In [1]:
```python
from sklearn import tree
from pandas import read_csv
from sklearn.tree import DecisionTreeClassifier
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
df=read_csv("Travel.csv")
```

In [2]:
```python
df
```

Out[2]:

	Age	EmploymentType	GraduateOrNot	AnnualIncome	FamilyMembers	ChronicDiseases	FrequentFlyer	EverTravelledAbroad	TravelInsura
0	31	Government Sector	Yes	400000	6	1	No	No	
1	31	Private Sector/Self Employed	Yes	1250000	7	0	No	No	
2	34	Private Sector/Self Employed	Yes	500000	4	1	No	No	
3	28	Private Sector/Self Employed	Yes	700000	3	1	No	No	
4	28	Private Sector/Self Employed	Yes	700000	8	1	Yes	No	
...	...	...	...	...	...	...	...	...	
1982	33	Private Sector/Self Employed	Yes	1500000	4	0	Yes	Yes	
1983	28	Private Sector/Self Employed	Yes	1750000	5	1	No	Yes	
1984	28	Private Sector/Self Employed	Yes	1150000	6	1	No	No	
1985	34	Private Sector/Self Employed	Yes	1000000	6	0	Yes	Yes	
1986	34	Private Sector/Self Employed	Yes	500000	4	0	No	No	

1987 rows × 9 columns

In [3]:
```python
features=['Age', 'AnnualIncome', 'FamilyMembers','ChronicDiseases']
X=df[features]
y=df['TravelInsurance']
print(X)
print(y)
```

```
      Age  AnnualIncome  FamilyMembers  ChronicDiseases
0      31        400000              6                1
1      31       1250000              7                0
2      34        500000              4                1
3      28        700000              3                1
4      28        700000              8                1
...   ...           ...            ...              ...
1982   33       1500000              4                0
1983   28       1750000              5                1
1984   28       1150000              6                1
1985   34       1000000              6                0
1986   34        500000              4                0

[1987 rows x 4 columns]
0       0
1       0
2       1
3       0
4       0
       ..
1982    1
1983    0
1984    0
1985    1
1986    0
Name: TravelInsurance, Length: 1987, dtype: int64
```

In [4]:
```python
inputs=df.drop('TravelInsurance',axis='columns')
target=df['TravelInsurance']
```

In [5]:
```python
from sklearn.preprocessing import LabelEncoder
```

In [6]:
```python
le_EmploymentType=LabelEncoder()
le_GraduateOrNot=LabelEncoder()
le_FrequentFlyer=LabelEncoder()
le_EverTravelledAbroad=LabelEncoder()
```

In [7]:
```python
inputs['EmploymentType_n']=le_EmploymentType.fit_transform(inputs['EmploymentType'])
inputs['GraduateOrNot_n']=le_GraduateOrNot.fit_transform(inputs['GraduateOrNot'])
inputs['FrequentFlyer_n']=le_FrequentFlyer.fit_transform(inputs['FrequentFlyer'])
inputs['EverTravelledAbroad_n']=le_EverTravelledAbroad.fit_transform(inputs['EverTravelledAbroad'])
inputs.head()
```

Out[7]:

	Age	EmploymentType	GraduateOrNot	AnnualIncome	FamilyMembers	ChronicDiseases	FrequentFlyer	EverTravelledAbroad	EmploymentTy
0	31	Government Sector	Yes	400000	6	1	No	No	
1	31	Private Sector/Self Employed	Yes	1250000	7	0	No	No	
2	34	Private Sector/Self Employed	Yes	500000	4	1	No	No	
3	28	Private Sector/Self Employed	Yes	700000	3	1	No	No	
4	28	Private Sector/Self Employed	Yes	700000	8	1	Yes	No	

In [8]:
```python
inputs_n=inputs.drop(['EmploymentType','GraduateOrNot','FrequentFlyer','EverTravelledAbroad'],axis='columns')
inputs_n
```

Out[8]:

	Age	AnnualIncome	FamilyMembers	ChronicDiseases	EmploymentType_n	GraduateOrNot_n	FrequentFlyer_n	EverTravelledAbroad_n
0	31	400000	6	1	0	1	0	0
1	31	1250000	7	0	1	1	0	0
2	34	500000	4	1	1	1	0	0
3	28	700000	3	1	1	1	0	0
4	28	700000	8	1	1	1	1	0
...	...	...	...	...	...	...	...	...
1982	33	1500000	4	0	1	1	1	1
1983	28	1750000	5	1	1	1	0	1
1984	28	1150000	6	1	1	1	0	0
1985	34	1000000	6	0	1	1	1	1
1986	34	500000	4	0	1	1	0	0

1987 rows × 8 columns

In [9]:
```python
# Defining the Naive Bayes
```

In [10]:
```python
from sklearn.naive_bayes import MultinomialNB
mnb=MultinomialNB(fit_prior=False)
```

In [11]:
```python
import sklearn.model_selection
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3,random_state=1)
mnb.fit(X_train,y_train)
```

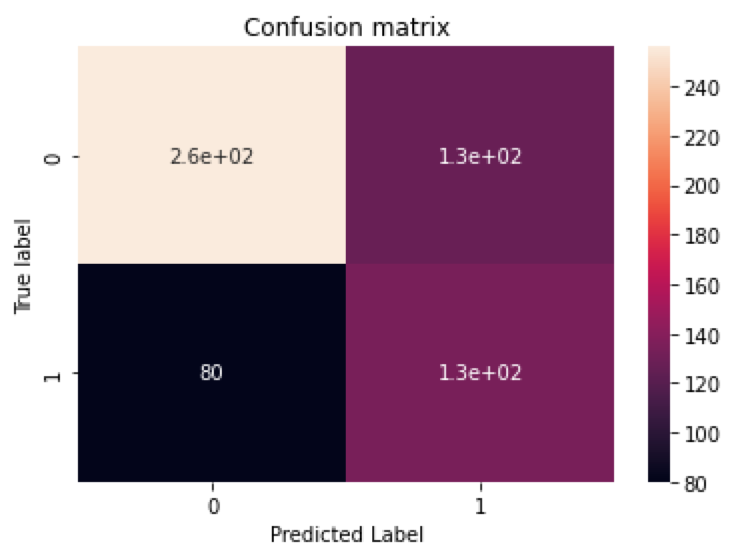
Out[11]:
```
MultinomialNB(fit_prior=False)
```

In [12]:
```python
y_pred=mnb.predict(X_test)
print(y_pred)
```

```
[0 0 0 0 1 1 0 0 0 1 0 1 0 0 0 1 0 0 0 1 0 1 0 1 1 0 1 1 1 0 0 0 0 0 0 1
 0 1 1 0 0 0 1 1 0 1 0 0 0 1 1 0 0 0 0 0 1 0 0 1 0 1 1 1 1 0 0 1 1 1 0 1 1
 0 0 0 1 1 0 0 0 1 1 0 1 0 0 1 0 1 0 0 0 1 1 1 1 0 0 1 0 0 1 0 0 1 0 1 0 0
 0 0 0 1 1 1 0 0 0 1 0 0 1 1 0 1 1 0 0 0 0 0 1 1 0 0 0 1 0 1 1 0 0 0 1 0 1
 1 0 1 0 1 0 0 1 0 1 1 0 0 1 0 0 1 0 1 1 0 1 0 1 0 0 0 1 0 0 1 0 0 1 1 0 1
 0 0 1 0 1 1 0 1 0 1 0 1 0 0 0 0 0 1 0 0 1 1 0 1 1 0 1 0 0 1 1 0 1 0 0 0 0
 0 1 0 1 1 1 0 0 0 0 0 0 1 0 1 0 0 1 0 0 0 1 1 1 1 0 1 1 1 0 1 0 0 1 1 1 0
 1 1 0 1 0 1 0 1 1 1 1 0 0 0 1 1 1 0 0 0 1 0 0 0 1 1 1 1 1 1 1 0 0 0 0 1 0
 0 1 0 1 1 0 0 0 1 1 1 1 0 1 1 0 1 0 1 0 1 0 1 0 0 0 0 0 0 1 0 0 0 1 0 1 0
 0 0 0 1 0 0 1 0 0 1 0 0 1 0 0 0 1 1 1 0 0 1 0 0 0 0 0 0 1 0 0 0 0 1 0 1 0
 1 1 1 0 0 0 0 1 1 0 1 1 1 0 0 0 0 1 0 1 0 0 0 1 0 0 0 1 1 0 1 1 0 0 0 1 1
 0 1 1 0 0 0 0 0 0 1 0 0 1 1 1 0 0 0 0 1 1 0 0 1 0 1 1 1 0 1 0 1 0 0 1 1 1
 1 1 1 0 0 1 1 0 0 0 0 1 0 0 0 1 0 1 1 0 0 0 0 0 0 0 0 1 1 1 0 0 1 1 0 0 0
 1 1 0 0 0 0 1 1 0 1 1 1 0 1 0 1 1 1 1 1 0 0 0 1 0 0 0 0 1 1 1 1 0 1 1 0 0
 0 1 1 1 0 0 0 1 0 0 0 0 0 1 0 1 0 1 0 1 1 1 1 1 1 0 0 1 0 0 0 1 1 0 0 0 1
 0 0 1 0 0 0 1 0 1 0 0 1 0 0 1 1 1 1 0 0 1 0 0 0 0 0 0 0 1 0 1 1 0 1 1 1 0
 0 1 0 1 1]
```

In [13]:
```python
# Confusion Matrix
```

In [14]:
```python
from sklearn.metrics import confusion_matrix
confusion_mat =confusion_matrix(y_test,y_pred)
sns.heatmap(confusion_mat,annot=True)
plt.xlabel("Predicted Label")
plt.ylabel("True label")
plt.title("Confusion matrix")
plt.show()
from sklearn.metrics import confusion_matrix
cm2=np.array(confusion_matrix(y_test,y_pred))
cm2
```



Out[14]:
```
array([[256, 127],
       [ 80, 134]], dtype=int64)
```

In [15]:
```python
from sklearn.metrics import accuracy_score
accuracy_score(y_test,y_pred)
```

Out[15]:
```
0.6532663316582915
```

In [16]:
```python
from sklearn.naive_bayes import GaussianNB
gnb=GaussianNB()
gnb.fit(X_train,y_train)
y_pred =gnb.predict(X_test)
print(y_pred)
```

```
[0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
 0 1 1 0 0 0 1 1 0 1 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 1 1 0 0 0 0 0 0 1 0 1 0
 0 0 0 1 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 1 0 0 1 0 0 0 0
 0 0 0 0 1 0 0 0 0 1 0 0 1 0 0 1 1 0 0 0 0 0 1 1 0 0 0 1 0 0 1 0 0 0 0 0 0
 1 0 0 0 1 0 0 1 0 1 1 0 0 0 0 0 1 0 1 1 0 1 0 1 0 0 0 1 0 0 0 0 0 1 1 0 1
 0 0 1 0 0 1 0 1 0 1 0 1 0 0 0 0 0 1 0 0 1 1 0 1 1 0 1 0 0 0 0 0 1 0 0 0 0
 0 0 0 1 1 1 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 1 0 0 1 0 1 1 1 0 0 0 0 0 0 1 0
 0 0 0 1 0 0 0 1 1 1 0 0 0 0 1 1 1 0 0 0 1 0 0 0 0 1 0 0 1 1 0 0 0 0 0 0 0
 0 1 0 1 1 0 0 0 1 1 1 0 0 0 0 0 1 0 1 0 1 0 1 0 0 0 0 0 0 1 0 0 0 1 0 1 0
 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 1 1 0 0 0 0 0 1 0 1 1 1 0 0 0 0 1 0 1 0 0 0 0 0 0 0 1 0 0 1 1 0 0 0 1 0
 0 1 1 0 0 0 0 0 0 1 0 0 1 1 0 0 0 0 0 1 0 0 0 1 0 0 1 1 0 0 0 0 0 0 0 1 0
 0 1 1 0 0 0 1 0 0 0 0 1 0 0 0 1 0 1 1 0 0 0 0 0 0 0 0 1 1 1 0 0 0 1 0 0 0
 0 1 0 0 0 0 0 1 0 1 1 1 0 0 0 0 0 1 1 1 0 0 0 1 0 0 0 0 1 1 0 1 0 0 0 0 0
 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 0 1 0 0 0 1
 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 1 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0
 0 0 0 0 1]
```

In [17]:
```python
from sklearn import metrics
print(accuracy_score(y_test,y_pred))
```

```
0.7738693467336684
```

In [18]:
```python
from sklearn.metrics import confusion_matrix
cm2=np.array(confusion_matrix(y_test,y_pred))
cm2
```

Out[18]:
```
array([[346,  37],
       [ 98, 116]], dtype=int64)
```