Concept behind Naive Bayes

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Outlook	Temp	Humidity	Windy	Play
sunny	hot	high	FALSE	no
sunny	hot	high	TRUE	no
overcast	hot	high	FALSE	yes
rainy	mild	high	FALSE	yes
rainy	cool	normal	FALSE	yes
rainy	cool	normal	TRUE	no
overcast	cool	normal	TRUE	yes
sunny	mild	high	FALSE	no
sunny	cool	normal	FALSE	yes
rainy	mild	normal	FALSE	yes
sunny	mild	normal	TRUE	yes
overcast	mild	high	TRUE	yes
overcast	hot	normal	FALSE	yes
rainy	mild	high	TRUE	no

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sunny	mild	normal	TRUE	yes
overcast	mild	high	TRUE	yes
overcast	hot	normal	FALSE	yes
rainy	mild	high	TRUE	no

$X = [\text{Outlook}, \text{Temp}, \text{Humidity}, \text{Windy}]$

$x_1 \quad x_2 \quad x_3 \quad x_4$

$C_k = [\text{Yes}, \text{No}]$

$C_1 \quad C_2$

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overcast	hot	normal	FALSE	yes
rainy	mild	high	TRUE	no

$$P(E_1 \mid E_2) = \frac{P(E_2 \mid E_1) * P(E_1)}{P(E_2)}$$

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$$P(E_1 \mid E_2) = \frac{P(E_2 \mid E_1) * P(E_1)}{P(E_2)}$$

$$P(C_k \mid X) = \frac{P(X \mid C_k) * P(C_k)}{P(X)}$$

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$$P(C_1 \mid x_1 \cap x_2 \cap x_3 \cap x_4) = \frac{P(x_1 \cap x_2 \cap x_3 \cap x_4 \mid C_1) * P(C_1)}{P(x_1 \cap x_2 \cap x_3 \cap x_4)}$$

Concept behind Naive Bayes

$$P(C_k \mid X) = \frac{P(X \mid C_k) * P(C_k)}{P(X)}$$

$$P(C_1 \mid x_1 \cap x_2 \cap x_3 \cap x_4) = \frac{P(x_1 \cap x_2 \cap x_3 \cap x_4 \mid C_1) * P(C_1)}{P(x_1 \cap x_2 \cap x_3 \cap x_4)}$$

$$P(C_1 \mid x_1 \cap x_2 \cap x_3 \cap x_4) = \frac{P(x_1 \mid C_1) * P(x_2 \mid C_1) * P(x_3 \mid C_1) * P(x_4 \mid C_1) * P(C_1)}{P(x_1) * P(x_2) * P(x_3) * P(x_4)}$$

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$$P(C_1 \mid x_1 \cap x_2 \cap x_3 \cap x_4) = \frac{P(x_1 \mid C_1) * P(x_2 \mid C_1) * P(x_3 \mid C_1) * P(x_4 \mid C_1) * P(C_1)}{P(x_1) * P(x_2) * P(x_3) * P(x_4)}$$

$$P(\text{yes} \mid \text{sunny} \cap \text{hot} \cap \text{high} \cap \text{windy}) = \frac{P(\text{sunny} \mid \text{yes}) * P(\text{hot} \mid \text{yes}) * P(\text{high} \mid \text{yes}) * P(\text{windy} \mid \text{yes}) * P(\text{yes})}{P(\text{sunny}) * P(\text{hot}) * P(\text{high}) * P(\text{windy})}$$

$$P(\text{no} \mid \text{sunny} \cap \text{hot} \cap \text{high} \cap \text{windy}) = \frac{P(\text{sunny} \mid \text{no}) * P(\text{hot} \mid \text{no}) * P(\text{high} \mid \text{no}) * P(\text{windy} \mid \text{no}) * P(\text{no})}{P(\text{sunny}) * P(\text{hot}) * P(\text{high}) * P(\text{windy})}$$

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