Python Report 1

June 6, 2025

1 Titanic Dataset Analysis

DSC 140

Leo Sanchez

[ ]:

```
# Imports
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import seaborn as sns
from scipy.stats import *
```

[78]:

```
# Uploading data file
titanic = pd.read_csv('/Users/leo/Downloads/titanic_train.csv')
```

[79]:

```
# Looking at the first 5 lines of the data set
titanic.head(5)
```

[79]:

```
   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
```

[80]:
```python
titanic.columns
```

[80]:
```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

[81]:
```python
# Dropping na values
titanic.dropna()
titanic.dropna(subset=['Parch','Cabin'])
titanic.head()
```

[81]:
```
   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
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   Parch            Ticket     Fare Cabin Embarked
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2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```
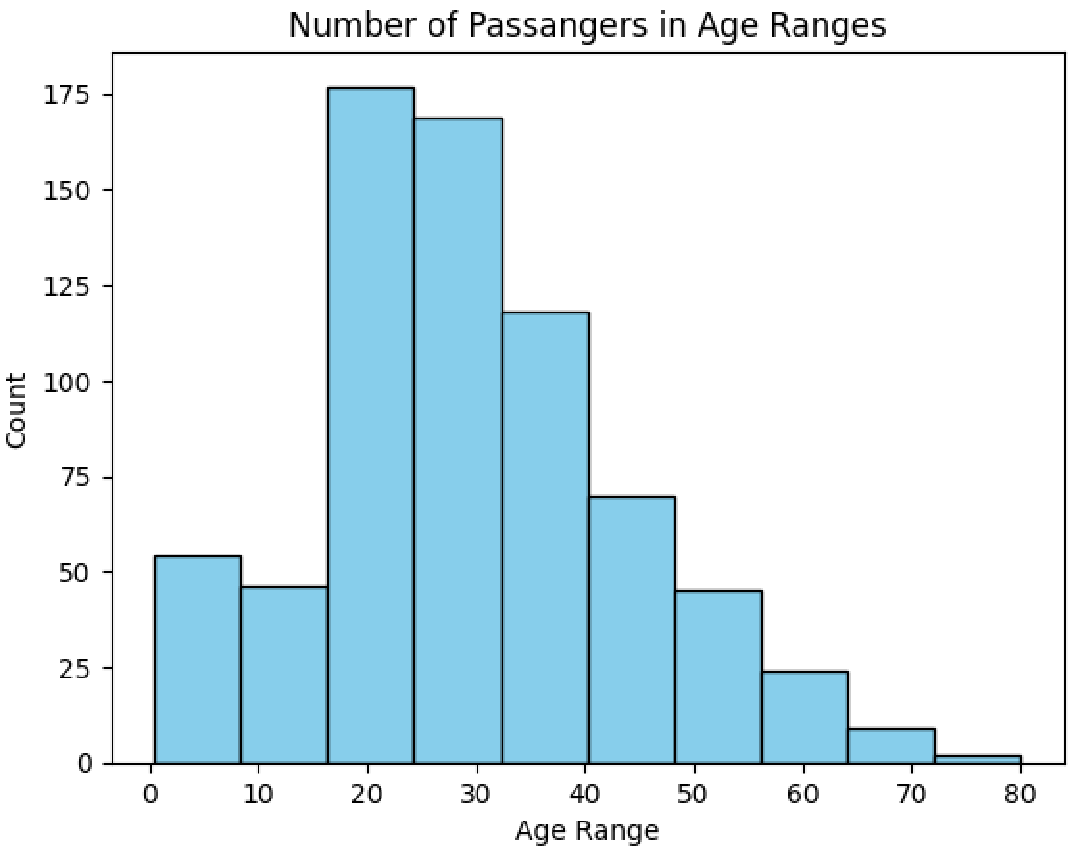

[82]:
```python
# Assigning variable names to each column for better sintax
passangerld = titanic['PassengerId']
survived = titanic["Survived"]
Pclas = titanic['Pclass']
name = titanic['Name']
sex = titanic['Sex']
age = titanic['Age']
SibSP = titanic['SibSp']
Parch = titanic['Parch']
ticket = titanic['Ticket']
Fare = titanic['Fare']
```

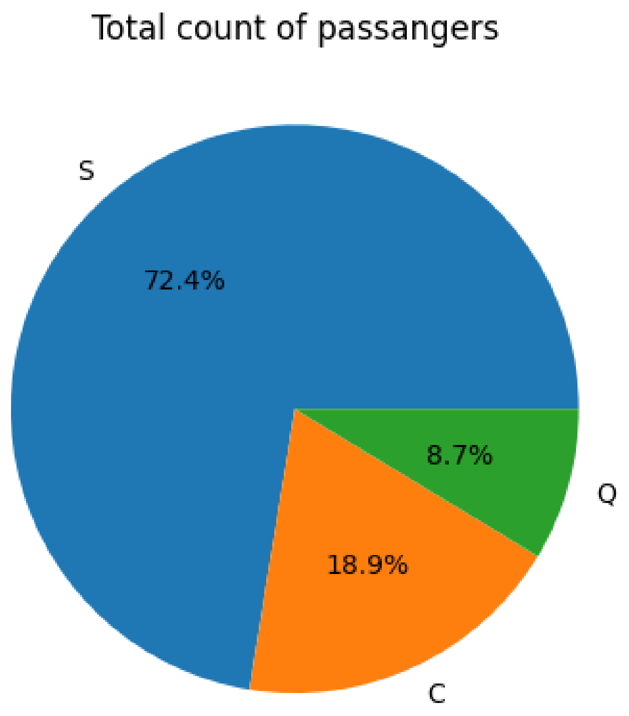
```
Cabin = titanic['Cabin']
Emabarked = titanic['Embarked']
```

[83]:
```
plt.figure()
plt.hist(age,bins=10, color='skyblue',edgecolor='black')
plt.xlabel('Age Range')
plt.ylabel('Count')
plt.title('Number of Passangers in Age Ranges')
```

[83]:
```
Text(0.5, 1.0, 'Number of Passangers in Age Ranges')
```



[84]:
```
# Correlation bewteen survival and embarked location
Embarked_counts = pd.Series(titanic['Embarked']).value_counts()
plt.figure()
plt.pie(Embarked_counts, labels=Embarked_counts.index, autopct='%1.1f%%')
plt.title('Total count of passangers')
plt.show()
```



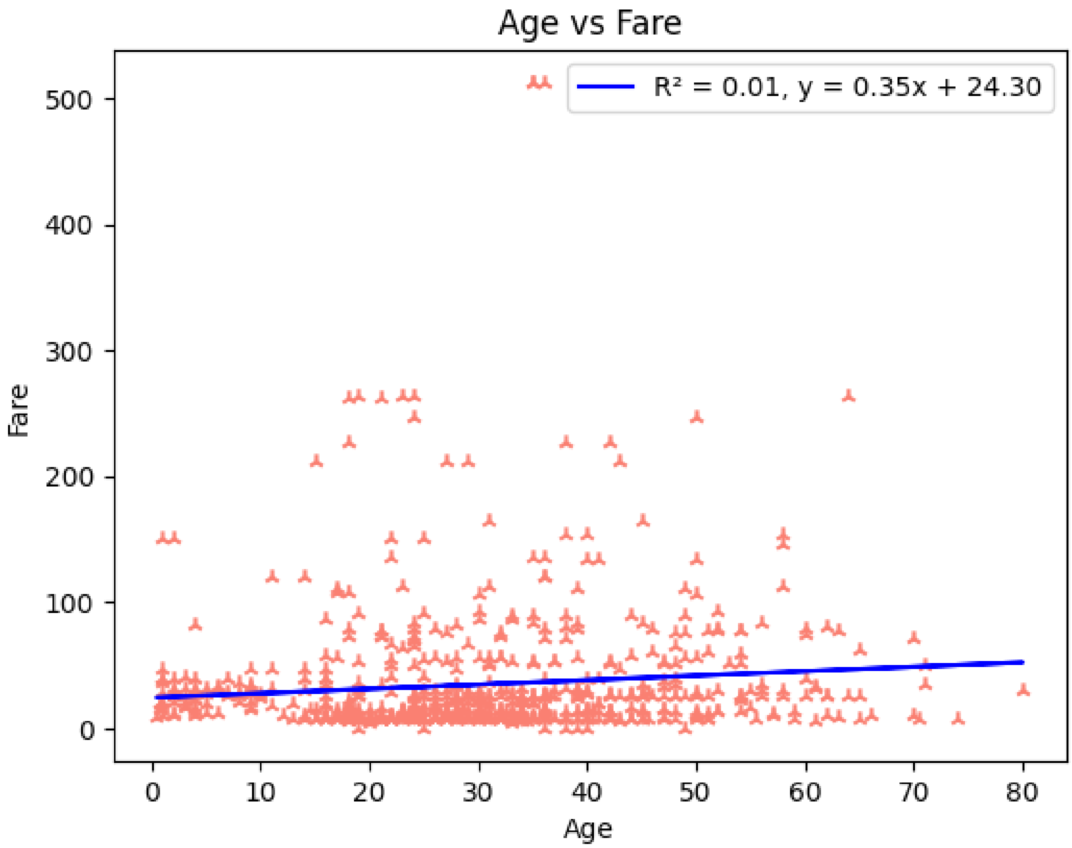
[85]:

```
filtered_data = pd.DataFrame({'Age': age, 'Fare': Fare}).dropna()
age = filtered_data['Age']
Fare = filtered_data['Fare']
```

[89]:

```
# Scatter plot Age vs Fare
plt.figure()
plt.scatter(age, Fare, color = 'salmon', marker='2')
slope, intercept, r_value, p_value, std_err = linregress(age, Fare)
plt.plot(age, slope * np.array(age) + intercept, color='blue', label=f'R² =␣
  ↪{r_value**2:.2f}, y = {slope:.2f}x + {intercept:.2f}')
plt.title('Age vs Fare')
plt.xlabel('Age')
plt.ylabel('Fare')
plt.legend()
plt.show()
```

```
Intel MKL WARNING: Support of Intel(R) Streaming SIMD Extensions 4.2 (Intel(R)
SSE4.2) enabled only processors has been deprecated. Intel oneAPI Math Kernel
Library 2025.0 will require Intel(R) Advanced Vector Extensions (Intel(R) AVX)
instructions.
```



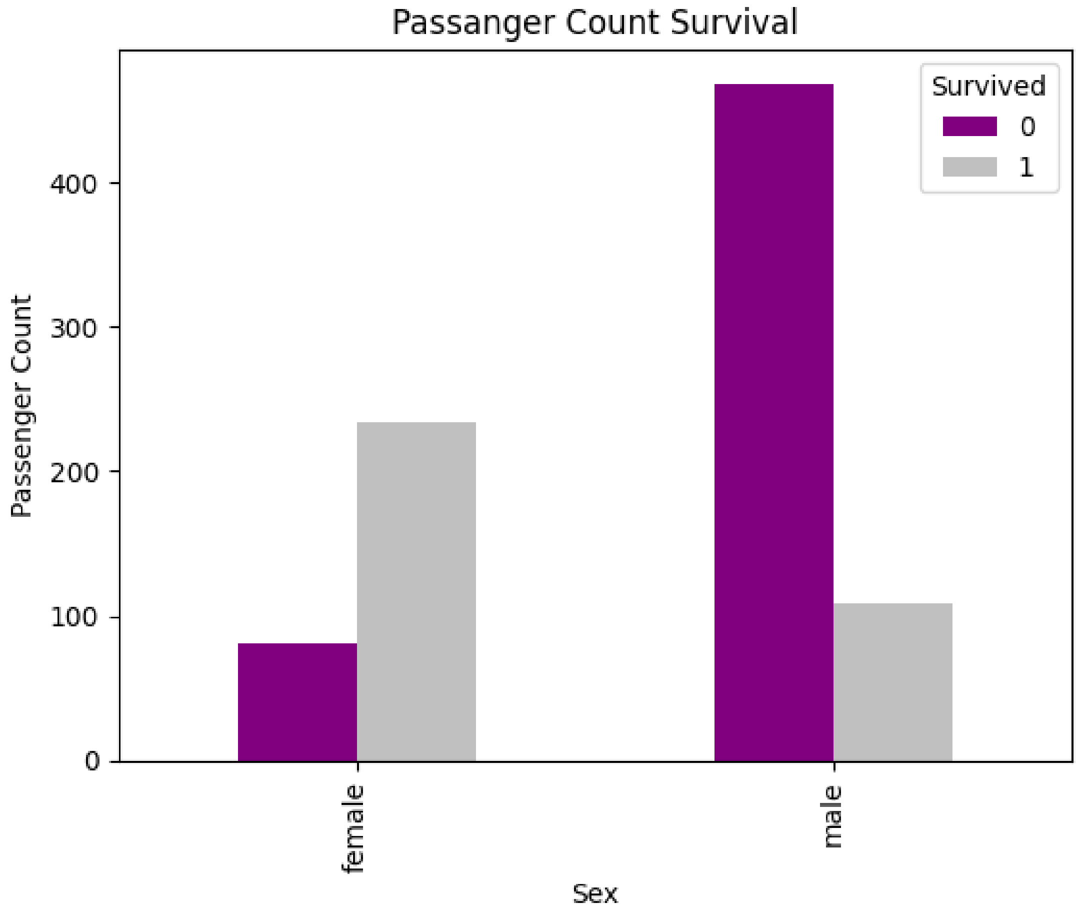
```
[87]: # Pivot table comparing the Fare bewtween sex and Pclass
      df_pt = pd.pivot_table(titanic, values="Fare",\
                             columns=["Sex"], index=["Pclass"],\
                             aggfunc="mean")
      print(df_pt)
```

```
Sex         female       male
Pclass
1       106.125798  67.226127
2        21.970121  19.741782
3        16.118810  12.661633
```

```
[88]: # Pivot table counting the passangers that survived depending on the sex
      df_pt = pd.pivot_table(titanic, values="PassengerId",\
                             columns=["Survived"], index=["Sex"],\
                             aggfunc='count')

      # Bar graph for Pivot table
      df_pt.plot(kind='bar', xlabel='Sex',ylabel='Passenger Count',title='Passanger␣
       ↪Count Survival', color= ['Purple', 'Silver'])
```

```
'''
the plot shows that most of the male passangers died, and that most female␣
↪passangers survived
0 means that they died and 1 means that they survived according to the␣
↪information in the website the data file came from
'''
```

[88]:
```
'\nthe plot shows that most of the male passangers died, and that most female
passangers survived\n0 means that they died and 1 means that they survived
according to the information in the website the data file came from\n'
```



[ ]:
```
# Pivot table counting the passengers that survived depending on the sex
df_pt = pd.pivot_table(titanic, values="PassengerId", columns=["Survived"],␣
↪index=["Sex"], aggfunc='count')

# Perform chi-square test
chi2, p, dof, expected = chi2_contingency(df_pt)
```

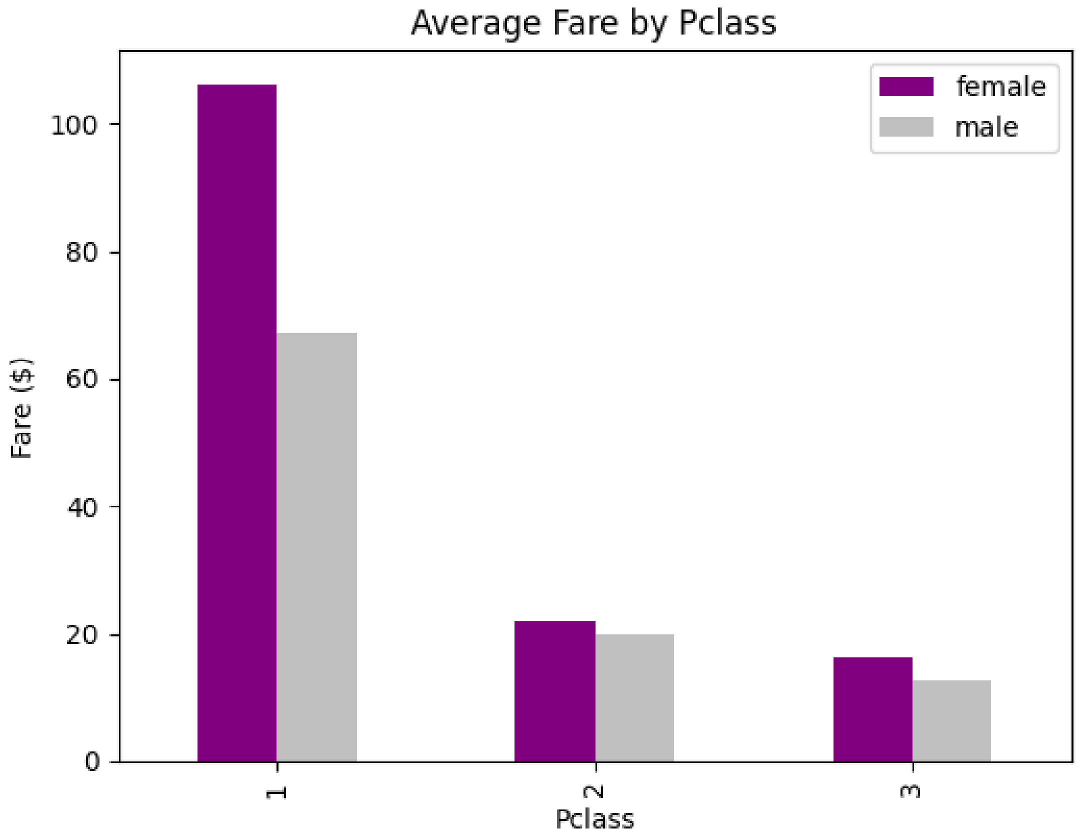
```
# Display results
print(df_pt)
print("p-value:", p)
print("Expected frequencies:\n", expected)
```

```
Survived    0    1
Sex
female     81  233
male      468  109
p-value: 1.1973570627755645e-58
Expected frequencies:
 [[193.47474747 120.52525253]
 [355.52525253 221.47474747]]
```

[97]:
```
# Pivot table comparing the Fare bewtween sex and Pclass
df_pt = pd.pivot_table(titanic, values="Fare",\
                              columns=["Sex"], index=["Pclass"],\
                              aggfunc="mean")
print(df_pt)
# Bar plot for the pivot table above to have a visual representation
df_pt.plot(kind='bar', xlabel= 'Pclass', ylabel='Fare ($)',title='Average Fare␣
 ↪by Pclass',color= ['Purple', 'Silver'])
plt.legend(loc='upper right')
```

```
Sex         female       male
Pclass
1       106.125798  67.226127
2        21.970121  19.741782
3        16.118810  12.661633
```

[97]:
```
<matplotlib.legend.Legend at 0x7fea807bdb20>
```


Average Fare by Pclass
female
male
Fare ($)
0
20
40
60
80
100
1
2
3
Pclass

```
[ ]:
```