Rakha Fathin Izzan Consetta
PM H / 5025221156
Naive Bayes
1)

1. Diketahui sebuah dataset untuk pelatihan (*data training*) seperti pada tabel dibawah ini:

Day	Outlook	Temperature	Humidity	Wind	PlayTennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Berdasarkan dataset diatas, **prediksi keputusan untuk bermain Tennis** menggunakan Bayesian learning jika data uji (*testing*) sebagai berikut:

a. X = (Outlook = Rain, Temperature = Hot, Humidity = Normal, Wind = Weak)
b. X = (Outlook = Sunny, Temperature = Mild, Humidity = Normal, Wind = Weak)

- P(Outlook = Sunny | No) = 3/5
- P(Outlook = Sunny | Yes) = 2/9
- P(Outlook = Overcast | No) = 0
- P(Outlook = Overcast | Yes) = 4/9
- P(Outlook = Rain | No) = 2/5
- P(Outlook = Rain | Yes) = 3/9 = 1/3
- P(Temperature = Hot | No) = 2/5
- P(Temperature = Hot | Yes) = 2/9
- P(Temperature = Mild | No) = 2/5
- P(Temperature = Mild | Yes) = 4/9
- P(Temperature = Cool | No) = 1/5
- P(Temperature = Cool | Yes) = 3/9 = 1/3
- P(Humidity = High | No) = 4/5
- P(Humidity = High | Yes) = 3/9 = 1/3
- P(Humidity = Normal | No) = 1/5
- P(Humidity = Normal | Yes) = 6/9 = 2/3
- P(Wind = Weak | No) = 2/5
- P(Wind = Weak | Yes) = 6/9 = 2/3
- P(Wind = Strong | No) = 3/5
- P(Wind = Strong | Yes) = 3/9 = 1/3

a. X = (Outlook = Rain, Temperature = Hot, Humidity = Normal, WInd = Weak)

Class No:

- P(Outlook = Rain | No) = 2/5
- P(Temperature = Hot | No) = 2/5
- P(Humidity = Normal | No) = 1/5
- P(Wind = Weak | No) = 2/5

P(X | No) = 2/5 * 2/5 * 1/5 * 2/5 = 8/625 = 0.0128

Class Yes:

- P(Outlook = Rain | Yes) = 3/9 = 1/3
- P(Temperature = Hot | Yes) = 2/9
- P(Humidity = Normal | Yes) = 6/9 = 2/3
- P(Wind = Weak | Yes) = 6/9 = 2/3

P(X | Yes) = 1/3 * 2/9 * 2/3 * 2/3 = 8/243 = 0.0329

Karena P(X | Yes) > P(X | No), maka Class = Yes, bermain tennis

b. X = (Outlook = Sunny, Temperature = Mild, Humidity = Normal, WInd = Weak)

Class No:

- P(Outlook = Sunny | No) = 3/5
- P(Temperature = Mild | No) = 2/5
- P(Humidity = Normal | No) = 1/5
- P(Wind = Weak | No) = 2/5

P(X | No) = 3/5 * 2/5 * 1/5 * 2/5 = 12/625 = 0.0192

Class Yes:

- P(Outlook = Sunny | Yes) = 2/9
- P(Temperature = Mild | Yes) = 4/9
- P(Humidity = Normal | Yes) = 6/9 = 2/3
- P(Wind = Weak | Yes) = 6/9 = 2/3

P(X | Yes) = 2/9 * 4/9 * 2/3 * 2/3 = 32/729 = 0.0439

Karena P(X | Yes) > P(X | No), maka Class = Yes, bermain tennis

2)

2. Diketahui sebuah dataset untuk pelatihan (data training) seperti pada tabel di bawah ini:

ID	Age	Income	Student	Credit_Rating	Class: Buys Computer
1	Youth	high	no	fair	no
2	Youth	high	no	excellent	no
3	middle aged	high	no	fair	yes
4	Senior	medium	no	fair	yes
5	Senior	low	yes	fair	yes
6	Senior	low	yes	excellent	no
7	middle aged	low	yes	excellent	yes
8	Youth	medium	no	fair	no
9	Youth	low	yes	fair	yes
10	Senior	medium	yes	fair	yes
11	Youth	medium	yes	excellent	yes
12	middle aged	medium	no	excellent	yes
13	middle aged	high	yes	fair	yes
14	Senior	medium	no	excellent	no

Berdasarkan dataset diatas, prediksilah keputusan untuk Membeli Komputer menggunakan Naïve Bayes jika data uji (testing) sebagai berikut:
a. X = (Age=Youth, Income=Medium, Student=Yes, Credit_Rating=Fair)!
b. X = (Age=Senior, Income=High, Student=No, Credit_Rating=Fair)!

- P(Age = Youth | No) = 3/5
- P(Age = Youth | Yes) = 2/9
- P(Age = Middle aged | No) = 0/5 = 0
- P(Age = Middle aged | Yes) = 4/9
- P(Age = Senior | No) = 2/5
- P(Age = Senior | Yes) = 3/9 = 1/3
- P(Income = High | No) = 2/5
- P(Income = High | Yes) = 2/9
- P(Income = Medium | No) = 2/5
- P(Income = Medium | Yes) = 4/9
- P(Income = Low | No) = 1/5
- P(Income = Low | Yes) = 3/9 = 1/3
- P(Student = No | No) = 4/5
- P(Student = No | Yes) = 3/9 = 1/3
- P(Student = Yes | No) = 1/5
- P(Student = Yes | Yes) = 6/9 = 2/3
- P(Credit_Rating = Fair | No) = 2/5
- P(Credit_Rating = Fair | Yes) = 6/9 = 2/3
- P(Credit_Rating = Excellent | No) = 3/5
- P(Credit_Rating = Excellent | Yes) = 3/9 = 1/3

a. X = (Age=Youth, Income=Medium, Student=Yes, Credit_Rating=Fair)

Class No:

- P(Age = Youth | No) = 3/5
- P(Income = Medium | No) = 2/5
- P(Student = Yes | No) = 1/5
- P(Credit_Rating = Fair | No) = 2/5

P(X | No) = 3/5 * 2/5 * 1/5 * 2/5 =12/625 = 0.0192

Class Yes:

- P(Age = Youth | Yes) = 2/9
- P(Income = Medium | Yes) = 4/9
- P(Student = Yes | Yes) = 6/9 = 2/3
- P(Credit_Rating = Fair | Yes) = 6/9 = 2/3

P(X | Yes) = 2/9 * 4/9 * 2/3 * 2/3 = 32/729 = 0.0439

Karena P(X | Yes) > P(X | No), maka Class = Yes, membeli komputer

b. X = (Age=Senior, Income=High, Student=No, Credit_Rating=Fair)

Class No:

- P(Age = Senior | No) = 2/5
- P(Income = High | No) = 2/5
- P(Student = No | No) = 4/5
- P(Credit_Rating = Fair | No) = 2/5

P(X | No) = 2/5 * 2/5 * 4/5 * 2/5 = 32/625 = 0.0512

Class Yes:

- P(Age = Senior | Yes) = 3/9 = 1/3
- P(Income = High | Yes) = 2/9
- P(Student = No | Yes) = 3/9 = 1/3
- P(Credit_Rating = Fair | Yes) = 6/9 = 2/3
- P(X | Yes) = 1/3 * 2/9 * 1/3 * 2/3 = 4/243 = 0.0165

Karena P(X | No) > P(X | Yes), maka Class = No, tidak membeli komputer