Titanic

2020 年 12 月 24 日

目次

1 タイタニック号

https://ja.wikipedia.org/wiki/%E3%82%BF%E3%82%A4%E3%82%BF%E3%83%8B%E3%83%83%E3%82%AF_(%E5%AE%A2%E

https://ja.wikipedia.org/wiki/%E3%82%BF%E3%82%A4%E3%82%BF%E3%83%8B%E3%83%83%E3%82%AF%E5%8F%B7%E6%

[1]:
```
import IPython.display
IPython.display.YouTubeVideo('CHekzSiZjrY', width=960, height=540)
```

[1]:

変数名	Definition	Key
survival	生存状況	0 = No, 1 = Yes
pclass	チケットクラス	1 = 一等, 2 = 二等, 3 = 3 等
sex	性別	
Age	年齢	
sibsp	同乗した兄弟や配偶者の数	
parch	同乗した親や子の数	
ticket	チッケット番号	
fare	旅客運賃	
cabin	船室番号	
embarked	乗船港	C = Cherbourg (仏・シェルブール), Q = Queenstown, S = Southampton

1.1 乗船港

[140]:
```python
import folium

Cherbourg = [49.63, -1.62]
Queenstown = [51.851, -8.2967]
Southampton = [50.89696, -1.40416]
center = [(x+y+z)/3 for (x, y, z) in zip(Cherbourg, Queenstown, Southampton)]
# center =[45, 5]

m = folium.Map(location=center, tiles='Stamen Terrain', zoom_start=6)
```

```
folium.Marker(location=Cherbourg, popup='<b>Cherbourg</b>').add_to(m)
folium.Marker(location=Queenstown, popup='<b>Queenstown</b>').add_to(m)
folium.Marker(location=Southampton, popup='<b> Southampton</b>').add_to(m)


m
```

```
[140]: <folium.folium.Map at 0x7f9cc20b9510>
```

1.2 Init

```
[5]: import numpy as np
     import pandas as pd
     # pd.set_option('display.max_rows')
     import matplotlib.pyplot as plt
     import seaborn as sns
     sns.set(style='darkgrid', font_scale = 1.8)
     plt.rcParams['figure.dpi'] = 300
     %matplotlib inline
```

1.3 Load

```
[6]: df = pd.read_csv("./data/train.csv")
```

```
[43]: titanic = sns.load_dataset("titanic")
```

1.4 データの様子

```
[7]: df.head().style.set_properties(**{'text-align': 'left'}).set_table_styles([␣
     ↪dict(selector='th', props=[('text-align', 'left')] ) ])
```

```
[7]: <pandas.io.formats.style.Styler at 0x7f9cbe0f8650>
```

```
[29]: # 敬称を抽出する関数
      def Title(name):
          ret = 'Other'
          target = name.split(" ")
          for i in range(len(target)):
              if "." in target[i]:
                  ret = target[i]
                  break
          return ret
```

```
[30]: df['Title'] = df['Name'].apply(Title)
```

```
[26]: df['Title'].unique()
```

```
[26]: array(['Mr.', 'Mrs.', 'Miss.', 'Master.', 'Don.', 'Rev.', 'Dr.', 'Mme.',
             'Ms.', 'Major.', 'Lady.', 'Sir.', 'Mlle.', 'Col.', 'Capt.',
             'Countess.', 'Jonkheer.'], dtype=object)
```

```
[31]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 13 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
 12  Title        891 non-null    object
dtypes: float64(2), int64(5), object(6)
memory usage: 90.6+ KB
```

```
[32]: df.describe(include='all')
```

```
[32]:         PassengerId    Survived      Pclass  \
      count    891.000000  891.000000  891.000000
      unique          NaN         NaN         NaN
      top             NaN         NaN         NaN
      freq            NaN         NaN         NaN
      mean     446.000000    0.383838    2.308642
      std      257.353842    0.486592    0.836071
      min        1.000000    0.000000    1.000000
      25%      223.500000    0.000000    2.000000
      50%      446.000000    0.000000    3.000000
      75%      668.500000    1.000000    3.000000
      max      891.000000    1.000000    3.000000

                                          Name   Sex         Age       SibSp  \
      count                                891   891  714.000000  891.000000
      unique                               891     2         NaN         NaN
      top     Kenyon, Mrs. Frederick R (Marion)  male         NaN         NaN
      freq                                   1   577         NaN         NaN
      mean                                 NaN   NaN   29.699118    0.523008
```

```
std                                  NaN   NaN   14.526497    1.102743
min                                  NaN   NaN    0.420000    0.000000
25%                                  NaN   NaN   20.125000    0.000000
50%                                  NaN   NaN   28.000000    0.000000
75%                                  NaN   NaN   38.000000    1.000000
max                                  NaN   NaN   80.000000    8.000000

             Parch  Ticket        Fare    Cabin Embarked Title
count   891.000000     891  891.000000      204      889   891
unique         NaN     681         NaN      147        3    17
top            NaN  347082         NaN  B96 B98        S   Mr.
freq           NaN       7         NaN        4      644   517
mean      0.381594     NaN   32.204208      NaN      NaN   NaN
std       0.806057     NaN   49.693429      NaN      NaN   NaN
min       0.000000     NaN    0.000000      NaN      NaN   NaN
25%       0.000000     NaN    7.910400      NaN      NaN   NaN
50%       0.000000     NaN   14.454200      NaN      NaN   NaN
75%       0.000000     NaN   31.000000      NaN      NaN   NaN
max       6.000000     NaN  512.329200      NaN      NaN   NaN
```

[33]:
```
df.drop(['PassengerId', 'Name', 'Ticket', 'Cabin'], axis=1, inplace=True)
```

[34]:
```
df[['Survived', 'Pclass']] = df[['Survived', 'Pclass']].astype(str)
```

1.5 欠損値

[35]:
```
df.isna().sum()
```

[35]:
```
Survived      0
Pclass        0
Sex           0
Age         177
SibSp         0
Parch         0
Fare          0
Embarked      2
Title         0
dtype: int64
```

[36]:
```
df[df.isna().sum(axis=1)>0].head()
```

[36]:
```
   Survived Pclass     Sex  Age  SibSp  Parch     Fare Embarked  Title
5         0      3    male  NaN      0      0   8.4583        Q    Mr.
17        1      2    male  NaN      0      0  13.0000        S    Mr.
19        1      3  female  NaN      0      0   7.2250        C   Mrs.
26        0      3    male  NaN      0      0   7.2250        C    Mr.
28        1      3  female  NaN      0      0   7.8792        Q  Miss.
```

[37]:
```
df.dropna(subset=['Embarked'], inplace=True)
```

2 単変量分析

[38]:
```
print(df.columns.values)
```

```
['Survived' 'Pclass' 'Sex' 'Age' 'SibSp' 'Parch' 'Fare' 'Embarked' 'Title']
```

[39]:
```
cat = ['Survived', 'Pclass', 'Sex', 'Embarked', 'Title']
num = ['Age', 'SibSp', 'Parch', 'Fare']
print('NOE: cat=', len(cat))
print('NOE: num=', len(num))
```

```
NOE: cat= 5
NOE: num= 4
```

2.1 質的変数

[40]:
```
df[cat].describe()
```

[40]:
```
       Survived Pclass   Sex Embarked Title
count       889    889   889      889   889
unique        2      3     2        3    17
top           0      3  male        S   Mr.
freq        549    491   577      644   517
```

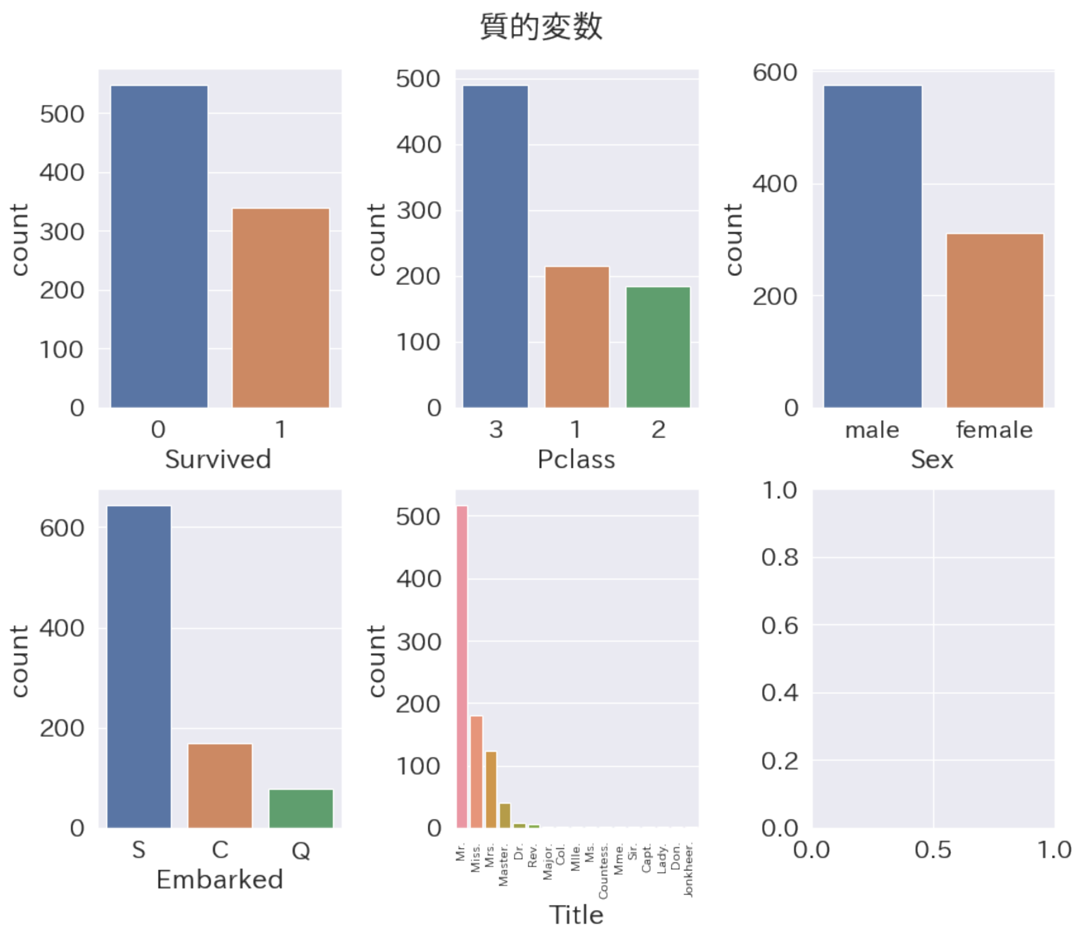
2.2 量的変数

[41]:
```
round(df[num].describe())
```

[41]:
```
         Age  SibSp  Parch   Fare
count  712.0  889.0  889.0  889.0
mean    30.0    1.0    0.0   32.0
std     14.0    1.0    1.0   50.0
min      0.0    0.0    0.0    0.0
25%     20.0    0.0    0.0    8.0
50%     28.0    0.0    0.0   14.0
75%     38.0    1.0    0.0   31.0
max     80.0    8.0    6.0  512.0
```

2.3 質的変数の棒グラフ

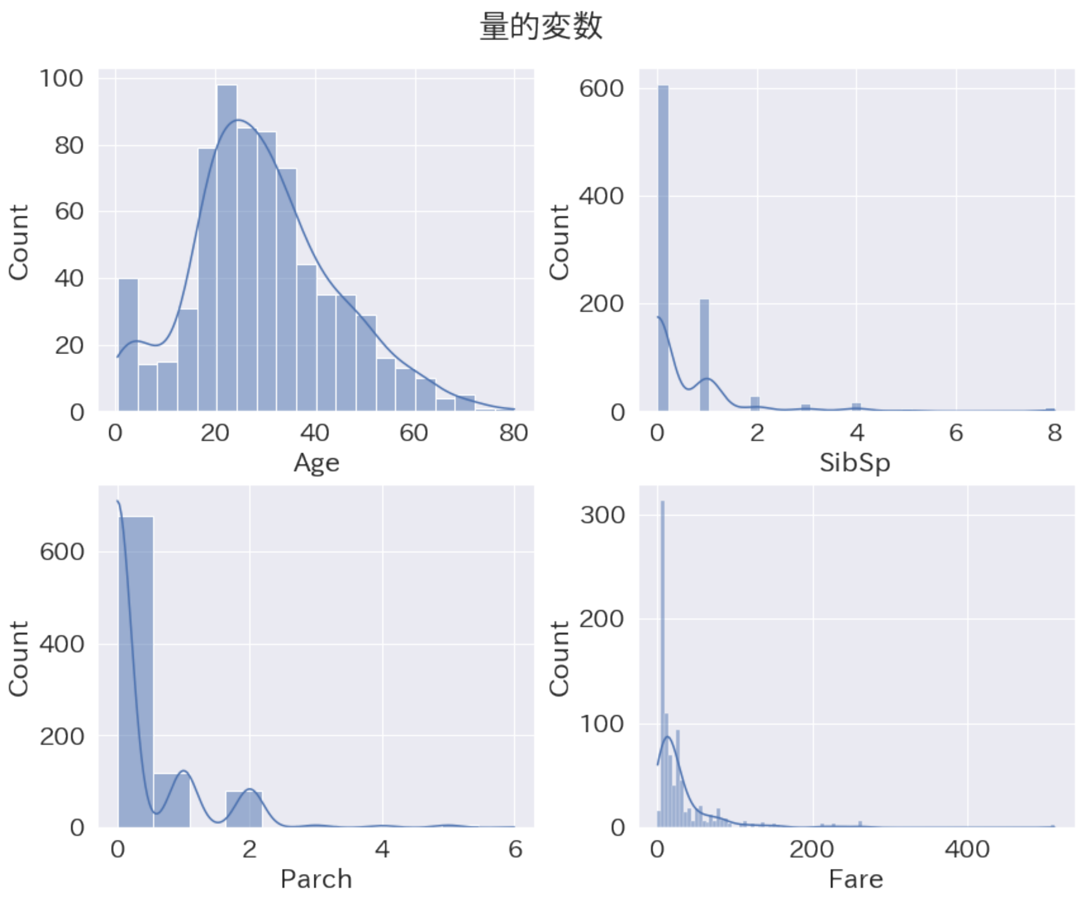
[60]:
```
nor, noc = 2, 3
fig, axs = plt.subplots(nor, noc, figsize=(12, 10))
for i in range(nor):
    for j in range(noc):
        k = noc*i + j
        if k < len(cat):
            sns.countplot(x=cat[k], data=df, order=df[cat[k]].value_counts().index,␣
 ↪ax=axs[i, j])
fig.tight_layout()
fig.suptitle('質的変数', fontsize=25)
fig.subplots_adjust(top=0.92)
labels = axs[1,1].get_xticklabels()
#plt.setp(labels, rotation=90);
axs[1,1].set_xticklabels(labels, rotation='vertical', fontsize=10)
plt.show()
```



2.4 量的変数のヒストグラム

```
[61]: nor, noc = 2, 2
fig, axs = plt.subplots(nor, noc, figsize=(12, 10))
for i in range(nor):
    for j in range(noc):
        k = noc*i + j
        if k < len(num):
            sns.histplot(x=num[k], kde=True, data=df, ax=axs[i, j])
```

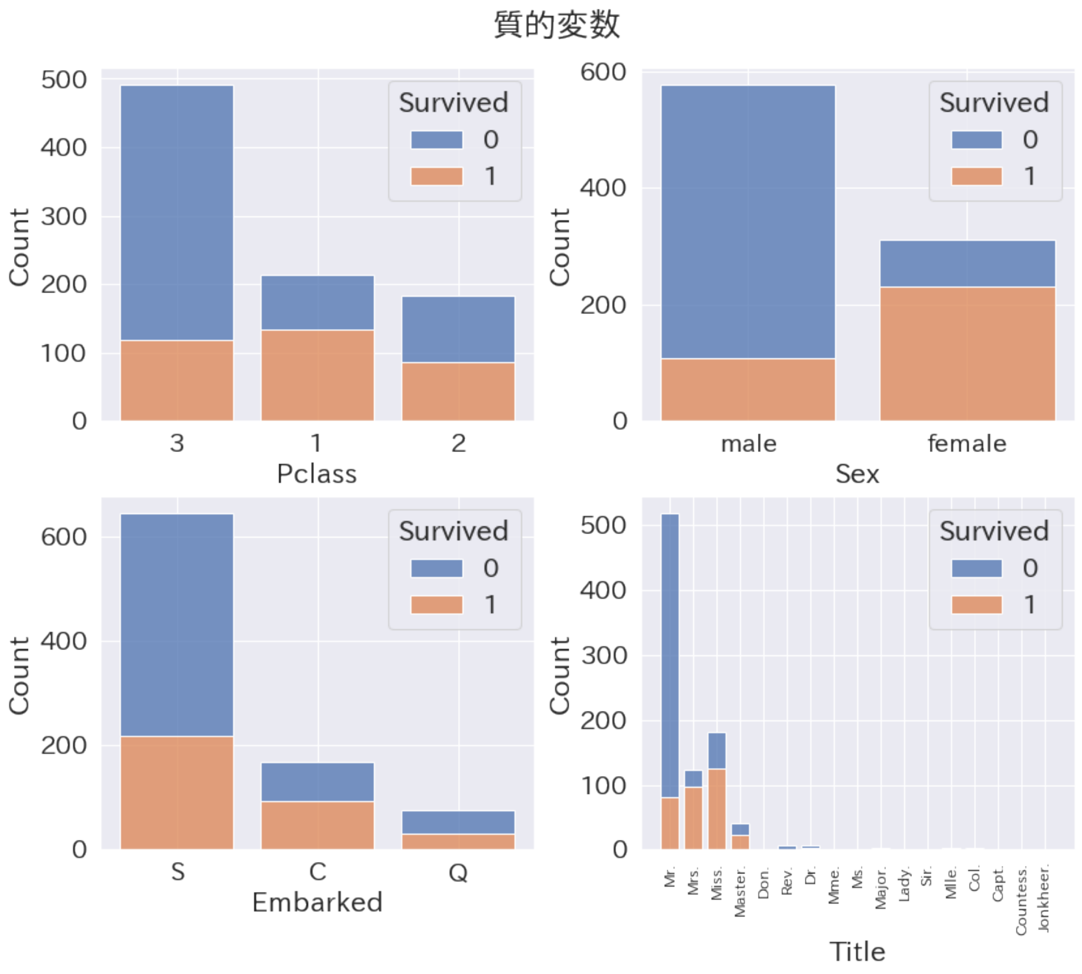
```
fig.tight_layout()
fig.suptitle('量的変数', fontsize=25)
fig.subplots_adjust(top=0.92)
plt.show()
```



3 多変量分析

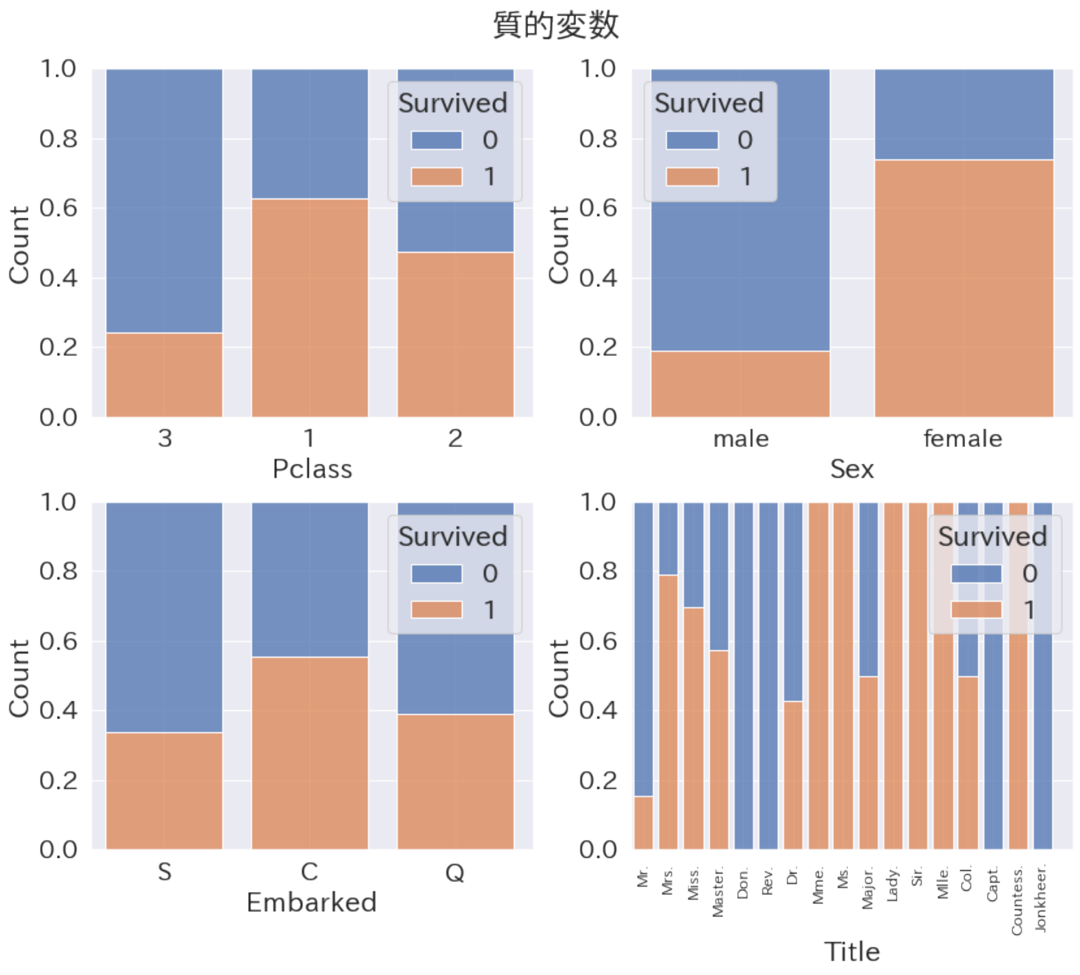
3.1 質的変数：の積み上げ棒グラフ

[118]:
```
nor, noc = 2, 2
fig, axs = plt.subplots(nor, noc, figsize=(12, 10))
for i in range(nor):
    for j in range(noc):
        k = noc*i + j
        sns.histplot(data=df, x=['Pclass', 'Sex', 'Embarked', 'Title'][k], hue='Survived',␣
 ↪multiple='stack', shrink=.8, ax=axs[i, j])
fig.tight_layout()
fig.suptitle('質的変数', fontsize=25)
fig.subplots_adjust(top=0.92)
labels = axs[1,1].get_xticklabels()
plt.setp(labels, rotation=90, fontsize=12)
plt.show()
```



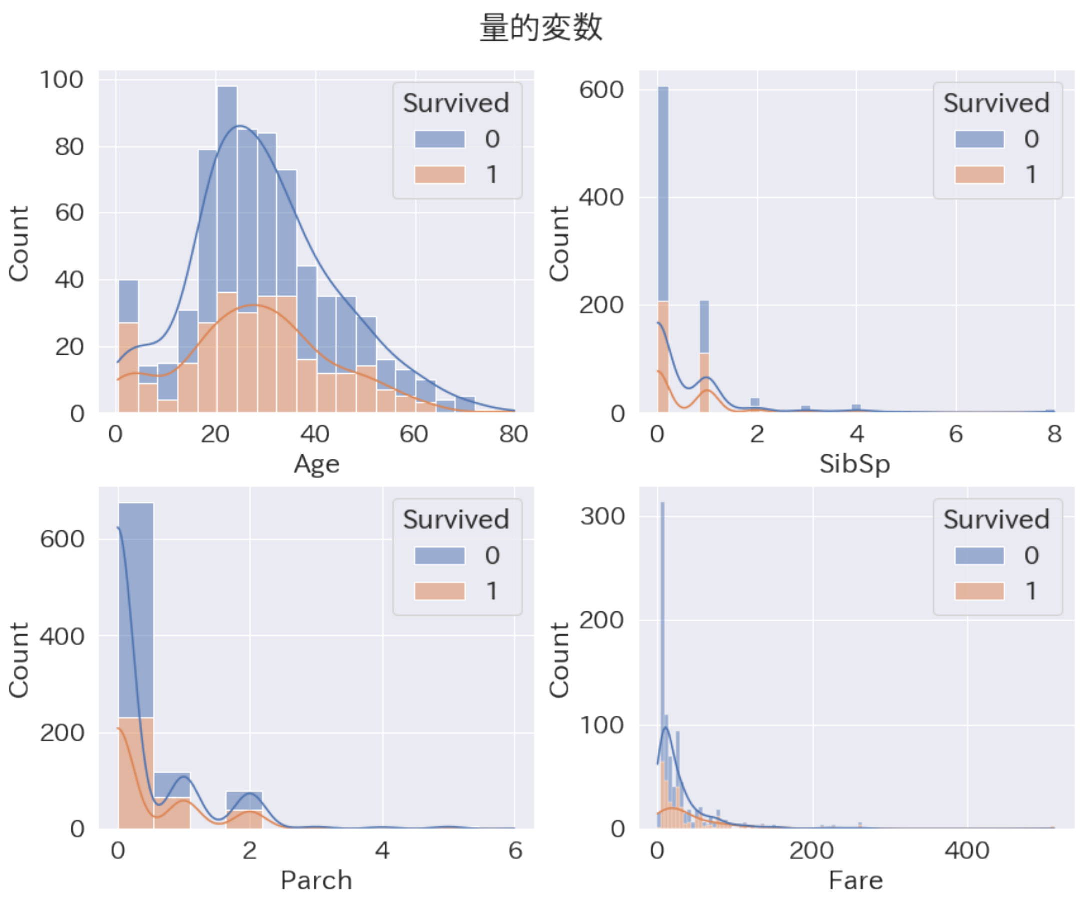
3.2　量的変数：100 %積み上げ棒グラフ

```
[119]: nor, noc = 2, 2
fig, axs = plt.subplots(nor, noc, figsize=(12, 10))
for i in range(nor):
    for j in range(noc):
        k = noc*i + j
        sns.histplot(data=df, x=['Pclass', 'Sex', 'Embarked', 'Title'][k], hue='Survived',␣
 ↪multiple='fill', shrink=.8, ax=axs[i, j])
fig.tight_layout()
fig.suptitle('質的変数', fontsize=25)
fig.subplots_adjust(top=0.92)
labels = axs[1,1].get_xticklabels()
plt.setp(labels, rotation=90, fontsize=12)
plt.show()
```



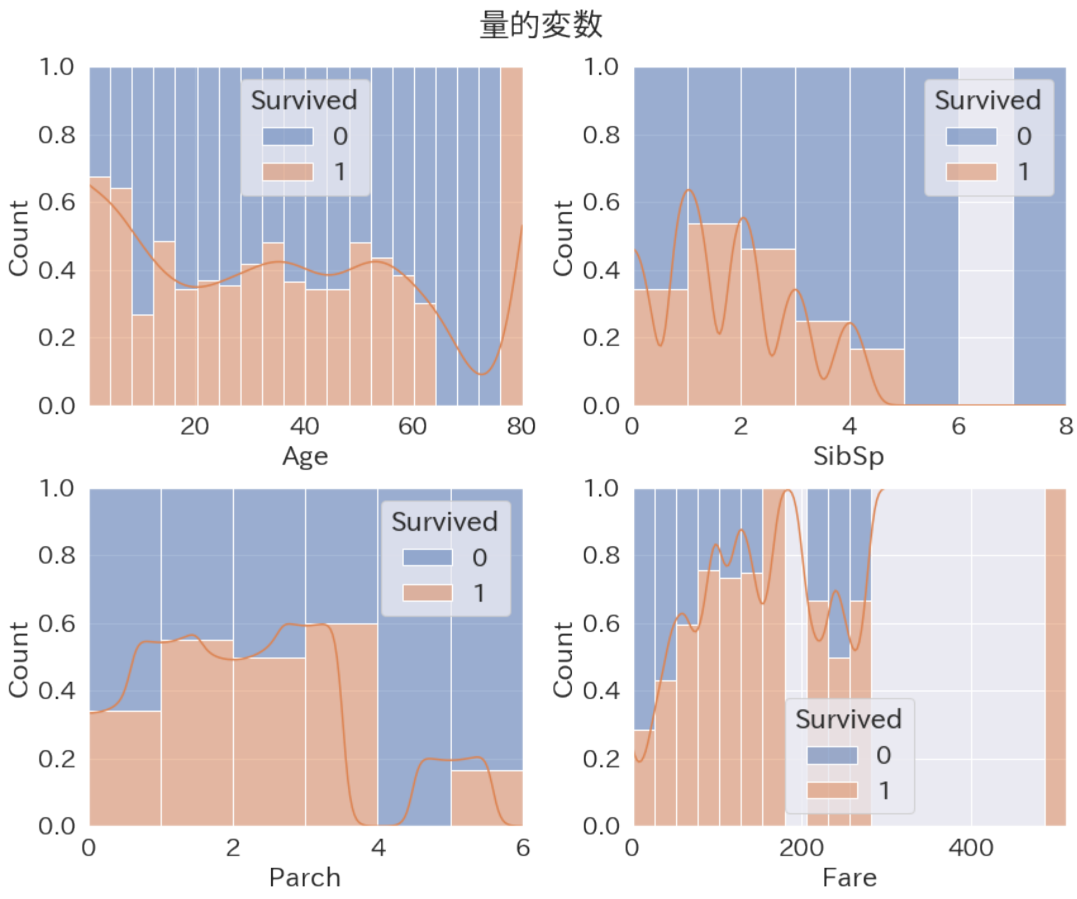
3.3 量的変数：ヒストグラム

[98]:
```
nor, noc = 2, 2
fig, axs = plt.subplots(nor, noc, figsize=(12, 10))
for i in range(nor):
    for j in range(noc):
        k = noc*i + j
        if k < len(num):
            sns.histplot(x=num[k], hue='Survived', multiple='stack', kde=True, data=df,␣
 ↪ax=axs[i, j])
fig.tight_layout()
fig.suptitle('量的変数', fontsize=25)
fig.subplots_adjust(top=0.92)
plt.show()
```



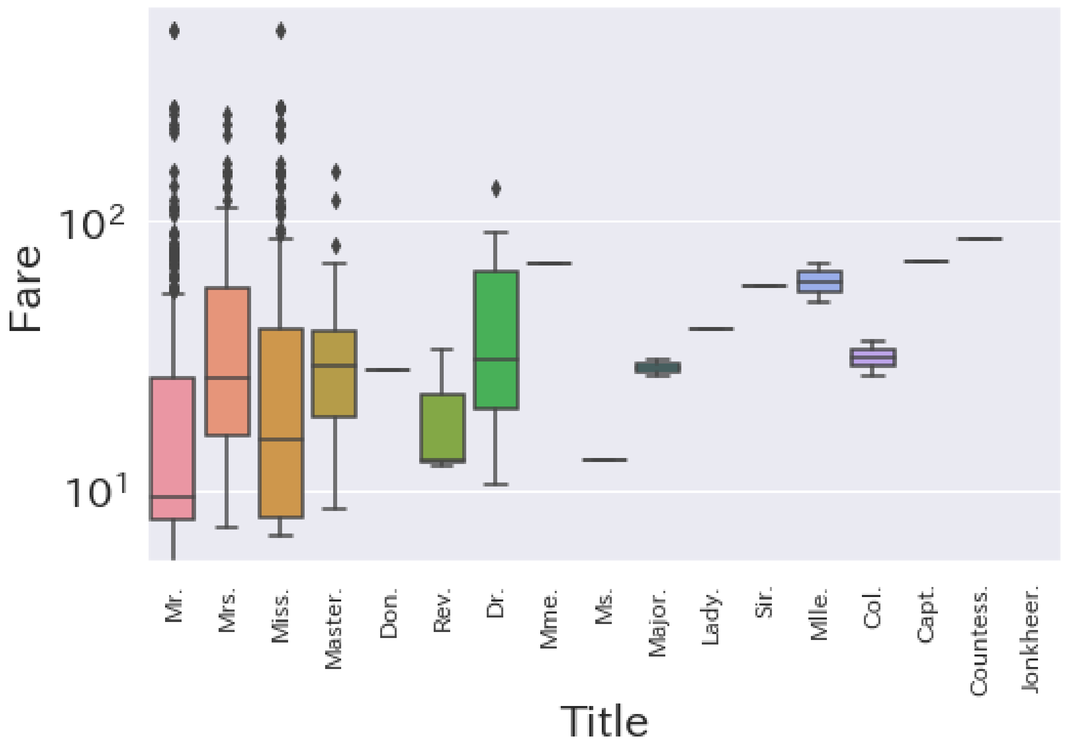
3.4　量的変数：100 %積み上げ棒グラフ

```
[151]: nor, noc = 2, 2
       fig, axs = plt.subplots(nor, noc, figsize=(12, 10))
       for i in range(nor):
           for j in range(noc):
               k = noc*i + j
               if k < len(num):
                   sns.histplot(x=num[k], hue='Survived', multiple='fill', bins=[20,8,6,20][k],␣
        ↪kde=True, data=df, ax=axs[i, j])
       fig.tight_layout()
       fig.suptitle('量的変数', fontsize=25)
       fig.subplots_adjust(top=0.92)
       plt.show()
```



3.5 箱ヒゲ図

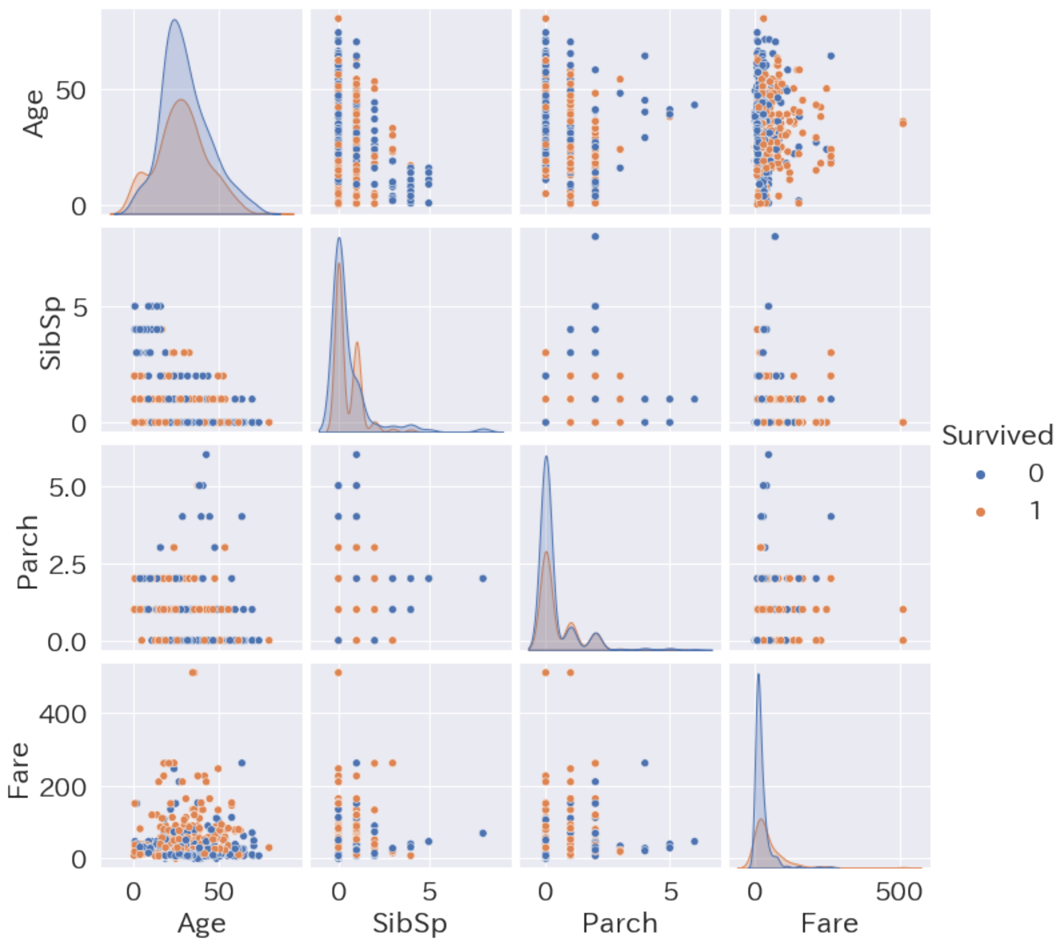
[152]:
```
fig, ax = plt.subplots(figsize=(8, 5))
sns.boxplot(x='Title', y='Fare', data=df, ax=ax)
labels = ax.get_xticklabels()
ax.set_xticklabels(labels, rotation='vertical', fontsize=12)
ax.set_yscale("log")
plt.show()
```



3.6　散布図

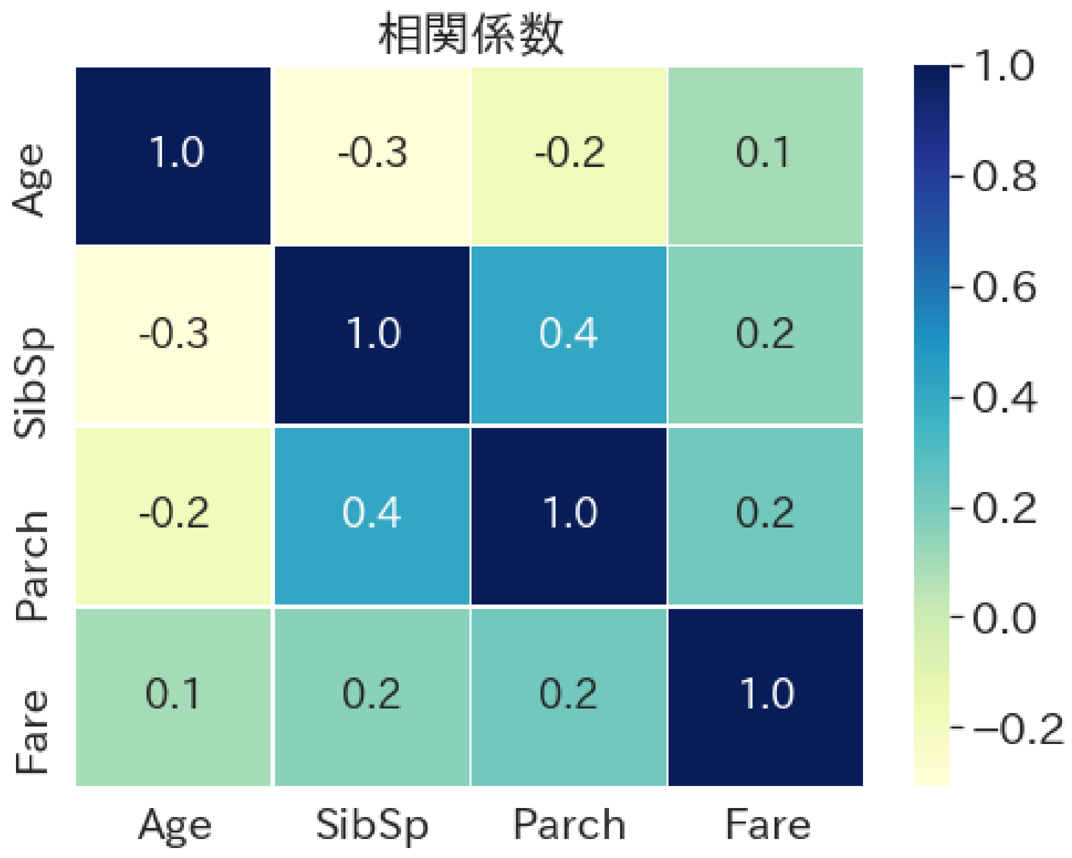
```
[151]: sns.pairplot(df, hue="Survived", height=2.5)
```

```
[151]: <seaborn.axisgrid.PairGrid at 0x7ff907d46090>
```



3.7　相関係数

[145]:
```
corr = df.corr()
plt.subplots(figsize=(8, 6))
sns.heatmap(corr, linewidth=.5, annot=True, annot_kws={"size": 18}, cmap='YlGnBu', fmt='.
↪1f')
plt.title(' 相関係数')
plt.show()
```



3.8 並行座標プロット

[148]:
```
df[['Survived', 'Pclass']] = df[['Survived', 'Pclass']].astype(int)
import plotly.express as px
fig = px.parallel_coordinates(df, color="Survived",
                              dimensions=['Age', 'SibSp', 'Parch', 'Pclass', 'Fare',␣
 ↪'Survived'],
                              color_continuous_scale=px.colors.diverging.Tealrose,
                              color_continuous_midpoint=0.5)
fig.show()
```