IPA 주관 인공지능센터 기본(fundamental) 과정

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이번 장에서는 `titanic` 데이터로 데이터 분석을 진행하고자 한다.

In [1]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import missingno as mino
import matplotlib.font_manager as fm
fm.rcParams['font.family'] = 'NanumMyeongjo'
```

In [2]:

```
titanic = sns.load_dataset('titanic')
```

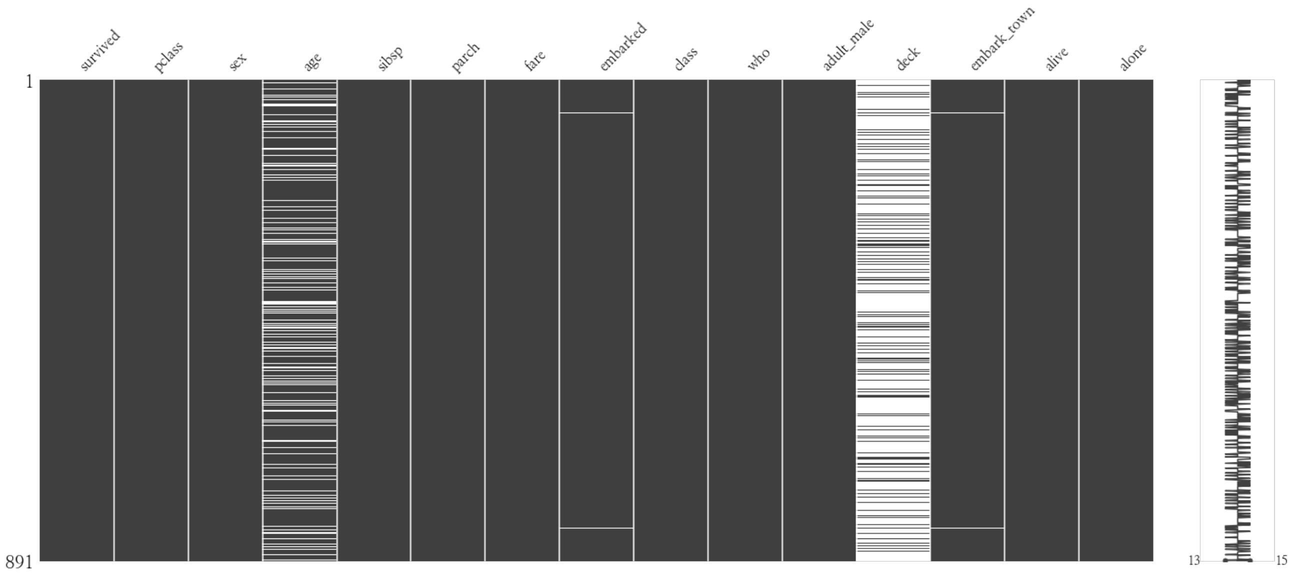
불러온 데이터에 **missing value**가 있는 것을 확인할 수 있다.

In [3]:

```
%matplotlib inline
mino.matrix(titanic)
```

Out[3]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f8a39944048>
```



`titanic` 데이터에 대한 정보를 살펴보면 다음과 같다.

In [4]:

```
import pandas_profiling as pp
```

```
pp.ProfileReport(titanic)
```

Out[4]:

Overview

Dataset info

Number of variables	15
Number of observations	891
Total Missing (%)	6.5%
Total size in memory	80.6 KiB
Average record size in memory	92.6 B

Variables types

Numeric	5
Categorical	7
Boolean	3
Date	0
Text (Unique)	0
Rejected	0
Unsupported	0

Warnings

- `age` has 177 / 19.9% missing values Missing
- `deck` has 688 / 77.2% missing values Missing
- `fare` has 15 / 1.7% zeros Zeros
- `parch` has 678 / 76.1% zeros Zeros
- `sibsp` has 608 / 68.2% zeros Zeros
- Dataset has 107 duplicate rows Warning

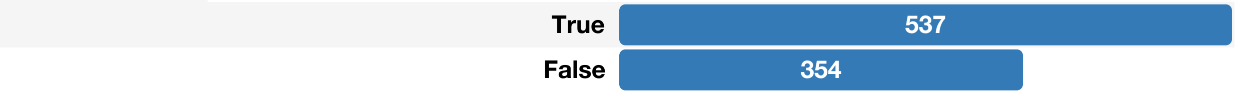
Variables

adult_male

Boolean

Distinct count	2
Unique (%)	0.2%
Missing (%)	0.0%
Missing (n)	0

Mean	0.60269



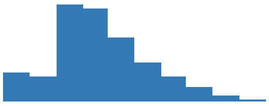
Toggle details

age

Numeric

Distinct count	89
Unique (%)	10.0%
Missing (%)	19.9%
Missing (n)	177
Infinite (%)	0.0%
Infinite (n)	0

Mean	29.699
Minimum	0.42
Maximum	80
Zeros (%)	0.0%

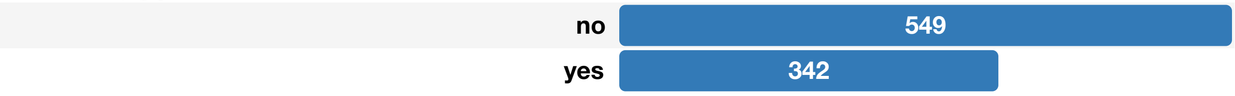


Toggle details

alive

Categorical

Distinct count	2
Unique (%)	0.2%
Missing (%)	0.0%
Missing (n)	0

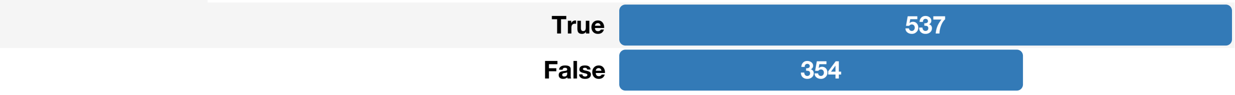


Toggle details

alone

Boolean

Distinct count	2
Unique (%)	0.2%
Missing (%)	0.0%
Missing (n)	0
Mean	0.60269



Toggle details

class

Categorical

Distinct count	3
Unique (%)	0.3%
Missing (%)	0.0%
Missing (n)	0

Third	491
First	216
Second	184

Toggle details

deck

Categorical

Distinct count	8
Unique (%)	0.9%
Missing (%)	77.2%
Missing (n)	688

C	59
B	47
D	33
Other values (4)	64
(Missing)	688

Toggle details

embark_town

Categorical

Distinct count	4
Unique (%)	0.4%
Missing (%)	0.2%
Missing (n)	2

Southampton	644
Cherbourg	168
Queenstown	77
(Missing)	2

Toggle details

embarked

Categorical

Distinct count	4
Unique (%)	0.4%
Missing (%)	0.2%
Missing (n)	2

S	644
C	168
Q	77
(Missing)	2

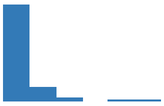
Toggle details

fare

Numeric

Distinct count	248
Unique (%)	27.8%
Missing (%)	0.0%
Missing (n)	0
Infinite (%)	0.0%
Infinite (n)	0

Mean	32.204
Minimum	0
Maximum	512.33
Zeros (%)	1.7%



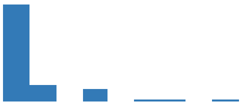
Toggle details

parch

Numeric

Distinct count	7
Unique (%)	0.8%
Missing (%)	0.0%
Missing (n)	0
Infinite (%)	0.0%
Infinite (n)	0

Mean	0.38159
Minimum	0
Maximum	6
Zeros (%)	76.1%



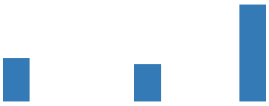
Toggle details

pclass

Numeric

Distinct count	3
Unique (%)	0.3%
Missing (%)	0.0%
Missing (n)	0
Infinite (%)	0.0%
Infinite (n)	0

Mean	2.3086
Minimum	1
Maximum	3
Zeros (%)	0.0%



Toggle details

sex
Categorical

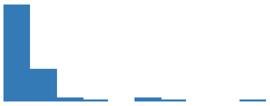
Distinct count	2
Unique (%)	0.2%
Missing (%)	0.0%
Missing (n)	0

male	577
female	314

Toggle details

sibsp
Numeric

Distinct count	7
Unique (%)	0.8%
Missing (%)	0.0%
Missing (n)	0
Infinite (%)	0.0%
Infinite (n)	0
Mean	0.52301
Minimum	0
Maximum	8
Zeros (%)	68.2%



Toggle details

survived
Boolean

Distinct count	2
Unique (%)	0.2%
Missing (%)	0.0%
Missing (n)	0
Mean	0.38384

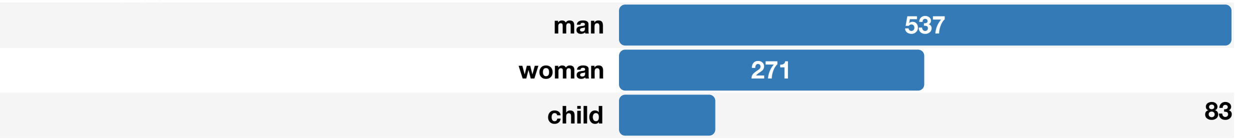
0	549
1	342

Toggle details

who
Categorical

Distinct count	3
Unique (%)	0.3%

Unique (%)	0.3%
Missing (%)	0.0%
Missing (n)	0



Toggle details

Correlations

Sample

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_m
0	0	3	male	22.0	1	0	7.2500	S	Third	man	T
1	1	1	female	38.0	1	0	71.2833	C	First	woman	Fa
2	1	3	female	26.0	0	0	7.9250	S	Third	woman	Fa
3	1	1	female	35.0	1	0	53.1000	S	First	woman	Fa
4	0	3	male	35.0	0	0	8.0500	S	Third	man	T

missing value를 `fillna`를 통해 평균값으로 대체시킨다.

In [5]:

```
titanic.fillna(method='bfill', inplace=True)
titanic.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 15 columns):
survived       891 non-null int64
pclass         891 non-null int64
sex            891 non-null object
age            891 non-null float64
sibsp          891 non-null int64
parch          891 non-null int64
fare           891 non-null float64
embarked       891 non-null object
class          891 non-null category
who            891 non-null object
adult_male     891 non-null bool
```

```
deck            890 non-null category
embark_town     891 non-null object
alive           891 non-null object
alone           891 non-null bool
dtypes: bool(2), category(2), float64(2), int64(4), object(5)
memory usage: 80.6+ KB
```

`sex` 와 `class` 간 생존 여부를 분석해본다.

In [6]:

```
group = titanic.groupby(['sex','class']).survived
total = group.sum()
```

In [7]:

```
total
```

Out[7]:

```
sex     class
female  First     91
        Second    70
        Third     72
male    First     45
        Second    17
        Third     47
Name: survived, dtype: int64
```

In [8]:

```
total.unstack()
```

Out[8]:

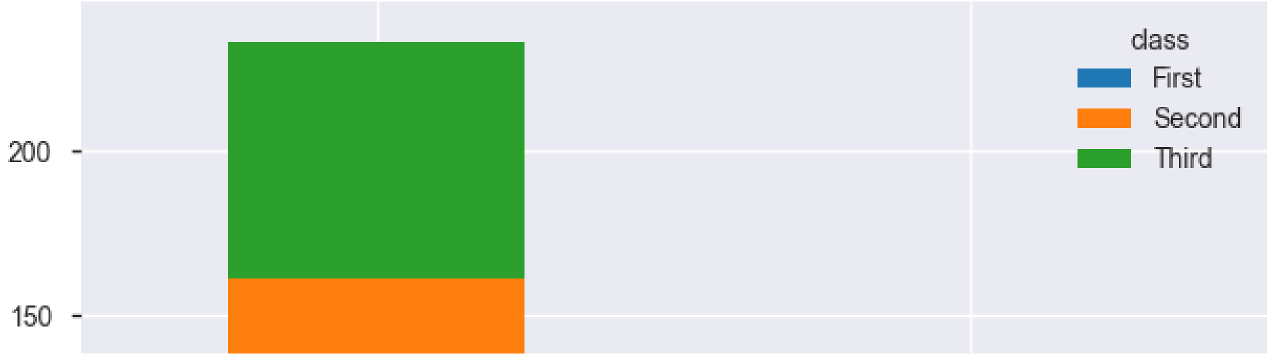
class	First	Second	Third
sex			
female	91	70	72
male	45	17	47

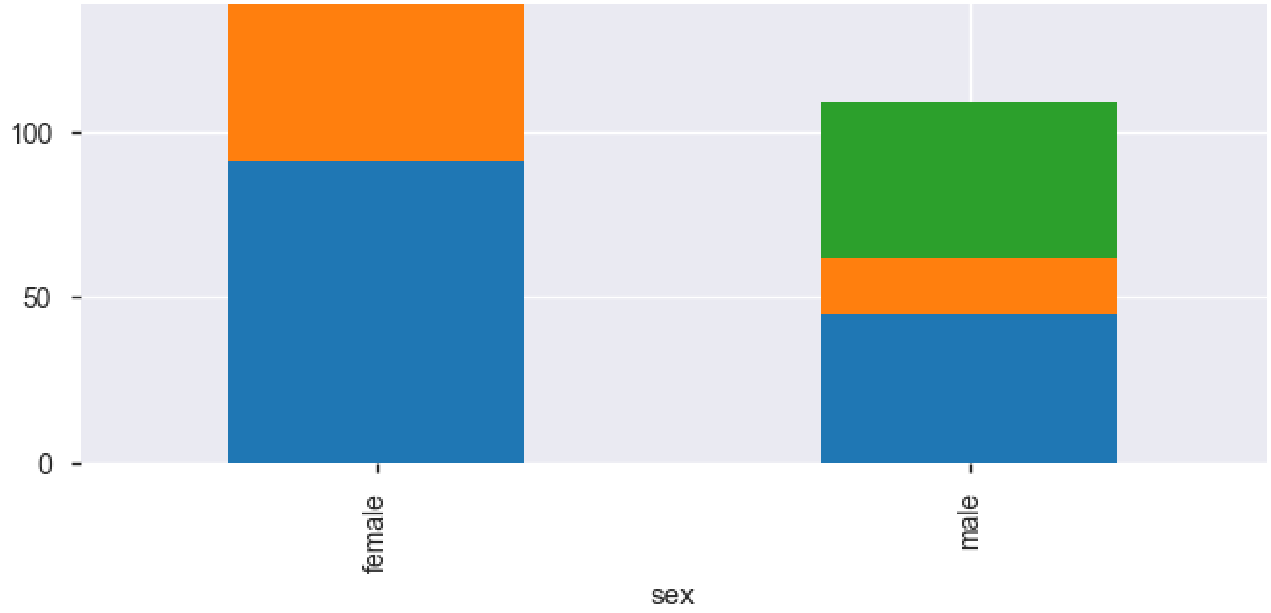
In [9]:

```
total.unstack().plot.bar(stacked=True)
```

Out[9]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f8a5fe0ef98>
```





In [10]:

```
titanic.embarked.value_counts()
```

Out[10]:

```
S    645
C    169
Q     77
Name: embarked, dtype: int64
```

In [11]:

```
titanic.embarked.map({'S':0,'C':1,'Q':2})
```

Out[11]:

```
0      0
1      1
2      0
3      0
4      0
5      2
6      0
7      0
8      0
9      1
10     0
11     0
12     0
13     0
14     0
15     0
16     2
17     0
18     0
19     1
20     0
21     0
22     2
23     0
24     0
25     0
```

```
25     0
26     1
27     0
28     2
29     0
      ..
861    0
862    0
863    0
864    0
865    0
866    1
867    0
868    0
869    0
870    0
871    0
872    0
873    0
874    1
875    1
876    0
877    0
878    0
879    1
880    0
881    0
882    0
883    0
884    0
885    2
886    0
887    0
888    0
889    1
890    2
Name: embarked, Length: 891, dtype: int64
```

In [12]:

```
titanic.pivot_table('survived','sex',aggfunc=sum)
```

Out[12]:

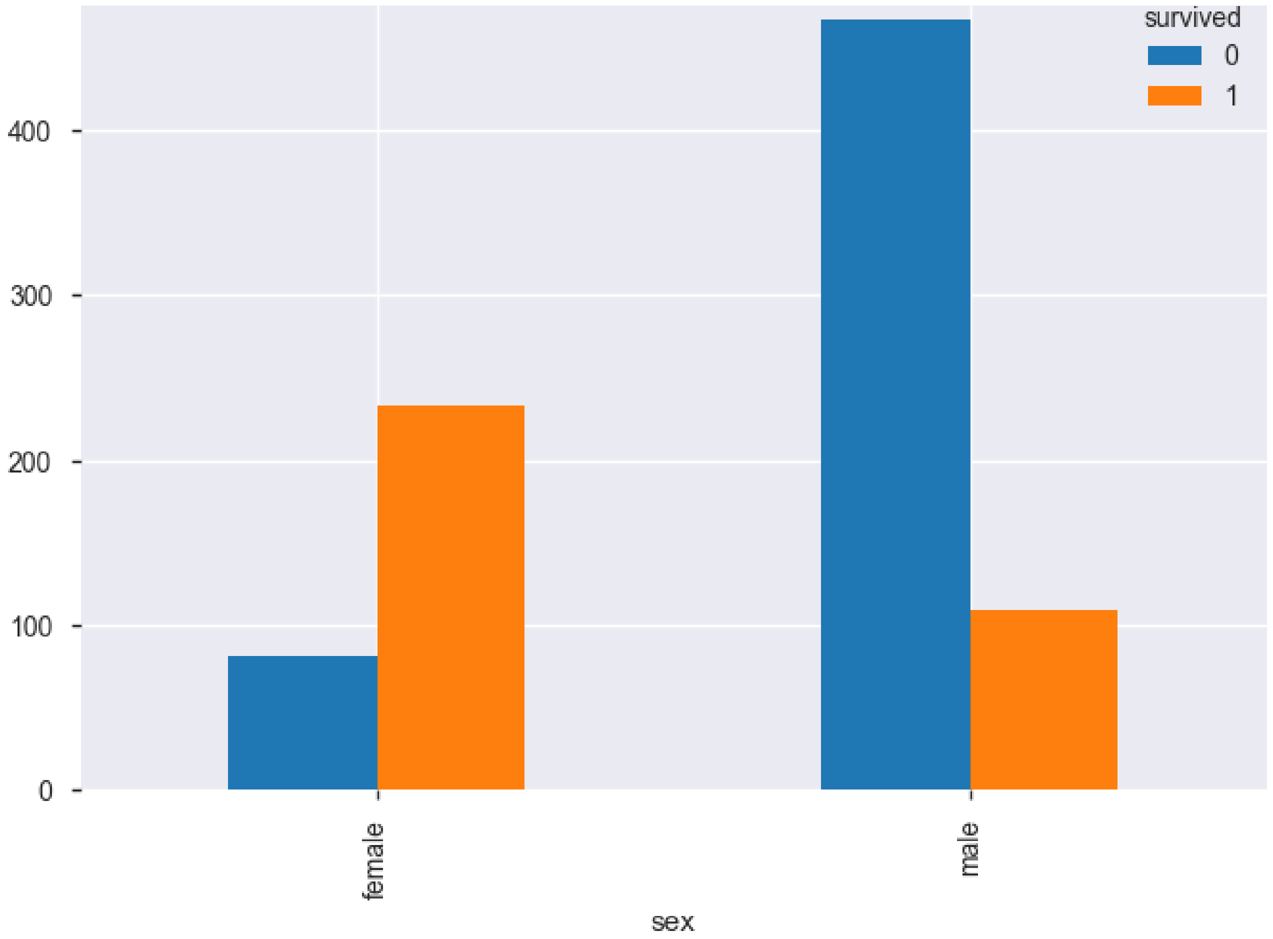
	survived
sex	
female	233
male	109

In [13]:

```
table = pd.crosstab(titanic.sex, titanic.survived)
table.plot.bar()
```

Out[13]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f8a5fe0e630>
```



In [14]:

```
table.stack()
```

Out[14]:

```
sex     survived
female  0            81
        1           233
male    0           468
        1           109
dtype: int64
```

In [15]:

```
table.unstack()
```

Out[15]:

```
survived  sex
0         female     81
          male      468
1         female    233
          male      109
dtype: int64
```

In [16]:

```
survived_group = titanic.groupby(['sex','survived'])
total = survived_group.sum().unstack()
total
```

Out[16]:

	pclass		age		sibsp		parch		fare		adult_male		alone
survived	0	1	0	1	0	1	0	1	0	1	0	1	0
sex													
female	231	447	2112.00	6886.42	98	120	84	120	1864.9752	12101.6876	0.0	0.0	27.0
male	1159	220	14637.83	2978.42	206	42	97	39	10277.7447	4449.5418	449.0	88.0	347.0

In [17]:

```
total.stack()
```

Out[17]:

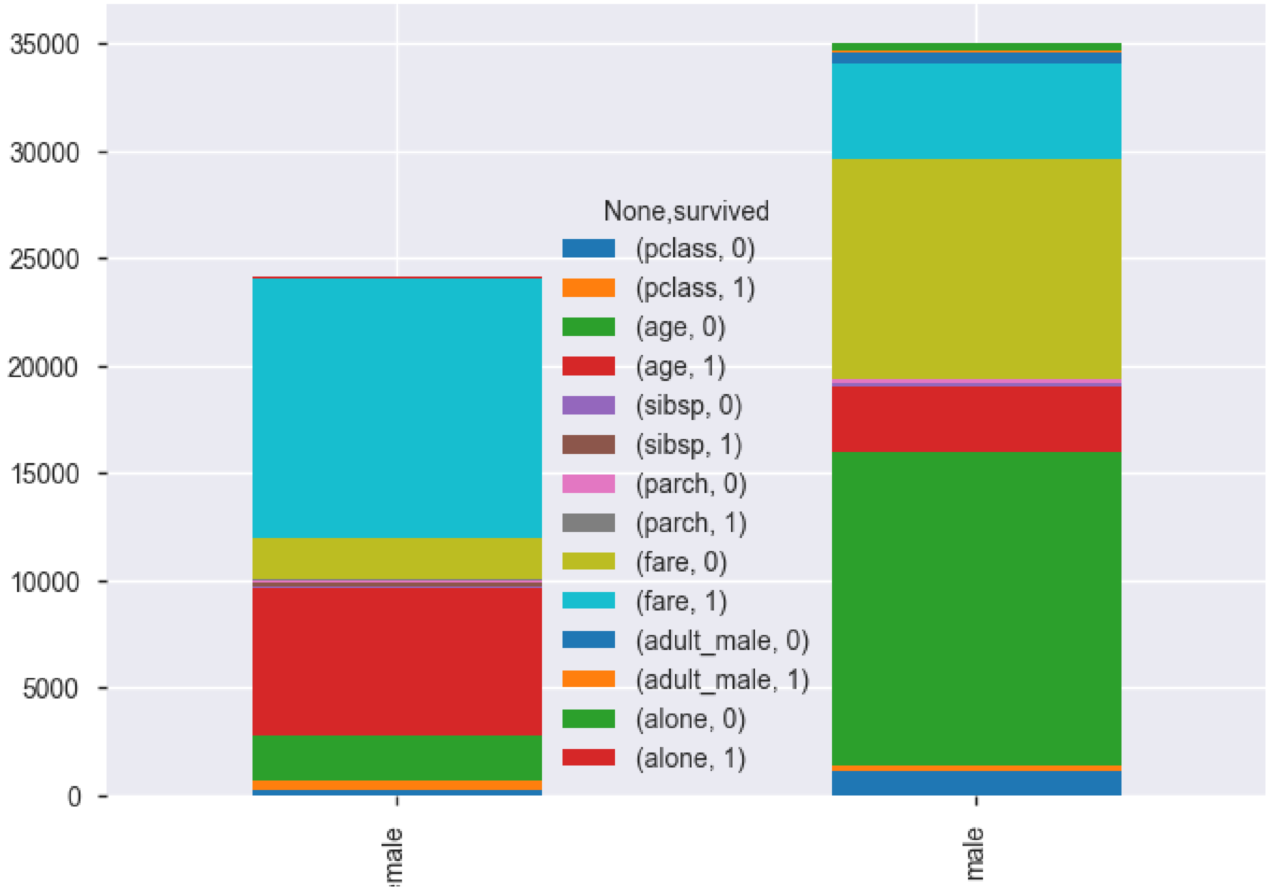
		pclass	age	sibsp	parch	fare	adult_male	alone
sex	**survived**							
female	0	231	2112.00	98	84	1864.9752	0.0	27.0
	1	447	6886.42	120	120	12101.6876	0.0	99.0
male	0	1159	14637.83	206	97	10277.7447	449.0	347.0
	1	220	2978.42	42	39	4449.5418	88.0	64.0

In [18]:

```
total.plot.bar(stacked=True)
```

Out[18]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f8a5fcc9390>
```



fe

sex