L09-18-11-7-P1-Bayes-Theorem-Live

November 12, 2018

In [1]:
```
import pandas as pd
from matplotlib import pyplot as plt
%matplotlib inline
```

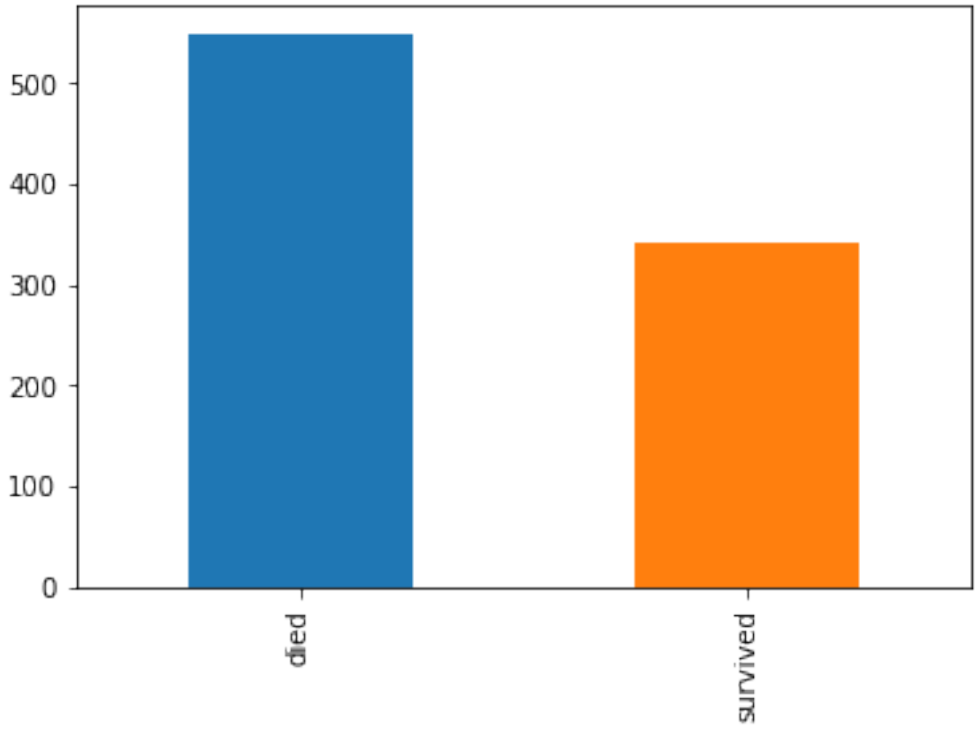
In [2]:
```
# Read the data

df= pd.read_csv('http://bit.ly/tscv17')
df.head()
```

Out[2]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

In [3]:
```
fig, ax = plt.subplots()
_ = df['Survived'].value_counts().plot.bar(ax=ax)
_ = ax.set_xticklabels(['died', 'survived'])
```




```
In [6]: (df['Survived'] != 1).sum(),(df['Survived'] == 1).sum()
```

```
Out[6]: (549, 342)
```

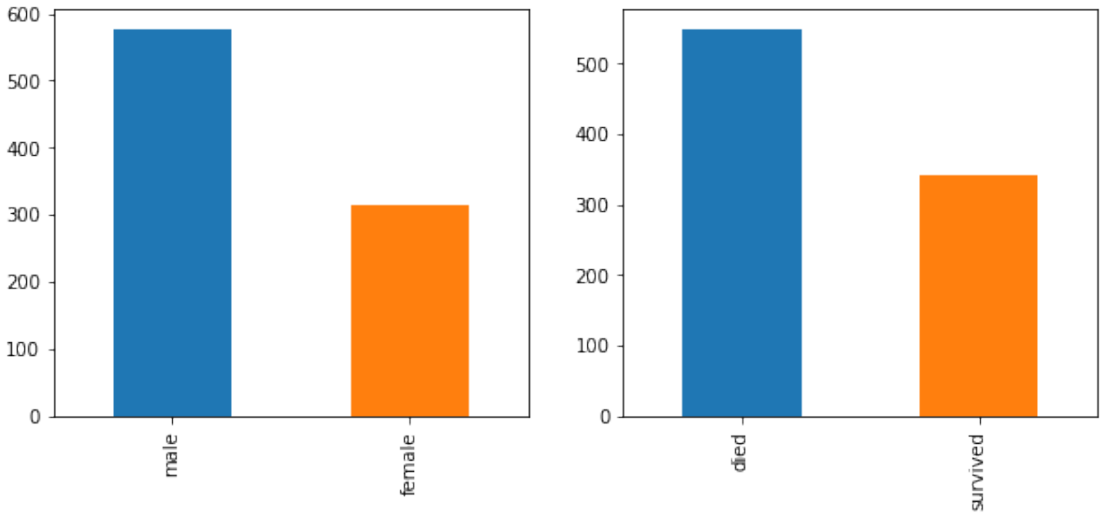
```
In [7]: p_surv = (df['Survived'] == 1).sum()/df['Survived'].count()
        print(f"Probability of survival {p_surv}")
```

```
Probability of survival 0.3838383838383838
```

```
In [8]: subset = df[['PassengerId','Survived',"Sex","Age"]]
        subset.head()
```

```
Out[8]:    PassengerId  Survived     Sex   Age
        0            1         0    male  22.0
        1            2         1  female  38.0
        2            3         1  female  26.0
        3            4         1  female  35.0
        4            5         0    male  35.0
```

```
In [9]: fig, (ax1, ax2) = plt.subplots(ncols=2,figsize=(10,4))
        _ = subset['Sex'].value_counts().plot.bar(ax=ax1)
        _ = subset['Survived'].value_counts().plot.bar(ax=ax2)
        _ = ax2.set_xticklabels(['died', 'survived'])
```

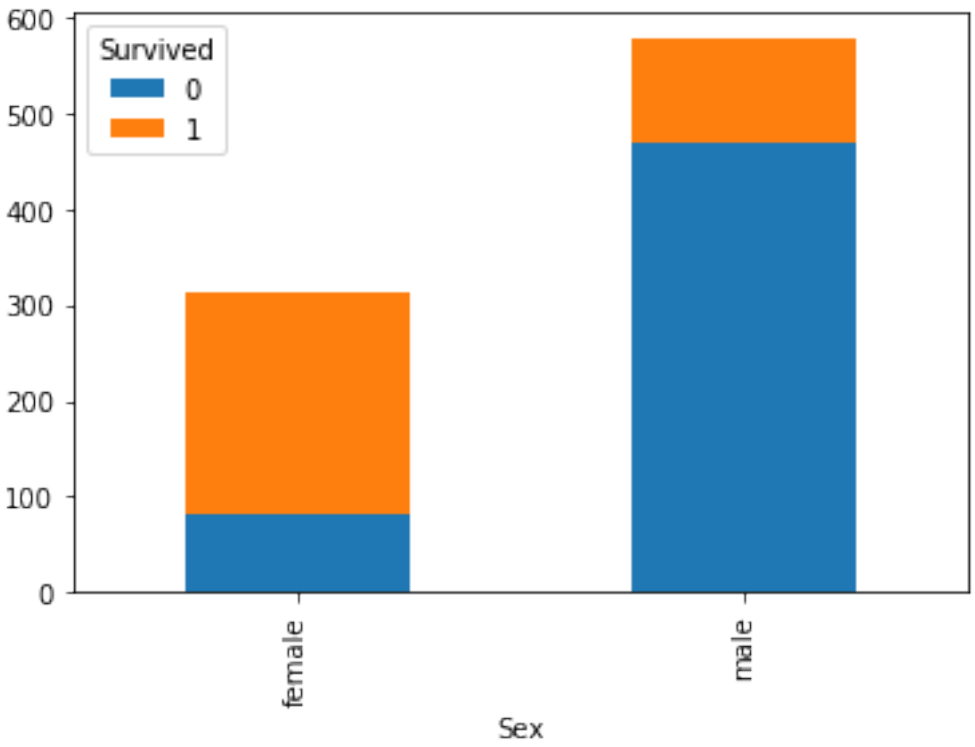



```
In [21]: gsub = subset[['Sex','Survived','PassengerId']].groupby(['Sex','Survived']).count()
         gsub.unstack()
```

Out[21]:

	PassengerId	
Survived	0	1
Sex		
female	81	233
male	468	109

```
In [22]: _ = gsub['PassengerId'].unstack().plot.bar(stacked=True)
```




```
In [23]: men_surv = gsub['PassengerId'].unstack().T['male']
         men_surv

Out[23]: Survived
         0    468
         1    109
         Name: male, dtype: int64

In [26]: female_surv = gsub['PassengerId'].unstack().T['female']
         female_surv

Out[26]: Survived
         0     81
         1    233
         Name: female, dtype: int64
```

$ P(male | died) = P(died | male)P(male)/P(died)$

```
In [27]: p_died = 1-p_surv
         p_died

Out[27]: 0.6161616161616161

In [34]: p_male = (1-subset['Sex'].str.contains('female')).sum()/subset['Sex'].count()
         p_male
```

```
Out[34]: 0.6475869809203143
```

$P(male|died)$

```
In [40]: p_dead_men = (men_surv/men_surv.sum())[0]
         p_dead_men

Out[40]: 0.8110918544194108

In [42]: p_male_dead = p_dead_men * p_male/p_died
         p_male_dead

Out[42]: 0.8524590163934428
```