NYCU 數學建模所洪翊誠 ID : 310653005

[1]:

```
import pandas as pd
train_df = pd.read_csv(r'D:\YCHung\Class\資料探勘\DataSet\titanic\train.csv')
test_df = pd.read_csv(r'D:\YCHung\Class\資料探勘\DataSet\titanic\test.csv')

# train_df.head()
print(f'The Training Dataset contains, Rows: {train_df.shape[0]} & Columns:␣
 ↪{train_df.shape[1]}')
print(f'The Test Dataset contains, Rows: {test_df.shape[0]} & Columns: {test_df.
 ↪shape[1]}')
```

```
The Training Dataset contains, Rows: 891 & Columns: 12
The Test Dataset contains, Rows: 418 & Columns: 11
```

瀏覽資料

[2]:

```
train_df.head()
```

[2]:

```
   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
```

[3]:

```
train_df.describe()
```

[3]:

```
       PassengerId    Survived      Pclass         Age       SibSp  \
count   891.000000  891.000000  891.000000  714.000000  891.000000
mean    446.000000    0.383838    2.308642   29.699118    0.523008
std     257.353842    0.486592    0.836071   14.526497    1.102743
min       1.000000    0.000000    1.000000    0.420000    0.000000
25%     223.500000    0.000000    2.000000   20.125000    0.000000
```

```
50%     446.000000    0.000000    3.000000   28.000000    0.000000
75%     668.500000    1.000000    3.000000   38.000000    1.000000
max     891.000000    1.000000    3.000000   80.000000    8.000000

            Parch        Fare
count  891.000000  891.000000
mean     0.381594   32.204208
std      0.806057   49.693429
min      0.000000    0.000000
25%      0.000000    7.910400
50%      0.000000   14.454200
75%      0.000000   31.000000
max      6.000000  512.329200
```

檢查缺失值以及觀察欄位型態屬於何種數值型態，或是類別型態

[4]:

```
train_df.info()
print()
print(train_df.isnull().sum())
# numeric_features = train_df.select_dtypes(exclude=['object']).columns
```

```
<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
```

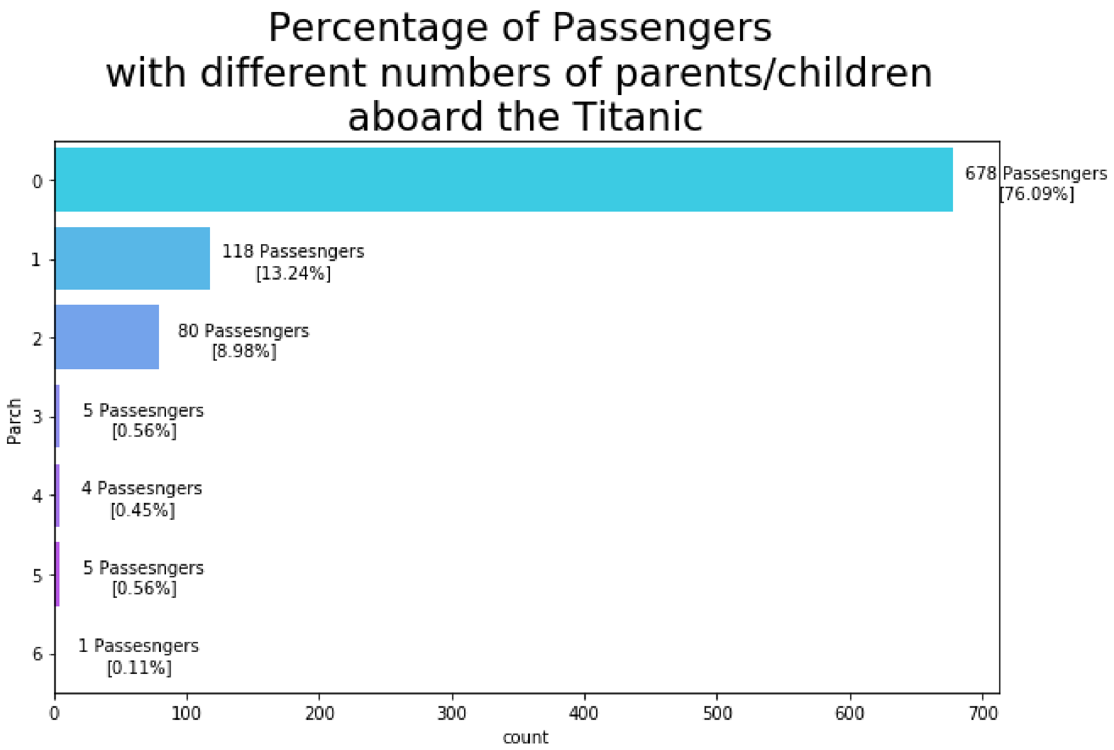
Define : horizontal_bar_plot

Define : bar_plot

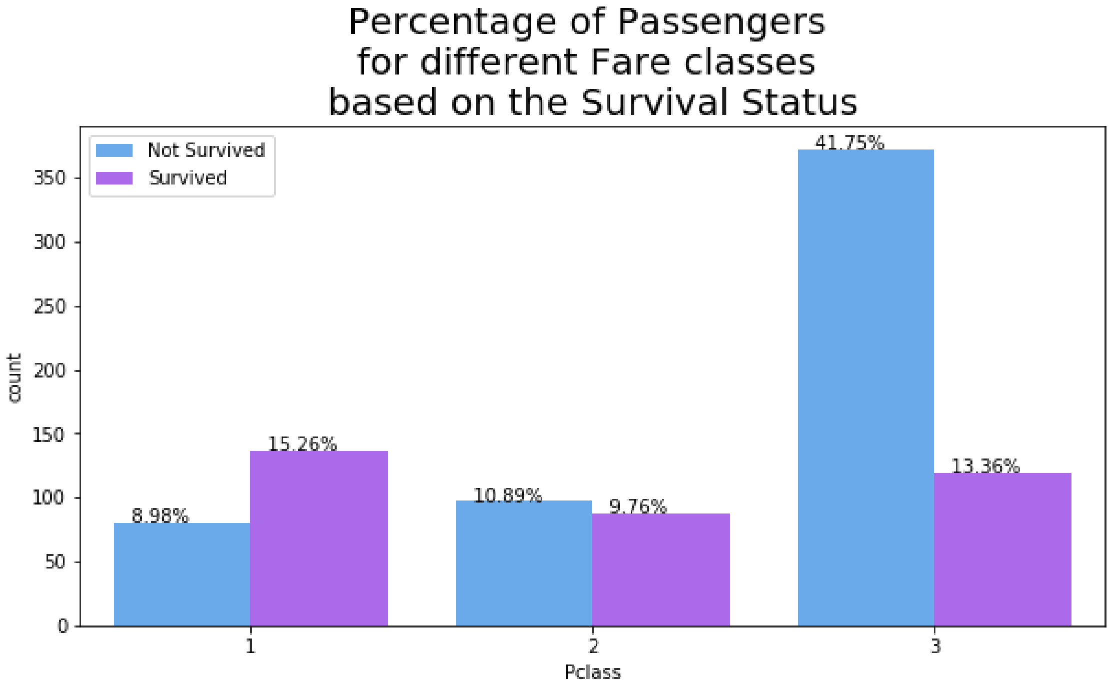
定義繪圖函數，視覺化觀察數據分布挑選可能可幫助分類的類別型特徵

```
[7]: import seaborn as sns
     import matplotlib.pyplot as plt

     def horizontal_bar_plot(feature, dataframe, color, title, adjust, figsize,␣
      ↪hue=None):
         # Create barplot
         plt.figure(figsize=figsize)

         if hue == None:
             ax = sns.countplot(y=feature, data=dataframe, palette=color)
         else:
             ax = sns.countplot(y=feature, data=dataframe, palette=color, hue=hue)

         # Annotate every single Bar with its value, based on it's width
         for p in ax.patches:
             width = p.get_width()
             plt.text(p.get_width()+adjust[0], p.get_y()+adjust[1]*p.get_height(),
                   '{} Passesngers\n[{:.2f}%]'.format(int(width), width*100/
      ↪train_df[feature].shape[0]),
                   ha='center', va='center')

         plt.title(title, fontsize=23)
         return None

     def bar_plot(attribute, data, color, title, size, space, comparison = None,␣
      ↪comparison_order=None):
         plt.figure(figsize=size)
         if comparison == None:
             ax = sns.countplot(x = attribute, data = data, palette=color)
         else:
             ax = sns.countplot(x = attribute, hue = comparison,␣
      ↪hue_order=comparison_order, data = data, palette=color)
         total = len(data)

         for i in ax.patches:
             percentage = ' '*space + '{:.2f}%'.format((i.get_height()/total)*100)
             x = i.get_x()
             y = i.get_height()
             ax.annotate(percentage, (x,y))
         plt.title(title, size = 20)
         return None
```

```
[8]: numeric_df = train_df[numeric_features]
     horizontal_bar_plot('Parch', numeric_df, 'cool',
                         "Percentage of Passengers \nwith different numbers of␣
      ↪parents/children \naboard the Titanic",
                         (63, 0.55), (10, 6))
```



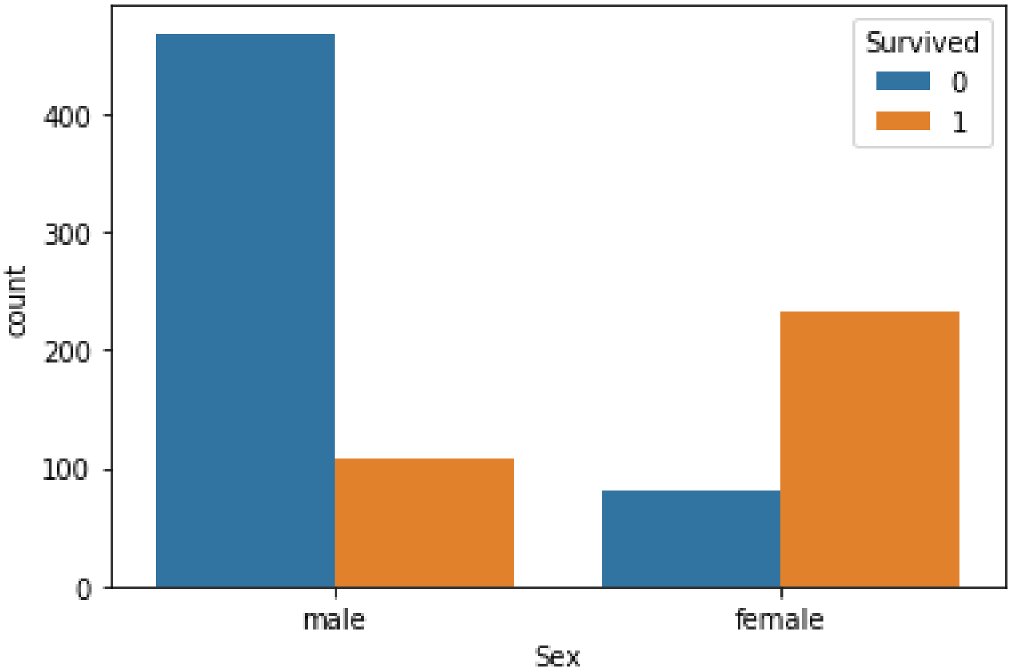
```
[9]: bar_plot('Pclass', numeric_df, 'cool',
              "Percentage of Passengers \nfor different Fare classes \nbased on the␣
      ↪Survival Status",
              (10, 5), 3, 'Survived')

     plt.legend(loc='upper left', labels=['Not Survived', 'Survived']);
```



船上男生女生生還死亡人數統計 & 生存比

```
[10]: # 船上男生女生生還死亡人數統計 & 生存比
      sns.countplot(train_df['Sex'], hue=train_df['Survived'])
      display(train_df[['Sex','Survived']].groupby(['Sex'], as_index=False).mean().
       ↪round(3))
```

```
      Sex  Survived
0  female     0.742
1    male     0.189
```



Start Build the model

將乘客 ID，姓名，票，船艙挑掉　原因:
ID，沒能給更多資訊純粹編碼計人數用
姓名，沒有特別將稱呼抓出來分析，認為有性別欄位在，姓名資訊量較少 (當然可以針對家族進行分群分析，但認為可能會太多類別)
票，沒有下手的概念，有文字也有代碼參雜，選擇移除
船艙，因為缺失值過多，故拔除，認為 Pclass 可以更有效提供訊息

將留存下來的類別欄位轉換成 one-hot encoding
將剩餘數值型態缺失值用中位數填補

分類器選擇: **RandomForestClassifier**

[11]:
```python
from sklearn.ensemble import RandomForestClassifier
def Prepocessing(df):
    df= df.drop(labels= ['PassengerId', 'Name', 'SibSp', 'Ticket', 'Cabin'], axis=1)
    df = pd.get_dummies(df)
#     df = df[numeric_features]
    df = df.fillna(df.median())
    df_X = df.drop(labels = ['Survived'], axis = 1)
    df_y = df['Survived']
    return df_X, df_y

def Training(X,y):
    model = RandomForestClassifier( random_state=2, n_estimators=100,␣
 ↪criterion='gini', min_samples_split=20, oob_score=True)
    model.fit(X,y)
    return model

def TestPrepocessing(df):
    ID = df['PassengerId']
    df = df.drop(labels= ['PassengerId', 'Name', 'SibSp', 'Ticket', 'Cabin'],␣
 ↪axis=1)
    df = pd.get_dummies(df)
    df = df.fillna(df.median())
    return ID, df

def Predict(model, X):
    return model.predict(X)
```

[12]:

```
X, y = Prepocessing(train_df)
model = Training(X, y)
```

[13]:

```
# X = X.fillna(X.mean())
X.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 9 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   Pclass      891 non-null    int64
 1   Age         891 non-null    float64
 2   Parch       891 non-null    int64
 3   Fare        891 non-null    float64
 4   Sex_female  891 non-null    uint8
 5   Sex_male    891 non-null    uint8
 6   Embarked_C  891 non-null    uint8
 7   Embarked_Q  891 non-null    uint8
 8   Embarked_S  891 non-null    uint8
dtypes: float64(2), int64(2), uint8(5)
memory usage: 32.3 KB
```

[14]:

```
ID, test = TestPrepocessing(test_df)
Prediction = Predict(model, test)
```

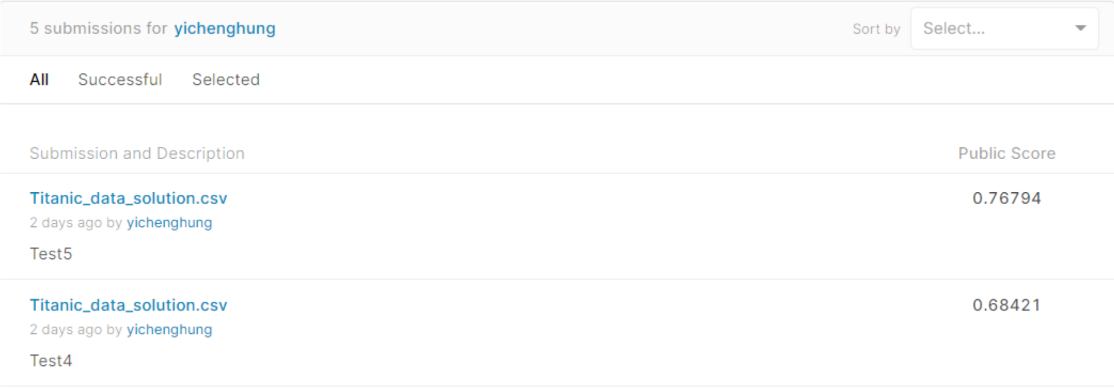
[15]:

```
submission= pd.DataFrame({"PassengerId": ID, "Survived": Prediction})
submission.to_csv("Titanic_data_solution.csv ", index=False)
```

```
print("Your submission was successfully saved!")
```

```
Your submission was successfully saved!
```

My Submission Score Result



5 submissions for yichenghung

Sort by Select...

All Successful Selected

Submission and Description	Public Score
Titanic_data_solution.csv 2 days ago by yichenghung Test5	0.76794
Titanic_data_solution.csv 2 days ago by yichenghung Test4	0.68421