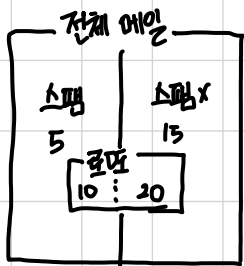


⊗ Bayes's theorem 예제

⊗ 확률 $p(A, B) = p(A \cap B)$



$$\begin{aligned}
 p(\text{스팸}|\text{로또}) &= \frac{p(\text{스팸}, \text{로또})}{p(\text{로또})} \\
 &= \frac{p(\text{로또}|\text{스팸})p(\text{스팸})}{p(\text{로또}|\text{스팸})p(\text{스팸}) + p(\text{로또}|\text{스팸x})p(\text{스팸x})} \\
 &= \frac{\frac{10}{15} \times \frac{15}{50}}{\frac{10}{15} \times \frac{15}{50} + \frac{20}{35} \times \frac{35}{50}} = \frac{1}{3}
 \end{aligned}$$

⊗ Naïve Bayes 예제

$$p(\text{스팸}) = \frac{15}{50}$$

$$p(\text{로또}) = \frac{30}{50} \quad p(\text{경품}) = \frac{10}{50}$$

$$p(\text{로또}|\text{스팸}) = \frac{10}{15} \Rightarrow p(\text{로또}|\text{스팸x}) = \frac{20}{35}$$

$$p(\text{경품}|\text{스팸}) = \frac{7}{15} \Rightarrow p(\text{경품}|\text{스팸x}) = \frac{3}{35}$$

$$\begin{aligned}
 p(\text{스팸}|\text{로또}, \text{경품}) &= \frac{p(A, B|\text{스팸})p(\text{스팸})}{p(A, B)} \\
 (\text{로또}=A, \text{경품}=B) &= \frac{p(A|\text{스팸})p(B|\text{스팸})p(\text{스팸})}{p(\text{스팸}|A, B) + p(\text{스팸x}|A, B)} \\
 &= \frac{p(A|\text{스팸})p(B|\text{스팸})p(\text{스팸})}{p(A, B|\text{스팸})p(\text{스팸}) + p(A, B|\text{스팸x})p(\text{스팸x})} \\
 &= \frac{p(A|\text{스팸})p(B|\text{스팸})}{\frac{10}{15} \times \frac{7}{15} \times \frac{15}{50} + \frac{20}{35} \times \frac{3}{35} \times \frac{35}{50}} \approx 0.731
 \end{aligned}$$

조건부독립조건 적용.

조건부독립조건