'], hue = df['Sex'])
pd.crosstab(df['Sex'], df['Survived']).apply(lambda r: round((r/r.sum())*100,␣
 ↪1), axis = 1)

ax = plt.gca()
for i in ax.patches:
    ax.text(i.get_x() + i.get_width()/2 , i.get_height(), '%d' %int(i.
 ↪get_height()), color='black', fontsize=25, ha='center', va='bottom')
plt.show()
```



6 Survival with Embarked

```
[69]: plt.figure(figsize=(20, 12))
      survival_with_emberked = sns.countplot(df['Survived'], hue = df['Embarked'])
      pd.crosstab(df['Embarked'], df['Survived']).apply(lambda r: round((r/r.
       ↪sum())*100, 1), axis = 1)

      ax = plt.gca()
      for i in ax.patches:
          ax.text(i.get_x() + i.get_width()/2 , i.get_height(), '%d' %int(i.
       ↪get_height()), color='black', fontsize=25, ha='center', va='bottom')
      plt.show()
```



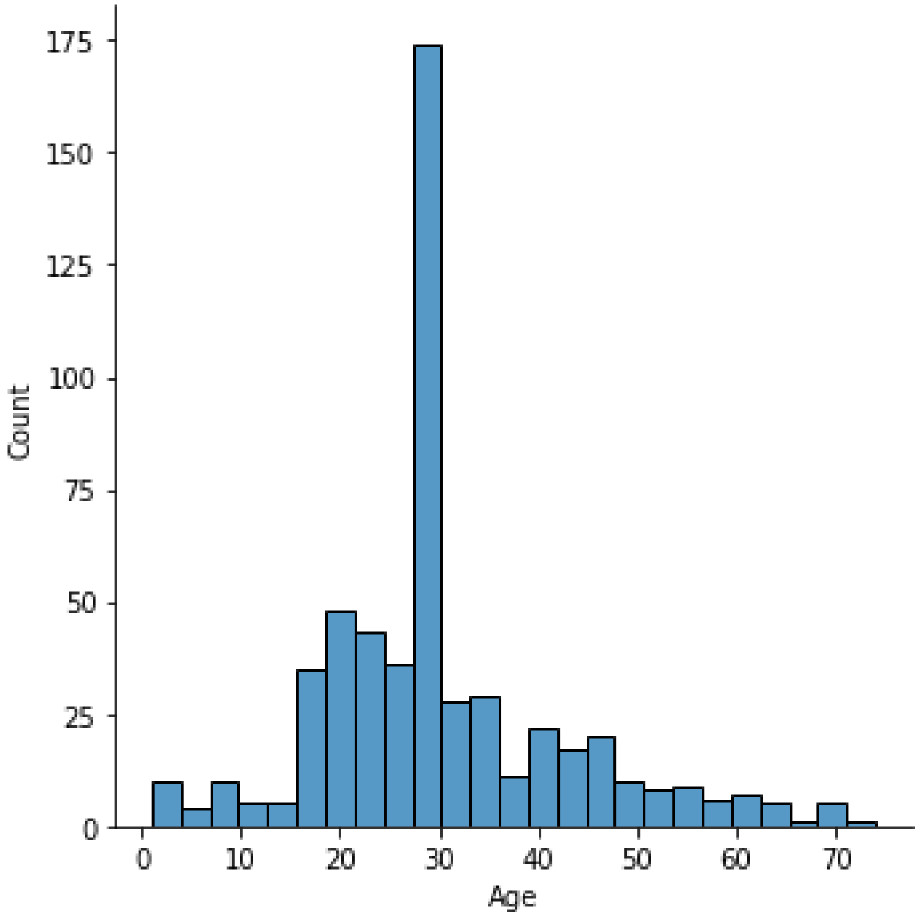
7 Survival with Age

[42]:

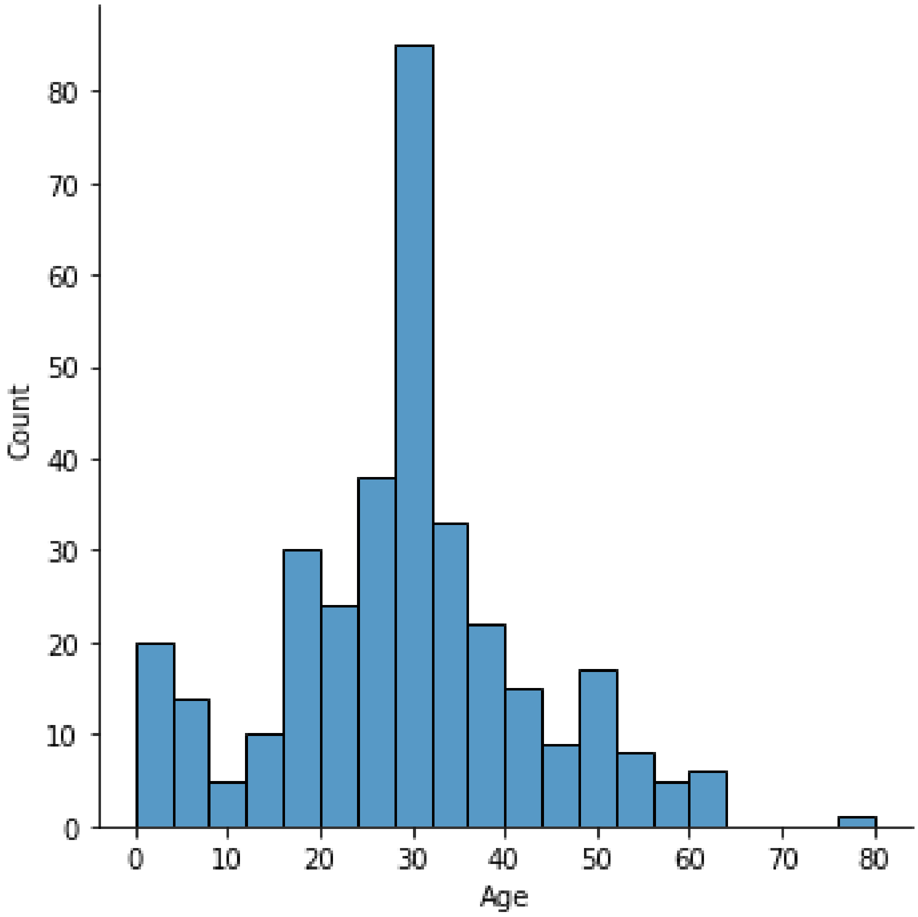
```
sns.displot(df[df['Survived']==0]['Age'])
sns.displot(df[df['Survived']==1]['Age'])
```

[42]:

```
<seaborn.axisgrid.FacetGrid at 0x243955afd00>
```



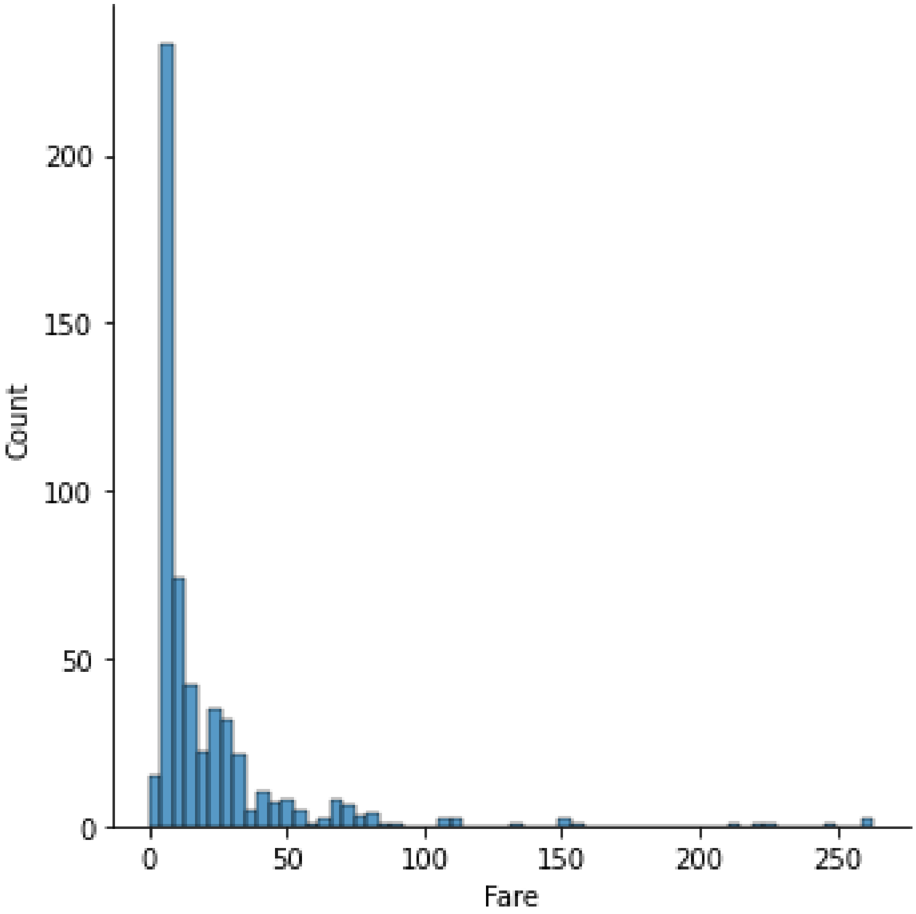
175
150
125
100
75
50
25
0
Count
0
10
20
30
40
50
60
70
Age

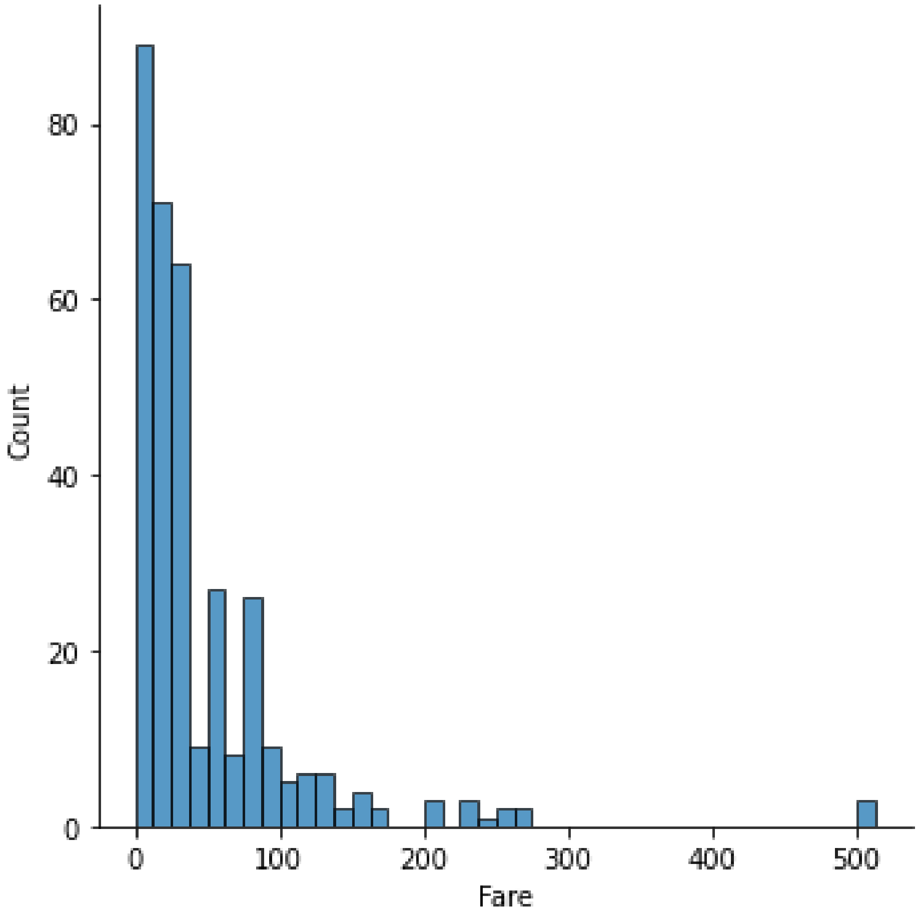


8 Survived with Fare

```
[43]: sns.displot(df[df['Survived']==0]['Fare'])
      sns.displot(df[df['Survived']==1]['Fare'])
```

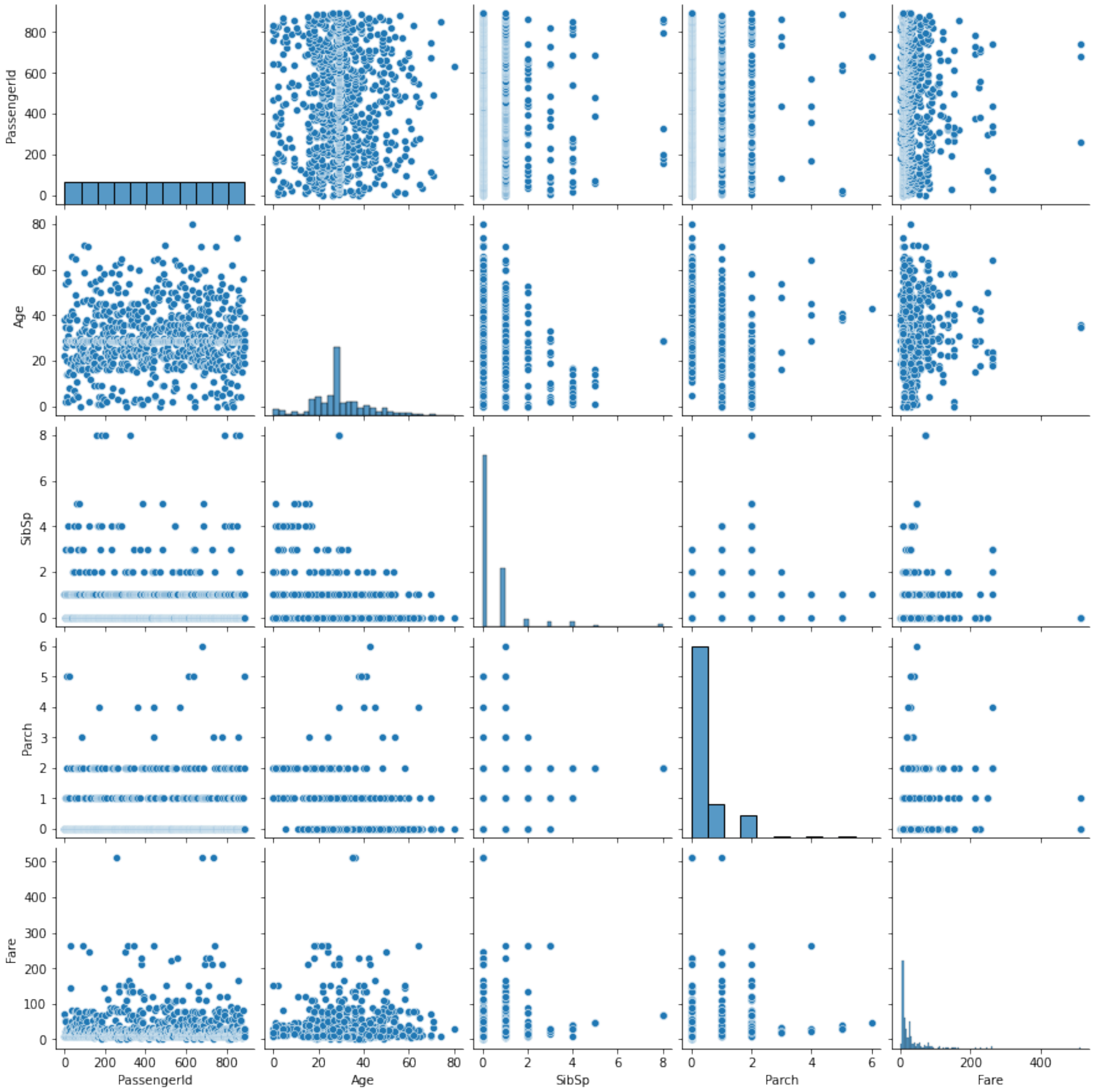
```
[43]: <seaborn.axisgrid.FacetGrid at 0x243956d9100>
```


200
150
100
50
0
Count
0
50
100
150
200
250
Fare



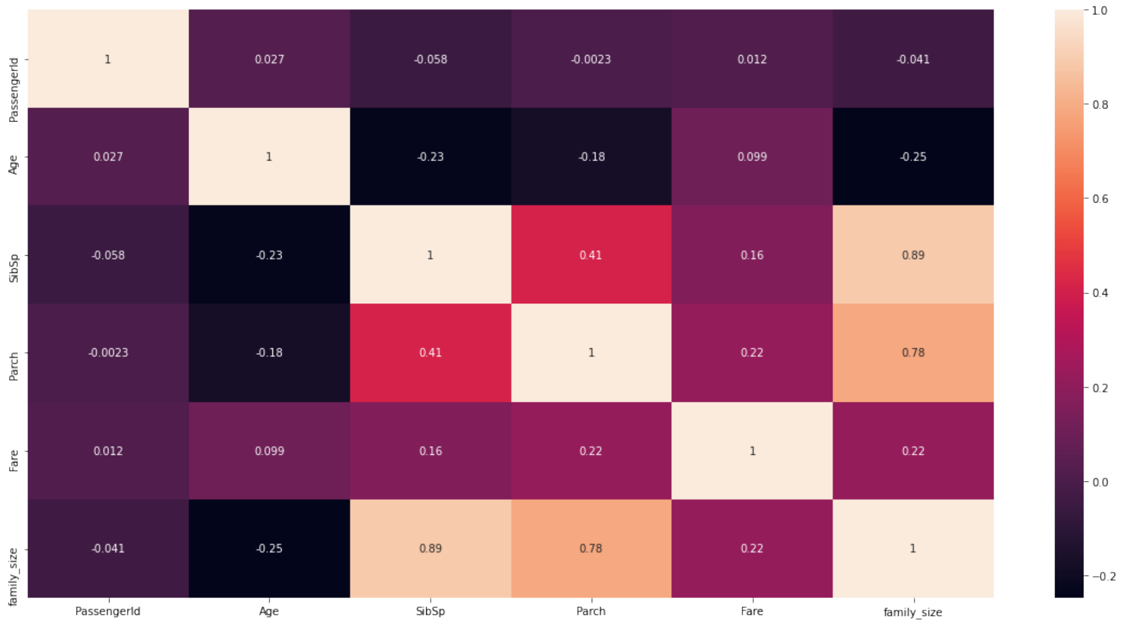
[44]:
```
plt.figure(figsize=(20, 10))
sns.pairplot(df)
plt.show()
```

```
<Figure size 1440x720 with 0 Axes>
```



[70]:

```
plt.figure(figsize=(20, 10))
sns.heatmap(df.corr(), annot=True)
plt.show()
```



[46]:
```
df['family_size'] = df['Parch'] + df['SibSp']
# random 5 ta dekhabe jekhane family_size thakbe
df.sample(5)
```

[46]:
```
     PassengerId Survived Pclass                          Name     Sex  Age  \
534          535        0      3             Cacic, Miss. Marija  female   30
644          645        1      3          Baclini, Miss. Eugenie  female    0
808          809        0      2              Meyer, Mr. August    male   39
529          530        0      2      Hocking, Mr. Richard George    male   23
448          449        1      3  Baclini, Miss. Marie Catherine  female    5

     SibSp  Parch  Ticket     Fare Embarked  family_size
534      0      0  315084   8.6625        S            0
644      2      1    2666  19.2583        C            3
808      0      0  248723  13.0000        S            0
529      2      1   29104  11.5000        S            3
448      2      1    2666  19.2583        C            3
```

[47]:
```
def family_type(number):
    if number==0:
        return 'Alone'
    elif number > 0 and number <= 4:
        return 'Medium'
    else:
        return 'Large'
```

[48]:
```
df['family_type'] = df['family_size'].apply(family_type)
```

[49]:
```
df.sample(5)
```

[49]:
```
     PassengerId Survived Pclass  \
261          262        1      3
146          147        1      3
534          535        0      3
763          764        1      1
111          112        0      3

                                          Name     Sex  Age  SibSp  Parch  \
261             Asplund, Master. Edvin Rojj Felix    male    3      4      2
146  Andersson, Mr. August Edvard ("Wennerstrom")    male   27      0      0
534                           Cacic, Miss. Marija  female   30      0      0
763     Carter, Mrs. William Ernest (Lucile Polk)  female   36      1      2
111                          Zabour, Miss. Hileni  female   14      1      0

     Ticket      Fare Embarked  family_size family_type
261  347077   31.3875        S            6       Large
146  350043    7.7958        S            0       Alone
534  315084    8.6625        S            0       Alone
763  113760  120.0000        S            3      Medium
111    2665   14.4542        C            1      Medium
```

[50]:
```
pd.crosstab(df['family_type'], df['Survived']).apply(lambda r: round((r/r.
↪sum())*100,1), axis = 1)
```

[50]:
```
Survived        0     1
family_type
Alone        69.6  30.4
Large        85.1  14.9
Medium       44.0  56.0
```

[51]:
```
df = df[df['Age'] <  (df['Age'].mean() + 3 * df['Age'].std())]
df.shape
```

[51]:
```
(884, 13)
```