

Ravy Pramono

5025221252

Pembelajaran Mesin B

Tugas Naive Bayes

$$P(\text{Yes}) = \frac{9}{14} \quad P(\text{No}) = \frac{5}{14} = 0,357143$$

$$a.) \quad 0,642857$$

Outlook = Rain

$$P(\text{Outlook} = \text{Rain} | \text{PlayTennis} = \text{Yes}) = 0,33$$

$$P(\text{Rain} | \text{No}) = 0,4$$

Temperature = Hot

$$P(\text{Hot} | \text{Yes}) = 0,22$$

$$P(\text{Hot} | \text{No}) = 0,4$$

Humidity = Normal

$$P(\text{Normal} | \text{Yes}) = 0,6667$$

$$P(\text{Normal} | \text{No}) = 0,2$$

Wind = Weak

$$P(\text{Weak} | \text{Yes}) = 0,667$$

$$P(\text{Weak} | \text{No}) = 0,4$$

$X = (\text{Outlook} = \text{Rain}, \text{Temperature} = \text{Hot}, \text{Humidity} = \text{Normal}, \text{Wind} = \text{Weak})$

$$P(X | \text{Yes}) = P(\text{Rain} | \text{Yes}) \times P(\text{Hot} | \text{Yes}) \times P(\text{Normal} | \text{Yes}) \times P(\text{Weak} | \text{Yes})$$

$$= 0,33 \cdot 0,22 \cdot 0,6667 \cdot 0,667$$

$$P(X | \text{Yes}) = 0,032921811$$

$$P(X | \text{No}) = P(\text{Rain} | \text{No}) \times P(\text{Hot} | \text{No}) \times P(\text{Normal} | \text{No}) \times P(\text{Weak} | \text{No})$$

$$= 0,4 \cdot 0,4 \cdot 0,2 \cdot 0,4$$

$$P(X | \text{No}) = 0,0128$$

$$P(\text{Yes} | X) = \frac{P(X | \text{Yes}) \cdot P(\text{Yes})}{(P(X | \text{Yes}) \cdot P(\text{Yes})) + (P(X | \text{No}) \cdot P(\text{No}))}$$

$$= \frac{0,032921811 \cdot 0,642857}{(0,032921811 \cdot 0,642857) + (0,0128 \cdot 0,357143)}$$

$$= 0,032921811 \cdot 0,642857$$

$$(0,032921811 \cdot 0,642857) + (0,0128 \cdot 0,357143)$$

$$P(\text{Yes} | X) = 0,822368421 \approx 82\%$$

$$P(\text{No} | X) = \frac{P(X | \text{No}) \cdot P(\text{No})}{(P(X | \text{Yes}) \cdot P(\text{Yes})) + (P(X | \text{No}) \cdot P(\text{No}))}$$

$$= \frac{0,0128 \cdot 0,357143}{(0,032921811 \cdot 0,642857) + (0,0128 \cdot 0,357143)}$$

$$= 0,0128 \cdot 0,357143$$

$$(0,032921811 \cdot 0,642857) + (0,0128 \cdot 0,357143)$$

$$P(\text{No} | X) = 0,177631579 \approx 17\%$$

Berdasarkan hasil perhitungan Prediksi untuk data X (outlook = Rain, Temperature = Hot, Humidity = Normal, Wind = weak) adalah PlayTennis = Yes sebesar 82,2 % //

b) Outlook = Sunny

$$P(\text{Sunny} | \text{Yes}) = 0,22$$

$$P(\text{Sunny} | \text{No}) = 0,6$$

Temperature = Mild

$$P(\text{Mild} | \text{Yes}) = 0,44$$

$$P(\text{Mild} | \text{No}) = 0,4$$

Humidity = Normal

$$P(\text{Normal} | \text{Yes}) = 0,667$$

$$P(\text{Normal} | \text{No}) = 0,2$$

Wind = Weak

$$P(\text{Weak} | \text{Yes}) = 0,667$$

$$P(\text{Weak} | \text{No}) = 0,4$$

$X = (\text{Outlook} = \text{Sunny}, \text{Temperature} = \text{Mild}, \text{Humidity} = \text{Normal}, \text{Wind} = \text{Weak})$

$$P(X | \text{Yes}) = P(\text{Sunny} | \text{Yes}) \cdot P(\text{Mild} | \text{Yes}) \cdot P(\text{Normal} | \text{Yes}) \cdot P(\text{Weak} | \text{Yes})$$

$$= 0,22 \cdot 0,44 \cdot 0,667 \cdot 0,667$$

$$P(X | \text{Yes}) = 0,043896$$

$$P(X | \text{No}) = P(\text{Sunny} | \text{No}) \cdot P(\text{Mild} | \text{No}) \cdot P(\text{Normal} | \text{No}) \cdot P(\text{Weak} | \text{No})$$

$$= 0,6 \cdot 0,4 \cdot 0,2 \cdot 0,4$$

$$P(X | \text{No}) = 0,0192$$

$$P(\text{Yes} | X) = \frac{P(X | \text{Yes}) \cdot P(\text{Yes})}{(P(X | \text{Yes}) \cdot P(\text{Yes})) + (P(X | \text{No}) \cdot P(\text{No}))}$$

$$= \frac{0,043896 \cdot 0,642857}{(0,043896 \cdot 0,642857) + (0,0192 \cdot 0,357143)}$$

$$= 0,043896 \cdot 0,642857$$

$$(0,043896 \cdot 0,642857) + (0,0192 \cdot 0,357143)$$

$$P(\text{Yes} | X) = 0,804505 \approx 80,4\%$$

$$P(\text{No} | X) = \frac{P(X | \text{No}) \cdot P(\text{No})}{(P(X | \text{Yes}) \cdot P(\text{Yes})) + (P(X | \text{No}) \cdot P(\text{No}))}$$

$$= \frac{0,0192 \cdot 0,357143}{(0,043896 \cdot 0,642857) + (0,0192 \cdot 0,357143)}$$

$$= 0,0192 \cdot 0,357143$$

$$(0,043896 \cdot 0,642857) + (0,0192 \cdot 0,357143)$$

$$P(\text{No} | X) = 0,195495 \approx 19,5\%$$

Berdasarkan hasil Perhitungan diatas, dapat kita simpulkan bahwa data $X = (\text{outlook} = \text{Sunny}, \text{Temperature} = \text{Mild}, \text{Humidity} = \text{Normal}, \text{Wind} = \text{Weak})$ memiliki Value PlayTennis Yes karena Probabilitasnya / hasil bayes nya adalah 0,804505 atau ekuivalen dengan 80,4% //

$$2.) P(\text{yes}) = 0,642857$$

$$P(\text{no}) = 0,357143$$

A.) $X = (\text{Age} = \text{Youth}, \text{Income} = \text{Medium}, \text{Student} = \text{Yes}, \text{Credit-Rating} = \text{Fair})$

Age = Youth

$$P(\text{Youth} | \text{Yes}) = 0,22$$

$$P(\text{Youth} | \text{No}) = 0,6$$

Income = medium

$$P(\text{medium} | \text{Yes}) = 0,44$$

$$P(\text{medium} | \text{No}) = 0,4$$

Student = yes

$$P(\text{yes} | \text{Yes}) = 0,67$$

$$P(\text{yes} | \text{No}) = 0,2$$

Credit-Rating = Fair

$$P(\text{Fair} | \text{Yes}) = 0,67$$

$$P(\text{Fair} | \text{No}) = 0,4$$

$$P(X | \text{yes}) = P(\text{Youth} | \text{yes}) \cdot P(\text{medium} | \text{yes}) \cdot P(\text{yes} | \text{yes}) \cdot P(\text{Fair} | \text{yes})$$

$$P(X | \text{yes}) = 0,22 \cdot 0,44 \cdot 0,67 \cdot 0,67$$

$$= 0,043895748$$

$$P(X | \text{no}) = P(\text{Youth} | \text{no}) \cdot P(\text{medium} | \text{no}) \cdot P(\text{yes} | \text{no}) \cdot P(\text{Fair} | \text{no})$$

$$P(X | \text{no}) = 0,6 \cdot 0,4 \cdot 0,2 \cdot 0,4$$

$$= 0,0192$$

$$P(\text{yes} | X) = \frac{P(X | \text{yes}) \cdot P(\text{yes})}{(P(X | \text{yes}) \cdot P(\text{yes})) + (P(X | \text{no}) \cdot P(\text{no}))}$$

$$= \frac{0,043895748 \cdot 0,642857}{(0,043895748 \cdot 0,642857) + (0,0192 \cdot 0,357143)}$$

$$P(\text{yes} | X) = 0,804505229 \approx 80,4\%$$

$$P(\text{no} | X) = 1 - P(\text{yes} | X)$$

$$= 1 - 0,804505229$$

$$P(\text{no} | X) = 0,195494771 \approx 19,5\%$$

Berdasarkan hasil Perhitungan di atas, Prediksi Class Bays computer yang mungkin untuk data $X (\text{Age} = \text{youth}, \text{Income} = \text{medium}, \text{Student} = \text{yes}, \text{Credit-Rating} = \text{Fair})$ adalah yes (80,4%)

B.) $X = (\text{Age} = \text{Senior}, \text{Income} = \text{High}, \text{student} = \text{no}, \text{Credit-Rating} = \text{Fair})$

Age = Senior

$$P(\text{senior} | \text{yes}) = 0,33$$

$$P(\text{senior} | \text{no}) = 0,4$$

Income = High

$$P(\text{High} | \text{yes}) = 0,22$$

$$P(\text{High} | \text{No}) = 0,4$$

Student = no

$$P(\text{no} | \text{yes}) = 0,33$$

$$P(\text{no} | \text{no}) = 0,8$$

$$P(X | \text{yes}) = P(\text{senior} | \text{yes}) \cdot P(\text{High} | \text{yes}) \cdot P(\text{no} | \text{yes}) \cdot P(\text{Fair} | \text{yes})$$

$$= 0,33 \cdot 0,22 \cdot 0,33 \cdot 0,67$$

$$P(X | \text{yes}) = 0,016461$$

$$P(X | \text{no}) = P(\text{senior} | \text{no}) \cdot P(\text{High} | \text{no}) \cdot P(\text{no} | \text{no}) \cdot P(\text{Fair} | \text{no})$$

$$= 0,4 \cdot 0,4 \cdot 0,8 \cdot 0,4$$

$$P(X | \text{no}) = 0,0512$$

$$P(\text{yes} | X) = \frac{P(X | \text{yes}) \cdot P(\text{yes})}{(P(X | \text{yes}) \cdot P(\text{yes})) + (P(X | \text{no}) \cdot P(\text{no}))}$$

$$= \frac{0,016461 \cdot 0,642857}{(0,016461 \cdot 0,642857) + (0,0512 \cdot 0,357143)}$$

$$P(\text{yes} | X) = 0,366569 \approx 36,6\%$$

$$P(\text{no} | X) = 1 - P(\text{yes} | X)$$

$$= 1 - 0,366569$$

$$P(\text{no} | X) = 0,633431 \approx 63,3\%$$

Berdasarkan Hasil Perhitungan di atas, Prediksi class Bays Computer yang mungkin untuk data $X (\text{Age} = \text{Senior}, \text{Income} = \text{High}, \text{Student} = \text{no}, \text{Credit-Rating} = \text{Fair})$ adalah No dengan kemungkinan sebesar 0,633431 / 63,3%