タイタニック号データセット

December, 2020

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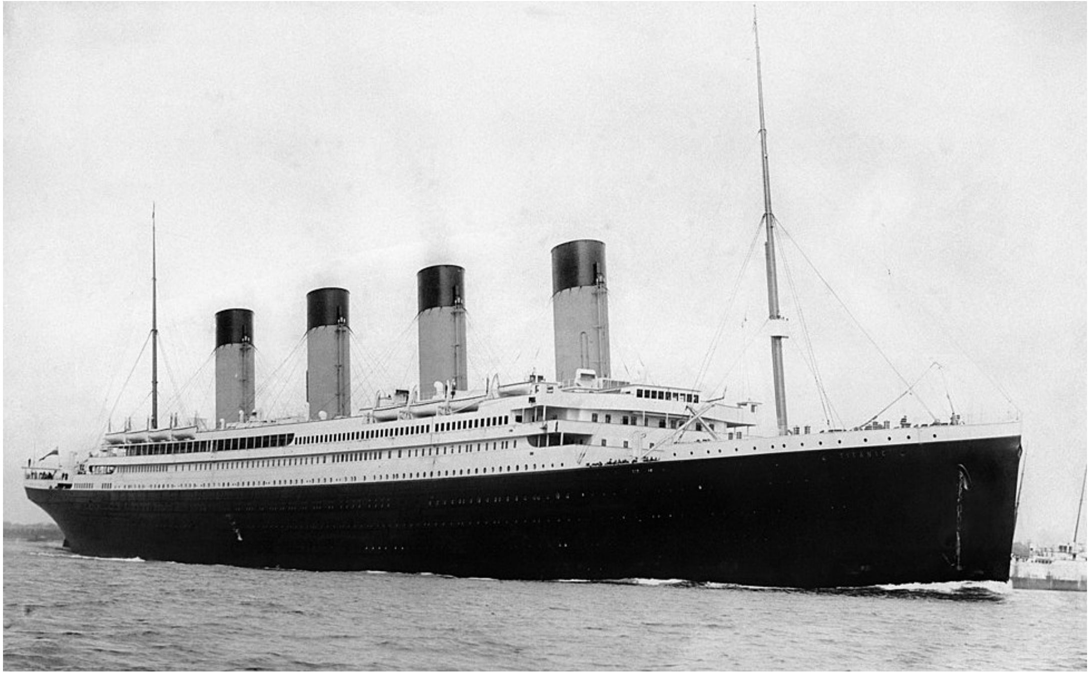
1　タイタニック号について

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

[1]:

タイタニック (客船) について

タイタニック号沈没事故について



2　タイタニック号データセット

＊データ提供元：kaggle[1] や seaborn[2] など。

2.1　変数

変数名	内容	キー
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), Q = Queenstown（愛）, S = Southampton（英）

2.2　乗船港

[2]:
```
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
```

[2]:
```
<folium.folium.Map at 0x7fe478da1050>
```

+
−
Dublin
IRELAND
Carrauntoohil 1038m
Snowdon 1085m
Leeds
Liverpool
Sheffield
Nottingham
UNITED KINGDOM
Cardiff
Bristol
NETHERLAN
Haarlem
Amsterdam
The Hague
Rotterdam
's-Hertogen
Dusseldorf
Antwerpen
Brussels
BELGIUM
LUXEMB
Amiens
Rouen
Caen
MANCHE
EURE
Luxembourg
Saarbrücken
CÔTES-D'ARMOR
Rennes
ESSONNE
AUBE
Stras
LOIRET
LOIRE-ATLANTIQUE
Tours
CÔTE-D'OR
CHER
Besan
Leaflet | Map tiles by Stamen Design, under CC BY 3.0. Data by © OpenStreetMap, under CC BY SA.

2.3 Init

```
[3]: 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
```

2.4 Load

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

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

2.5 データの様子

```
[6]: df.head()
```

```
[6]:    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
```

[7]:

```
# 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
```

[8]:

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

[9]:

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

[9]:

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

[10]:

```
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
```

[11]:
```
df.describe(include='all')
```

[11]:
```
        PassengerId    Survived      Pclass                           Name  \
count    891.000000  891.000000  891.000000                            891
unique          NaN         NaN         NaN                            891
top             NaN         NaN         NaN  Chambers, Mr. Norman Campbell
freq            NaN         NaN         NaN                              1
mean     446.000000    0.383838    2.308642                            NaN
std      257.353842    0.486592    0.836071                            NaN
min        1.000000    0.000000    1.000000                            NaN
25%      223.500000    0.000000    2.000000                            NaN
50%      446.000000    0.000000    3.000000                            NaN
75%      668.500000    1.000000    3.000000                            NaN
max      891.000000    1.000000    3.000000                            NaN

         Sex         Age       SibSp       Parch  Ticket        Fare    Cabin  \
count    891  714.000000  891.000000  891.000000     891  891.000000      204
unique     2         NaN         NaN         NaN     681         NaN      147
top     male         NaN         NaN         NaN  347082         NaN  B96 B98
freq     577         NaN         NaN         NaN       7         NaN        4
mean     NaN   29.699118    0.523008    0.381594     NaN   32.204208      NaN
std      NaN   14.526497    1.102743    0.806057     NaN   49.693429      NaN
min      NaN    0.420000    0.000000    0.000000     NaN    0.000000      NaN
25%      NaN   20.125000    0.000000    0.000000     NaN    7.910400      NaN
50%      NaN   28.000000    0.000000    0.000000     NaN   14.454200      NaN
75%      NaN   38.000000    1.000000    0.000000     NaN   31.000000      NaN
max      NaN   80.000000    8.000000    6.000000     NaN  512.329200      NaN

       Embarked Title
count       889   891
unique        3    17
top           S   Mr.
freq        644   517
mean        NaN   NaN
std         NaN   NaN
min         NaN   NaN
25%         NaN   NaN
50%         NaN   NaN
75%         NaN   NaN
max         NaN   NaN
```

[12]:
```
df.drop(['PassengerId', 'Name', 'Ticket', 'Cabin'], axis=1, inplace=True)
```

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

2.6 欠損値

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

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

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

```
[15]:    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.
```

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

3　単変量分析

[17]:

```
print(df.columns.values)
```

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

[18]:

```
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
```

3.1　質的変数

3.1.1　水準数・最頻値

[19]:

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

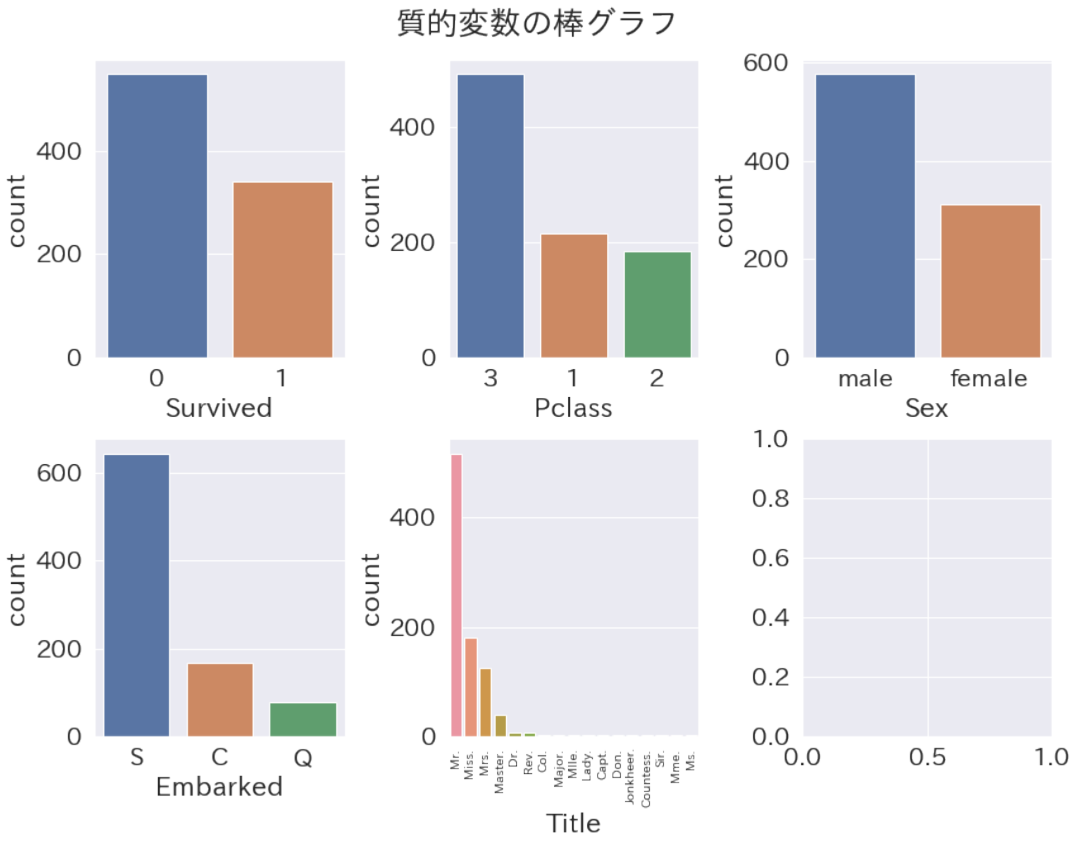
[19]:

```
       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
```

3.1.2　棒グラフ

[20]:

```
nor, noc = 2, 3
fig, axs = plt.subplots(nor, noc, figsize=(12, 9))
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('質的変数の棒グラフ', fontsize=25)
fig.subplots_adjust(top=0.92)
labels = axs[1,1].get_xticklabels()
axs[1,1].set_xticklabels(labels, rotation='vertical', fontsize=10)
plt.show()
```



3.2 量的変数

3.2.1 平均・標準偏差・５数要約

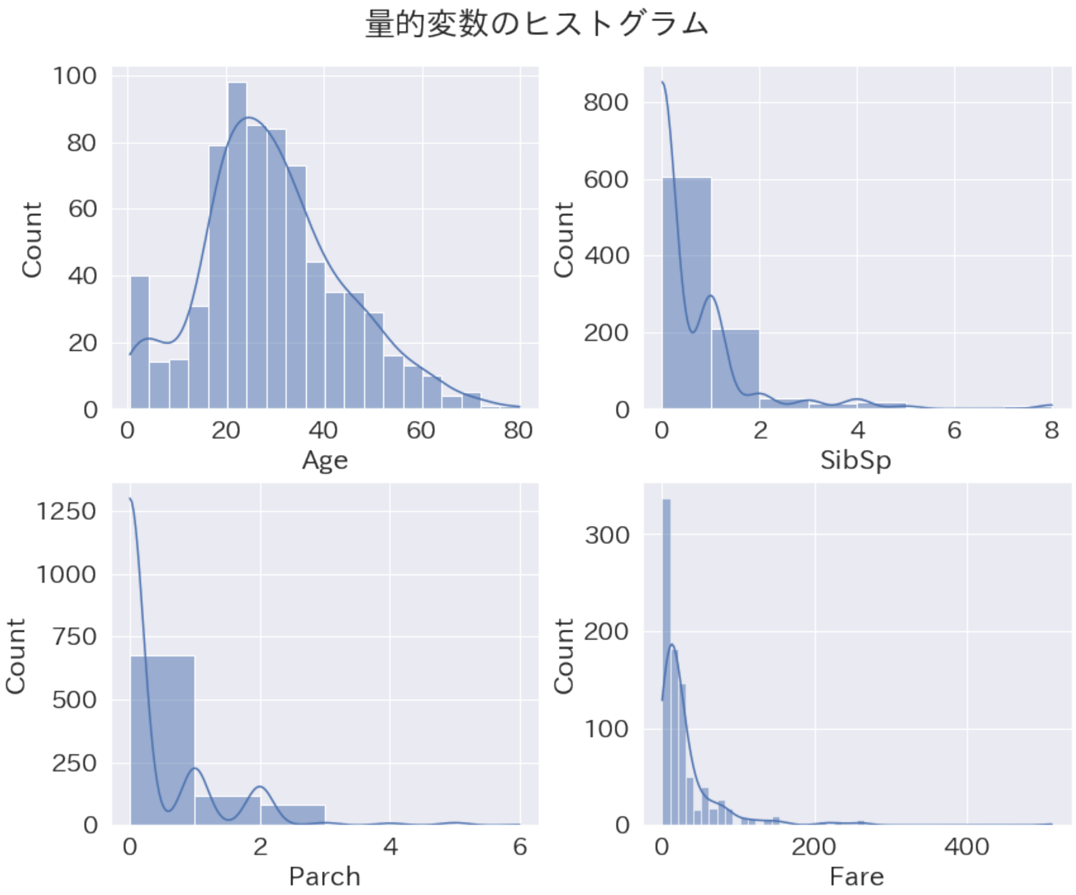
```
[21]: round(df[num].describe())
```

```
[21]:         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
```

3.2.2 ヒストグラム

```
[22]: 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(data=df, x=num[k], kde=True, bins=[20,8,6,50][k], ax=axs[i, j])
fig.tight_layout()
fig.suptitle('量的変数のヒストグラム', fontsize=25)
fig.subplots_adjust(top=0.92)
plt.show()
```



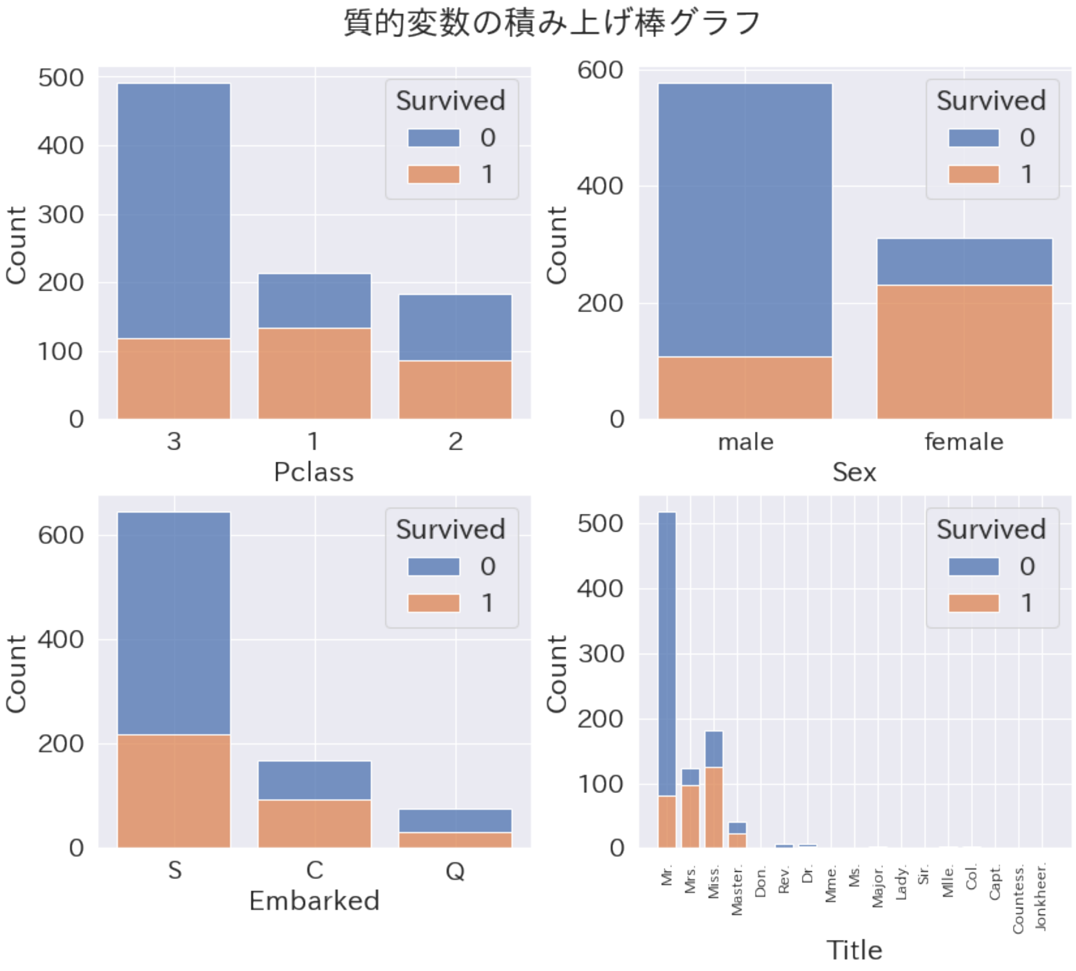
4 多変量分析

4.1 質的変数

4.1.1 積み上げ棒グラフ

[23]:

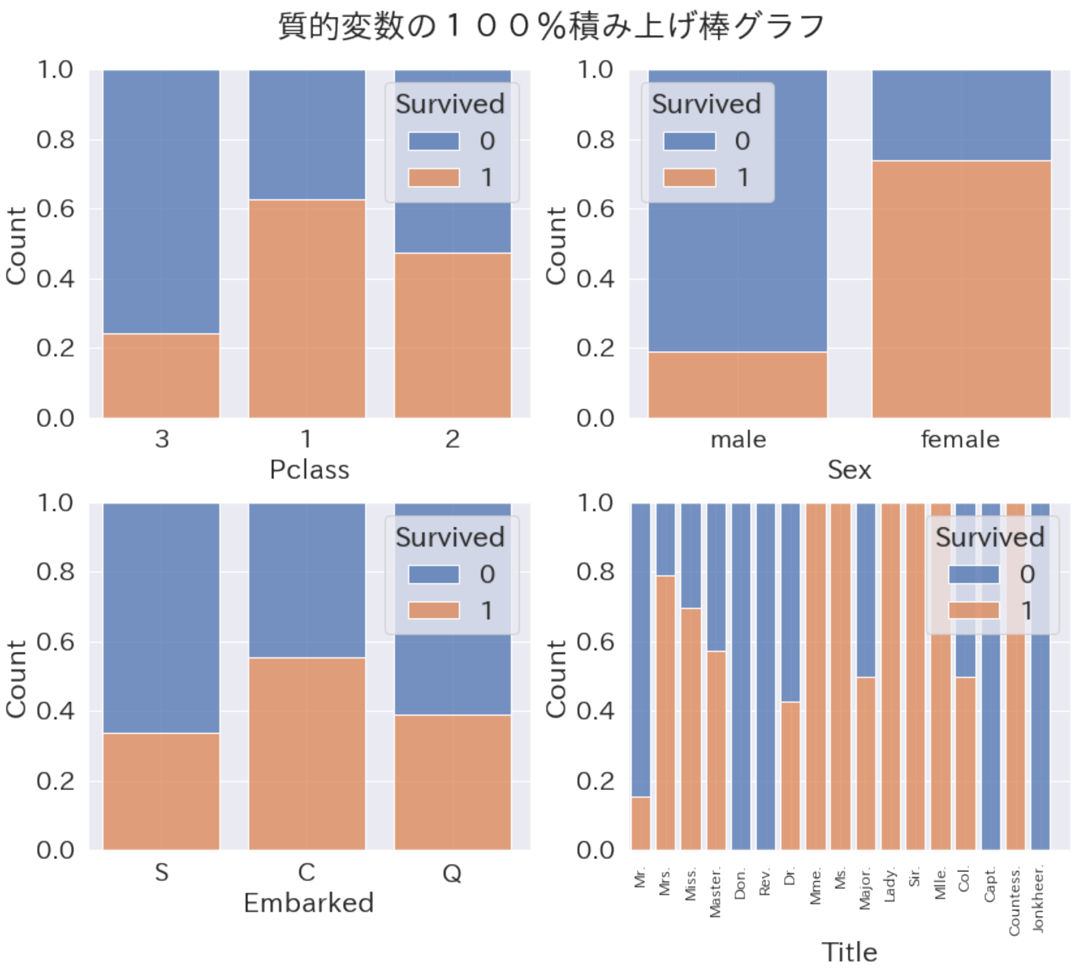
```
nor, noc = 2, 2
fig, axs = plt.subplots(nor, noc, figsize=(12, 10))
for i in range(nor):
    for j in range(noc):
        k = noc*i + j
        sns.histplot(data=df, x=cat[k+1], hue='Survived', multiple='stack', shrink=.8,␣
 ↪ax=axs[i, j])
fig.tight_layout()
fig.suptitle('質的変数の積み上げ棒グラフ', fontsize=25)
fig.subplots_adjust(top=0.92)
labels = axs[1,1].get_xticklabels()
plt.setp(labels, rotation=90, fontsize=12)
plt.show()
```



4.1.2　100 %積み上げ棒グラフ

[24]:

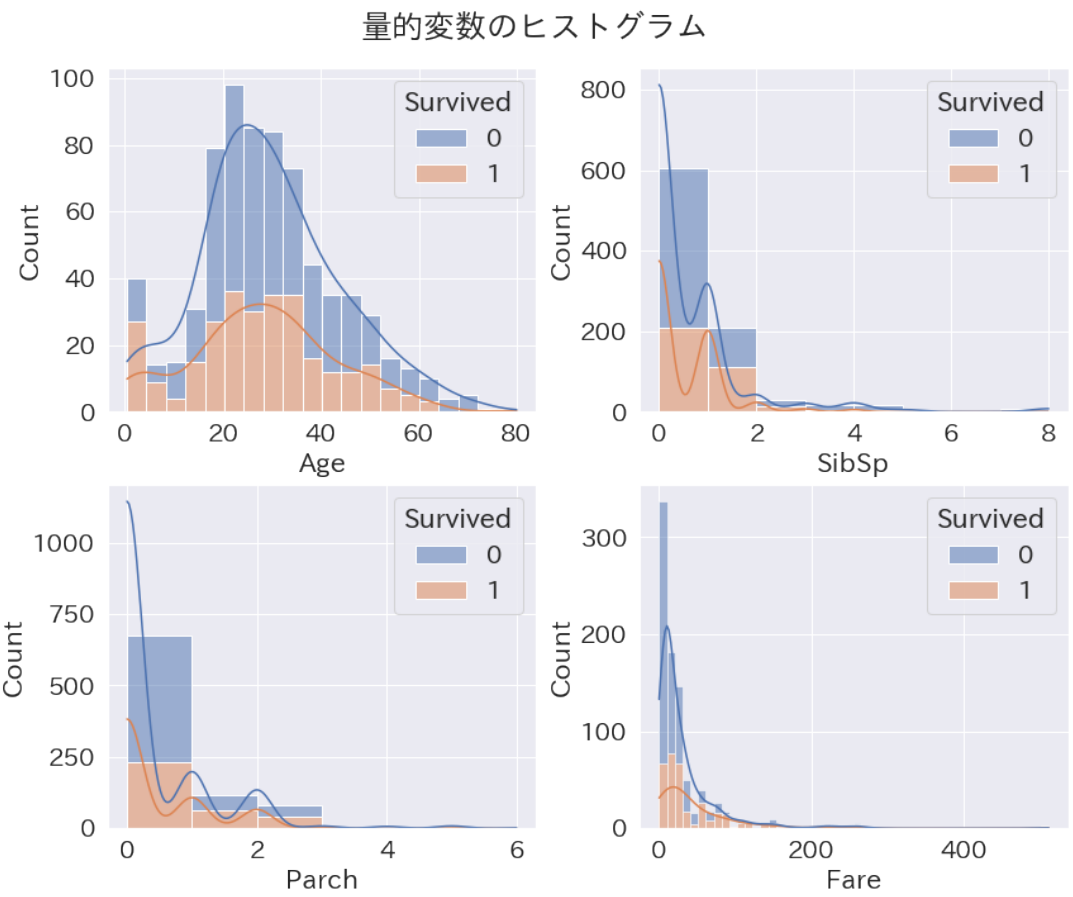
```
nor, noc = 2, 2
fig, axs = plt.subplots(nor, noc, figsize=(12, 10))
for i in range(nor):
    for j in range(noc):
        k = noc*i + j
        sns.histplot(data=df, x=cat[k+1], hue='Survived', multiple='fill', shrink=.8,␣
 ↪ax=axs[i, j])
fig.tight_layout()
fig.suptitle('質的変数の１００%積み上げ棒グラフ', fontsize=25)
fig.subplots_adjust(top=0.92)
labels = axs[1,1].get_xticklabels()
plt.setp(labels, rotation=90, fontsize=12)
plt.show()
```



4.2 量的変数

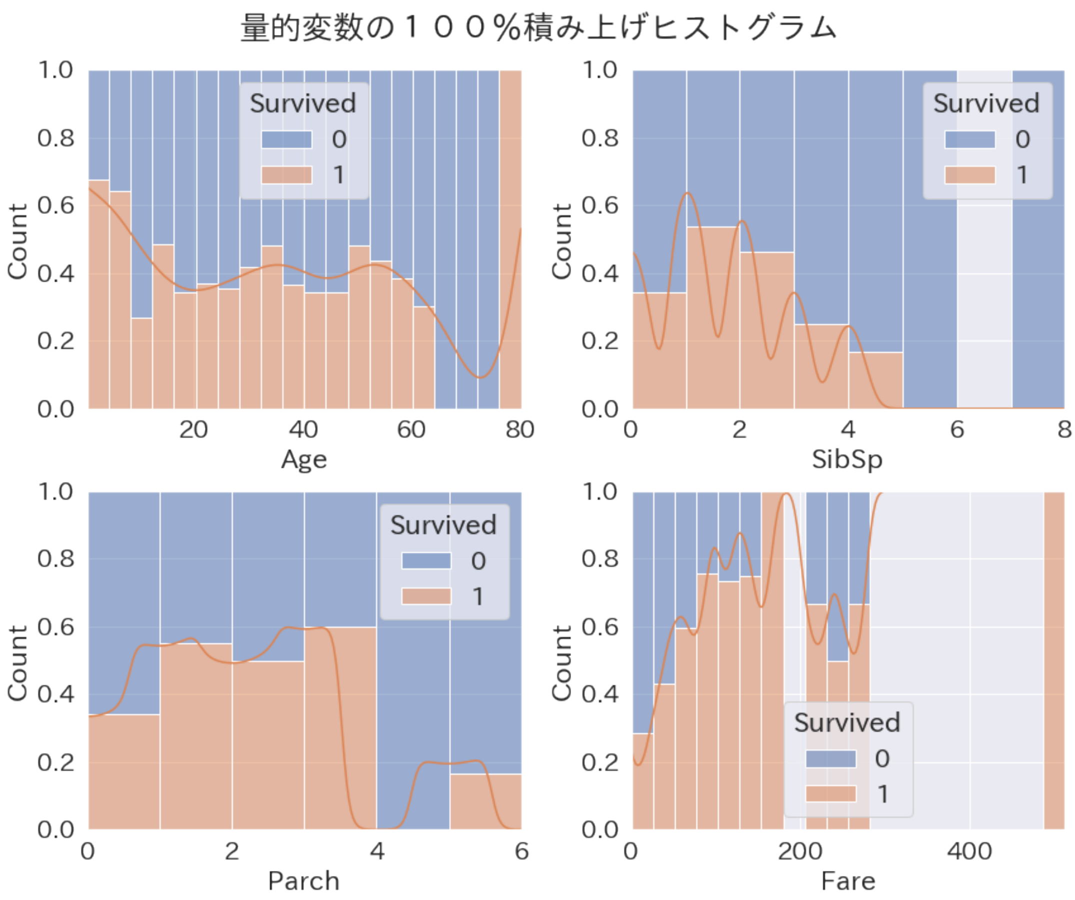
4.2.1 ヒストグラム

[25]:
```
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=num[k], hue='Survived', multiple='stack', kde=True,␣
 ↪bins=[20,8,6,50][k], ax=axs[i, j])
fig.tight_layout()
fig.suptitle('量的変数のヒストグラム', fontsize=25)
fig.subplots_adjust(top=0.92)
plt.show()
```



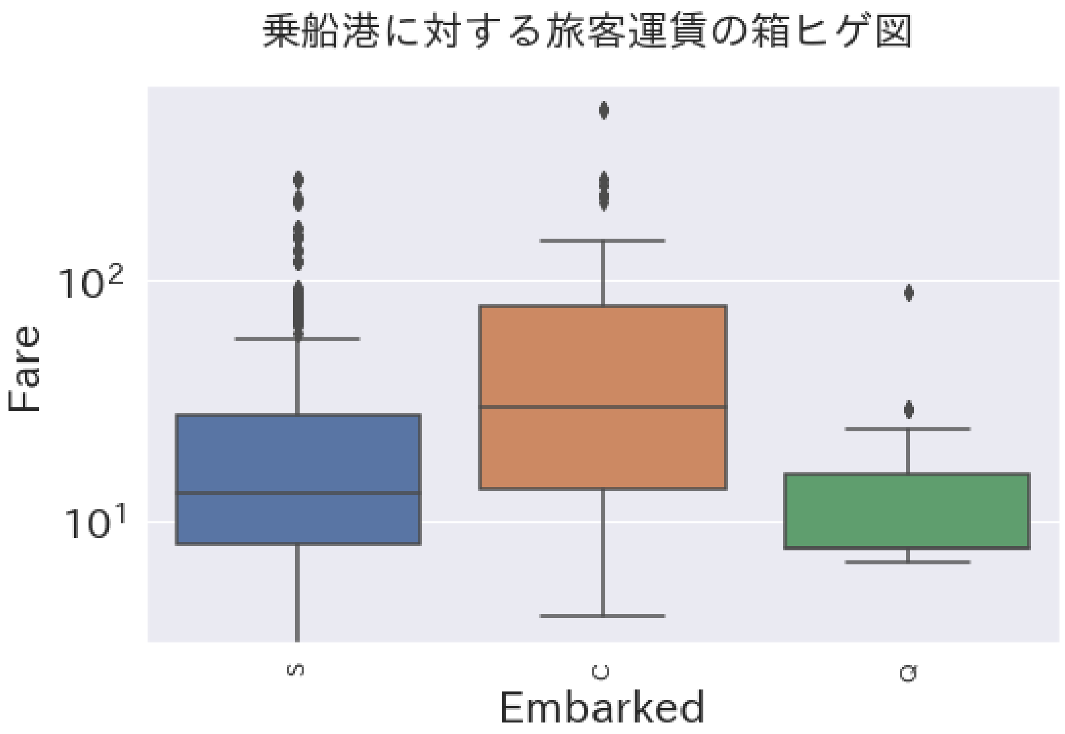
4.2.2 100 %積み上げヒストグラム

[26]:
```
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=num[k], hue='Survived', multiple='fill',␣
 ↪bins=[20,8,6,20][k], kde=True,ax=axs[i, j])
fig.tight_layout()
fig.suptitle('量的変数の１００%積み上げヒストグラム', fontsize=25)
fig.subplots_adjust(top=0.92)
plt.show()
```

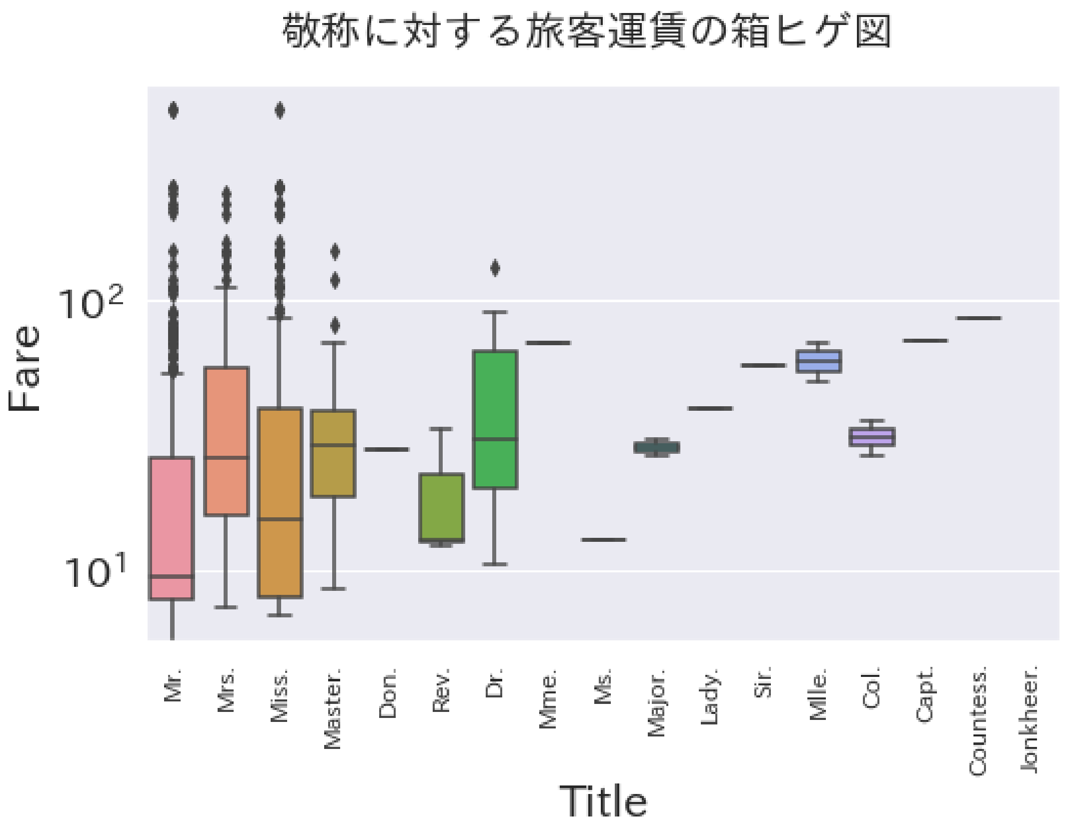


4.2.3　箱ヒゲ図

[27]:
```
fig, ax = plt.subplots(figsize=(8, 5))
sns.boxplot(x='Embarked', y='Fare', data=df, ax=ax)
labels = ax.get_xticklabels()
ax.set_xticklabels(labels, rotation='vertical', fontsize=12)
ax.set_yscale("log")
plt.suptitle('乗船港に対する旅客運賃の箱ヒゲ図', fontsize=20)
plt.show()
```

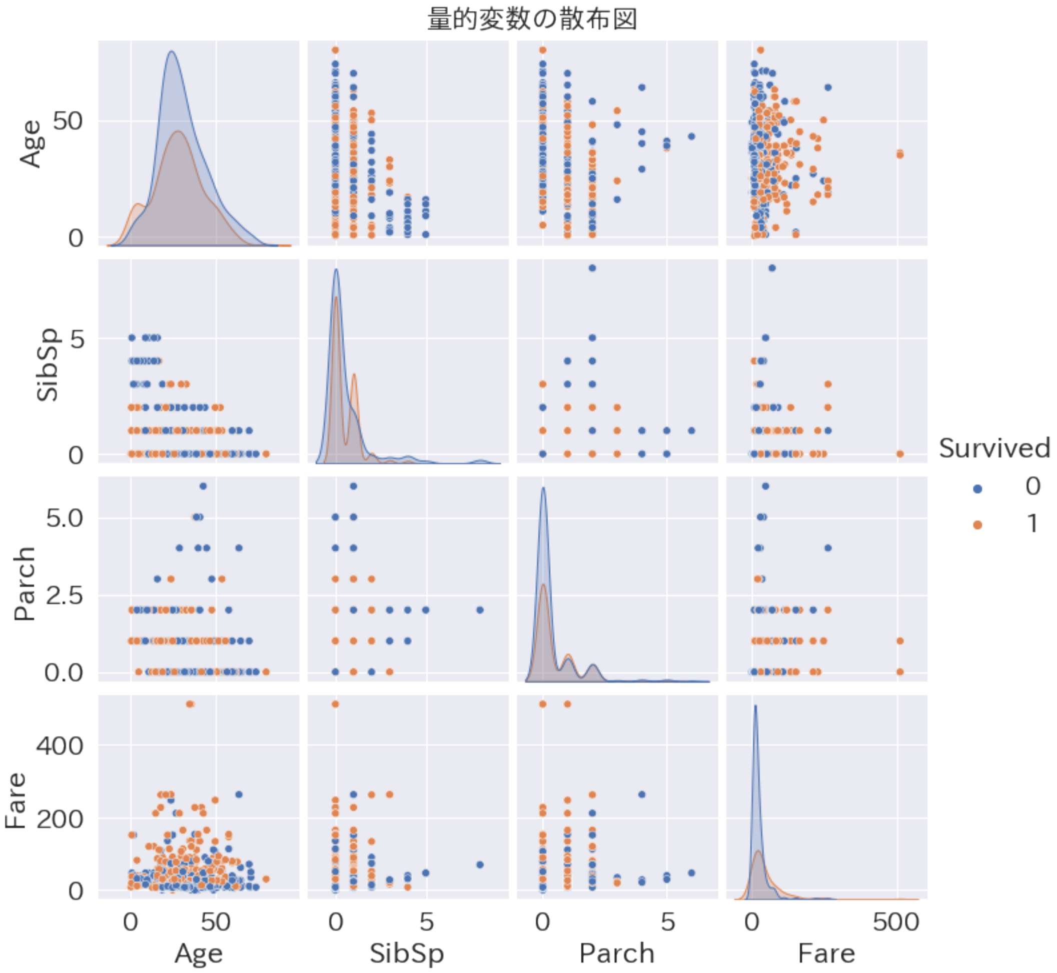


[28]:
```
fig, ax = plt.subplots(figsize=(8, 5))
sns.boxplot(x='Title', y='Fare', data=df, ax=ax)
labels = ax.get_xticklabels()
ax.set_xticklabels(labels, rotation='vertical', fontsize=12)
ax.set_yscale("log")
plt.suptitle(' 敬称に対する旅客運賃の箱ヒゲ図', fontsize=20)
plt.show()
```



4.2.4 散布図

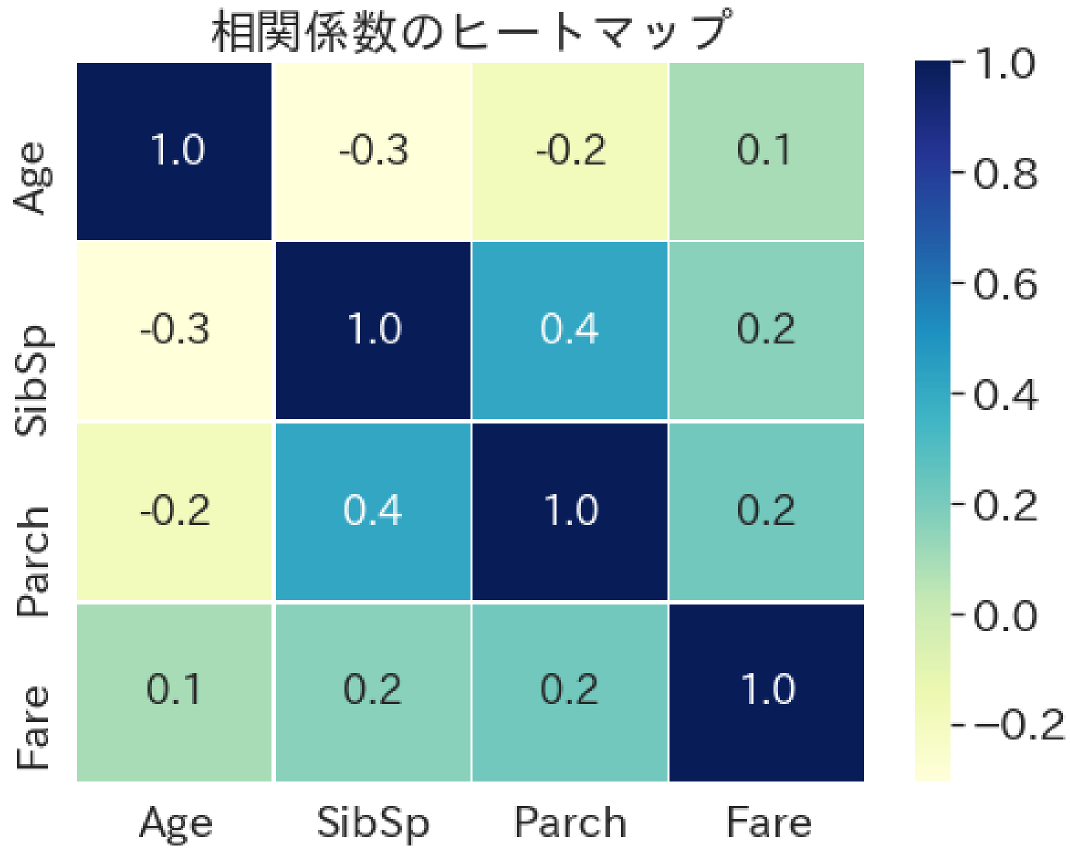
[29]:
```
sns.pairplot(df, hue="Survived", height=2.5)
plt.suptitle('量的変数の散布図', fontsize=20, y=1.02)
plt.show()
```



4.2.5 相関係数のヒートマップ

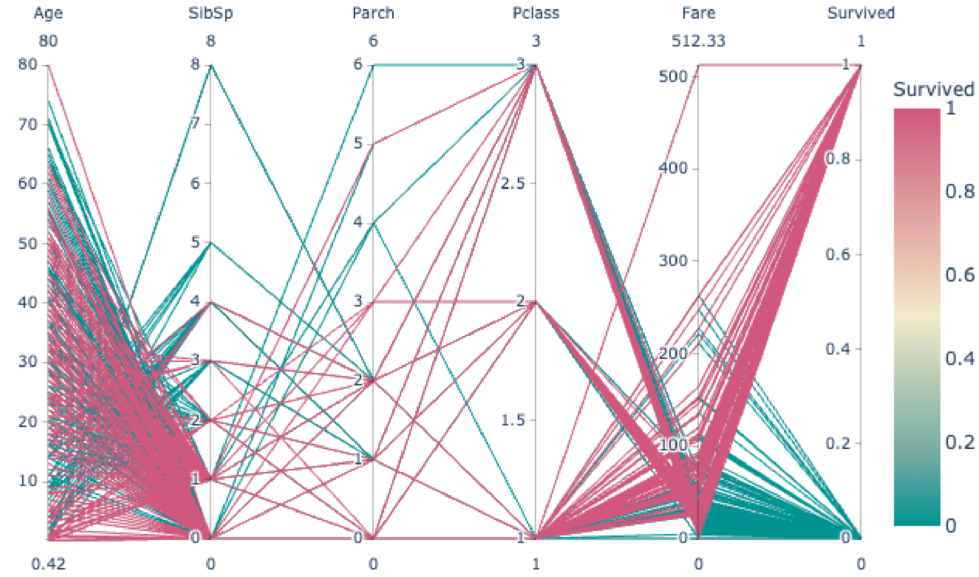
[30]:

```
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('相関係数のヒートマップ')
plt.show()
```



4.2.6 並行座標プロット

```
[31]: 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()
```



Age
80
0.42
SibSp
8
0
Parch
6
0
Pclass
3
1
Fare
512.33
0
Survived
1
0
Survived
1
0.8
0.6
0.4
0.2
0

参考文献

[1] kaggle: Titanic - Machine Learning from Disaster
https://www.kaggle.com/c/titanic

[2] seaborn
https://seaborn.pydata.org/index.html