Titanic Data Analysis (Homework1)

I-Hsuan Wu

2025-02-22

目錄

1. 讀取 Titanic 數據集，並查看數據結構

```
df <- read.csv("C:/Users/user/Downloads/titanic.csv")
```

下表顯示了 Titanic 數據集的結構和基本統計資訊，包括變數的類型與連續型變數的數值分布。

```
str(df)
```

```
'data.frame':	891 obs. of  12 variables:
 $ PassengerId: int  1 2 3 4 5 6 7 8 9 10 ...
 $ Survived   : int  0 1 1 1 0 0 0 0 1 1 ...
 $ Pclass     : int  3 1 3 1 3 3 1 3 3 2 ...
 $ Name       : chr  "Braund, Mr. Owen Harris" "Cumings, Mrs. John Bradley (Florence Briggs Thayer)" "He
 $ Sex        : chr  "male" "female" "female" "female" ...
 $ Age        : num  22 38 26 35 35 NA 54 2 27 14 ...
 $ SibSp      : int  1 1 0 1 0 0 0 3 0 1 ...
 $ Parch      : int  0 0 0 0 0 0 0 1 2 0 ...
 $ Ticket     : chr  "A/5 21171" "PC 17599" "STON/O2. 3101282" "113803" ...
 $ Fare       : num  7.25 71.28 7.92 53.1 8.05 ...
 $ Cabin      : chr  "" "C85" "" "C123" ...
 $ Embarked   : chr  "S" "C" "S" "S" ...
```

```r
summary(df)
```

```
  PassengerId       Survived          Pclass          Name          
 Min.   :  1.0   Min.   :0.0000   Min.   :1.000   Length:891        
 1st Qu.:223.5   1st Qu.:0.0000   1st Qu.:2.000   Class :character  
 Median :446.0   Median :0.0000   Median :3.000   Mode  :character  
 Mean   :446.0   Mean   :0.3838   Mean   :2.309                     
 3rd Qu.:668.5   3rd Qu.:1.0000   3rd Qu.:3.000                     
 Max.   :891.0   Max.   :1.0000   Max.   :3.000                     
                                                                    
     Sex                 Age            SibSp           Parch       
 Length:891         Min.   : 0.42   Min.   :0.000   Min.   :0.0000  
 Class :character   1st Qu.:20.12   1st Qu.:0.000   1st Qu.:0.0000  
 Mode  :character   Median :28.00   Median :0.000   Median :0.0000  
                    Mean   :29.70   Mean   :0.523   Mean   :0.3816  
                    3rd Qu.:38.00   3rd Qu.:1.000   3rd Qu.:0.0000  
                    Max.   :80.00   Max.   :8.000   Max.   :6.0000  
                    NA's   :177                                     
    Ticket               Fare           Cabin             Embarked        
 Length:891         Min.   :  0.00   Length:891         Length:891        
 Class :character   1st Qu.:  7.91   Class :character   Class :character  
 Mode  :character   Median : 14.45   Mode  :character   Mode  :character  
                    Mean   : 32.20                                        
                    3rd Qu.: 31.00                                        
                    Max.   :512.33                                        
```

下面顯示了各類別變數的類別分布情況，例如生還人數、不同艙等乘客比例、性別比例等，以瞭解乘客的基本分佈。

```r
table(df$Survived)
```

```

  0   1 
549 342 
```

```r
table(df$Pclass)
```

```
  1   2   3 
216 184 491 
```

```r
table(df$Sex)
```

```
female   male 
   314    577 
```

```r
table(df$Embarked)
```

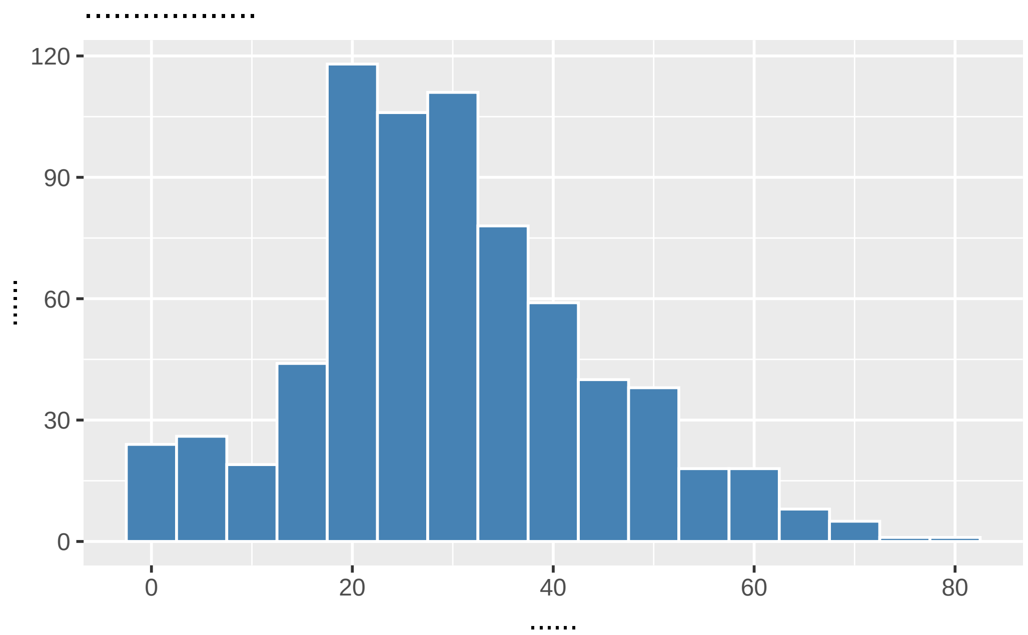
```
      C   Q   S 
  2 168  77 644 
```

2.視覺化

2.1乘客人口統計分析

2.1.1 乘客年齡分布

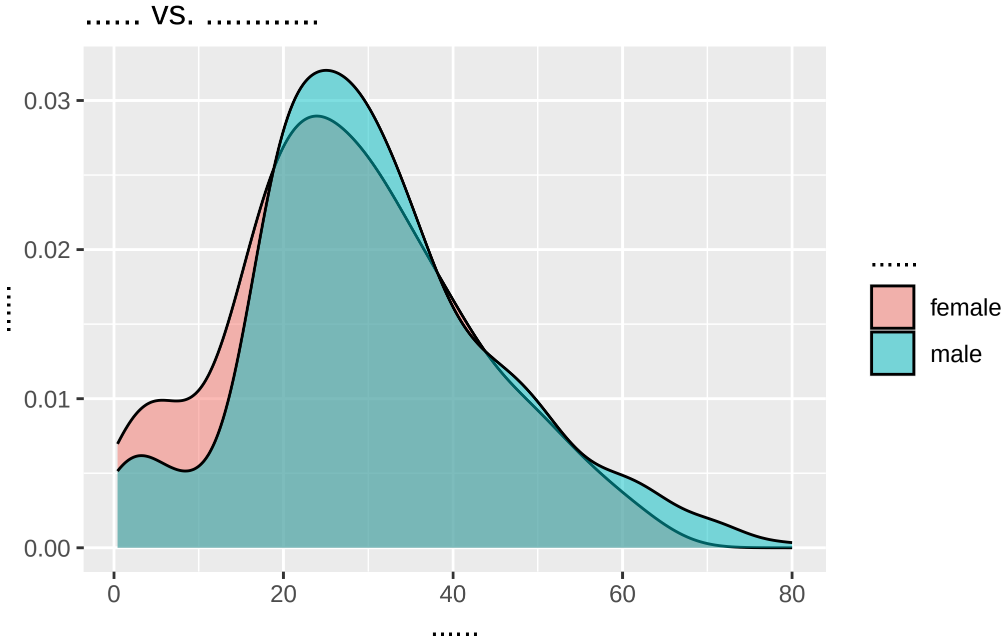
```r
ggplot(df, aes(x = Age)) +
  geom_histogram(binwidth = 5, fill = "steelblue", color = "white") +
  labs(title = "   ", x = " ", y = " ")
```



大部分乘客的年齡集中在20-30歲之間，表示該年齡層佔多數。

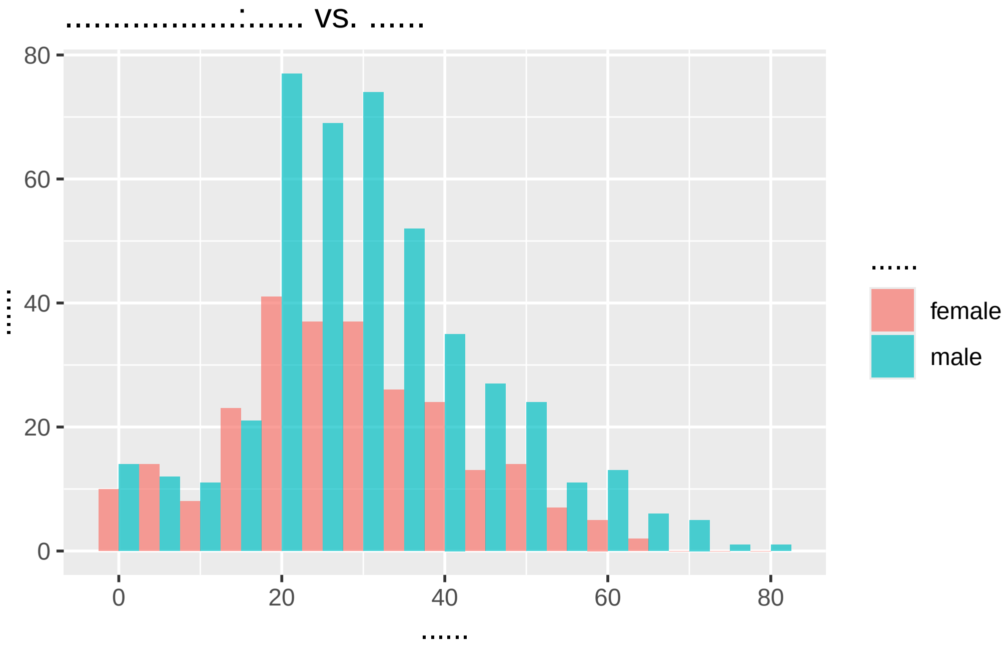
2.1.2 年齡與性別的關聯性

```r
ggplot(df, aes(x = Age, fill = Sex)) +
  geom_density(alpha = 0.5) +
  labs(title = "  vs.    ", x = " ", y = " ", fill = " ")
```



此圖顯示男性與女性的年齡分布。若女性年齡整體較小，則可能影響其生存率較高的結果。

```r
ggplot(df, aes(x = Age, fill = Sex)) +
  geom_histogram(binwidth = 5, position = "dodge", alpha = 0.7) +
  labs(title = "      vs.   ", x = " ", y = " ", fill = " ")
```

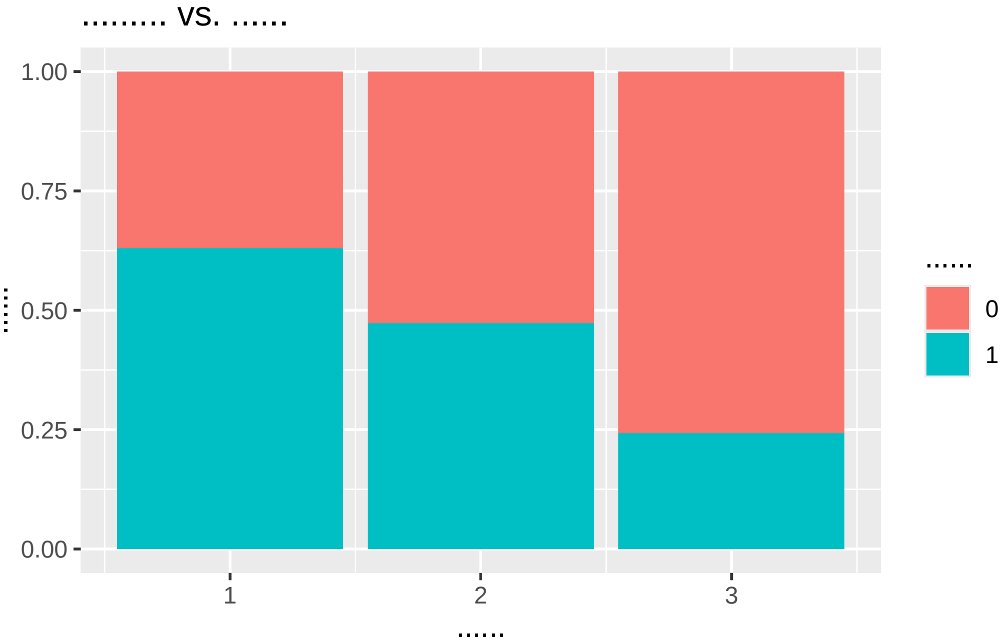


此圖比較不同年齡層的男女乘客人數，在20歲以後，男性的人數明顯高於女性，且在65歲以上，幾乎沒有女性。。

2.2 生存率分析

2.2.1 艙等與生存率

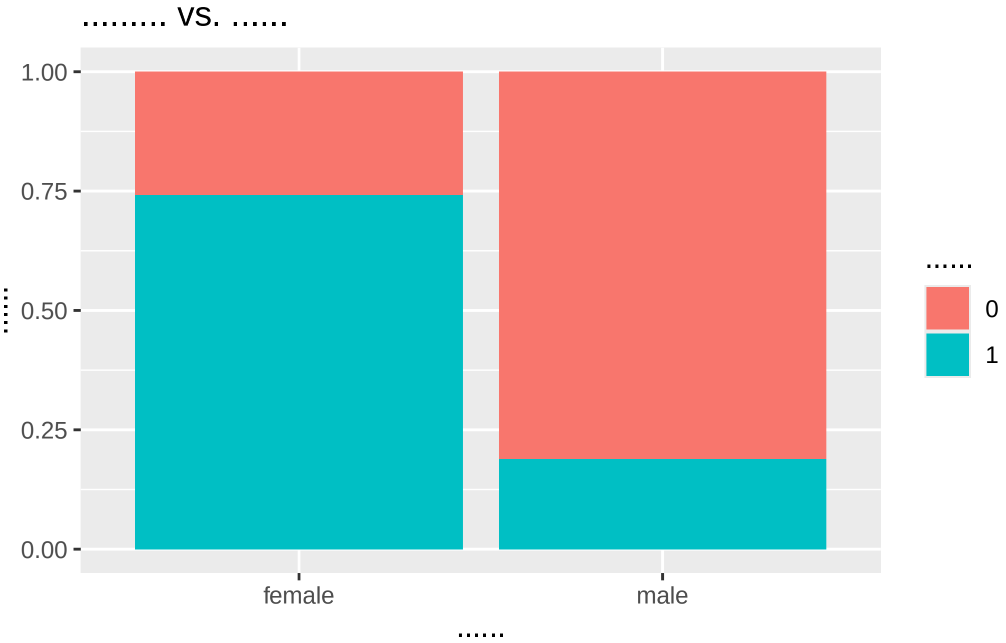
```
ggplot(df, aes(x = Pclass, fill = as.factor(Survived))) +
  geom_bar(position = "fill") +
  labs(title = "   vs.   ", y = " ", x = " ", fill = " ")
```



一等艙乘客的生存率最高，而三等艙的生存率最低，顯示艙等與生存機率有顯著關聯。

2.2.2 性別與生存率

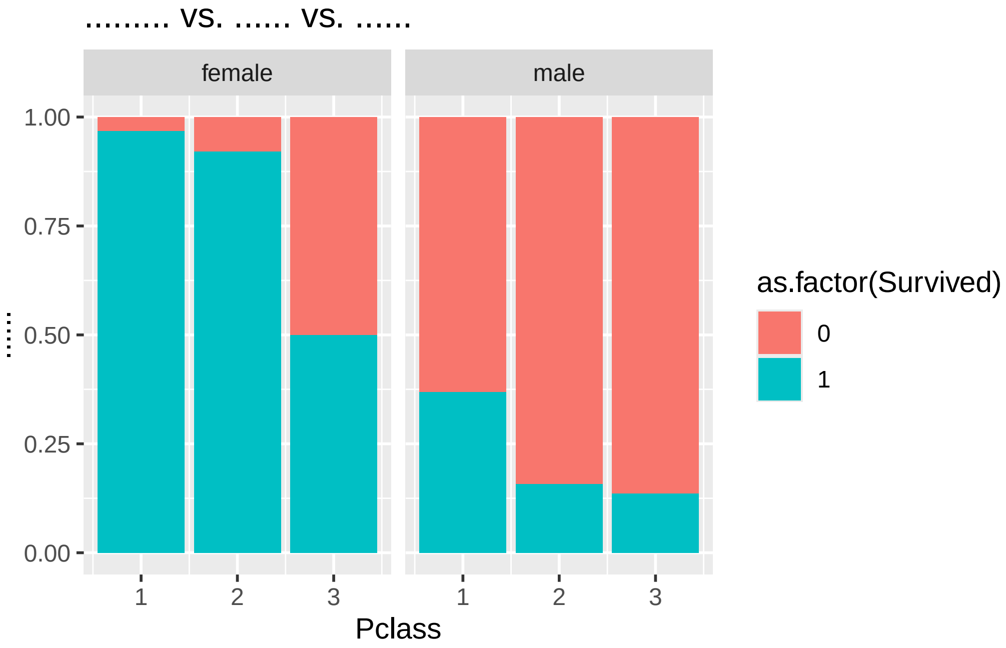
```r
ggplot(df, aes(x = Sex, fill = as.factor(Survived))) +
  geom_bar(position = "fill") +
  labs(title = "   vs.   ", y = " ", x = " ", fill = " ")
```



女性的生存率明顯高於男性。

2.2.3 艙等、性別與生存率

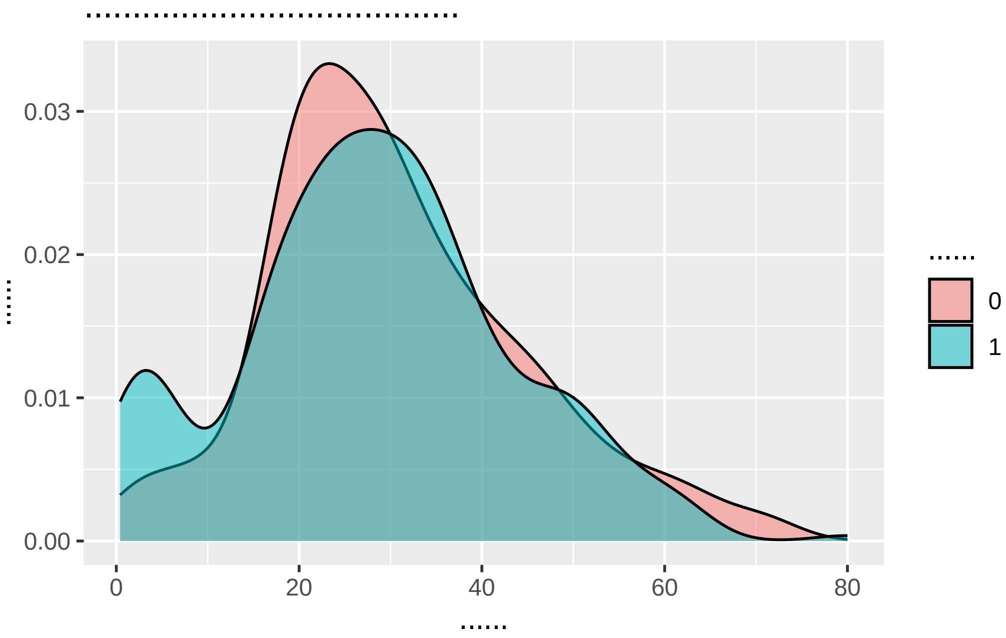
```
ggplot(df, aes(x = Pclass, fill = as.factor(Survived))) +
  geom_bar(position = "fill") +
  facet_wrap(~Sex) +
  labs(title = "  vs.   vs.  ", y = " ")
```



不同性別與艙等的生存率顯示：女性在所有艙等的生存率都明顯高於男性，特別是一等艙女性生存率最高，而三等艙男性生存率最低。

2.2.4 年齡與生存率

```
ggplot(df, aes(x = Age, fill = as.factor(Survived))) +
  geom_density(alpha = 0.5) +
  labs(title = "       ", x = " ", y = " ", fill = " ")
```

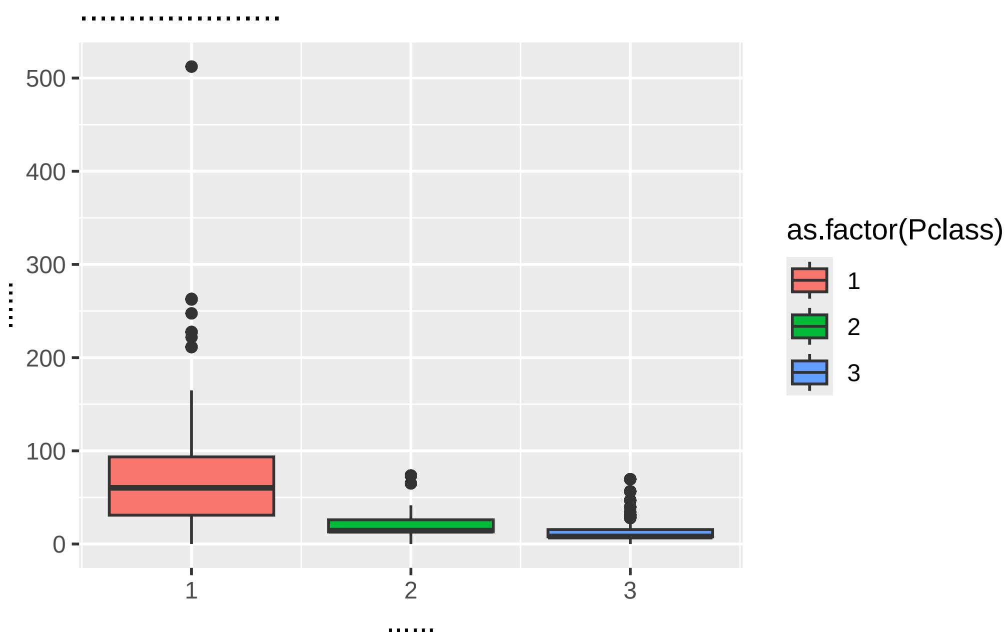


年齡與生存率的關聯顯示：年齡較小的乘客生存率較高，而年齡較大的乘客生存率則較低。

2.3 其他影響因素

2.3.1 艙等與票價分布

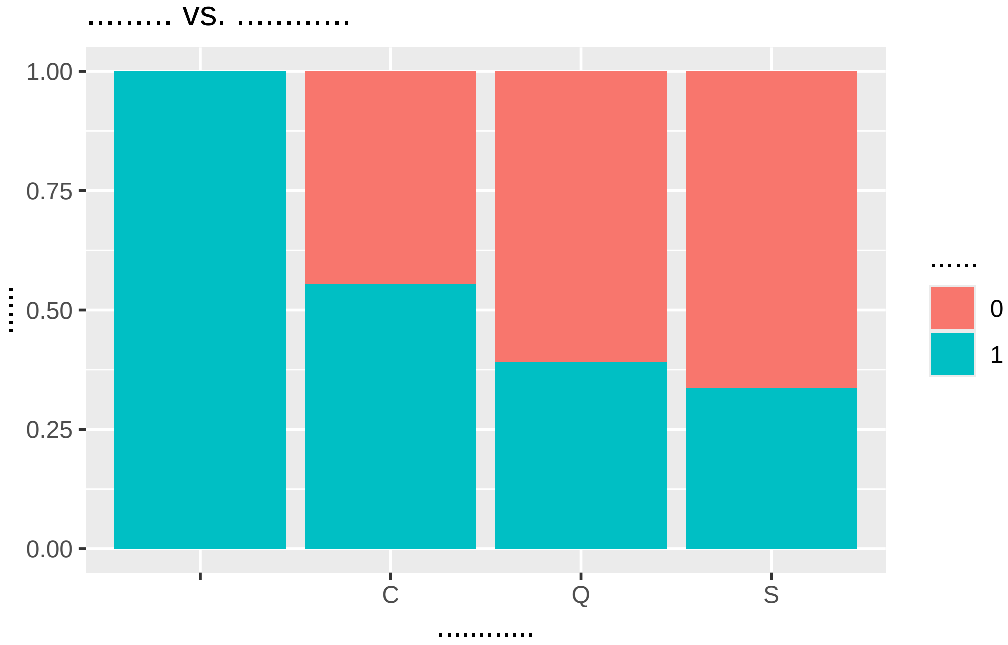
```
ggplot(df, aes(x = Pclass, y = Fare, fill = as.factor(Pclass))) +
  geom_boxplot() +
  labs(title = "    ", x = " ", y = " ")
```



票價的箱型圖顯示，一等艙的票價高於二、三等艙，顯示艙等與票價之間的差異。

2.3.2 登船港口與生存率

```
ggplot(df, aes(x = Embarked, fill = as.factor(Survived))) +
  geom_bar(position = "fill") +
  labs(title = "   vs.   ", y = " ", x = "  ", fill = " ")
```



從登船港口來看，從C港（Cherbourg）登船的乘客生存率最高。(因為未知的登船口資料從前面的類別結構來看只有兩筆，所以先忽略)

3. 統計描述與結論

- 年齡分布：大多數乘客年齡集中在20-30歲，且65歲以上幾乎都是男性乘客，孩童的生存率較高。
- 性別影響：女性的生存率顯著高於男性。
- 艙等影響：一等艙乘客的生存率遠高於二、三等艙。
- 票價與艙等：一等艙的票價高於二、三等艙。
- 登船港口影響：C港（Cherbourg）登船的乘客生存率最高。

以上結果顯示 Titanic 事故的生存機率可能受到多種因素影響，包括性別、艙等、年齡、票價與登船港口等。