

Übungsblatt 3

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Aufgabe 10

a)

$$\begin{aligned} P(\text{Typ}_1/\text{schwarz}) &= \frac{P(\text{schwarz}/\text{Typ}_1) \cdot P(\text{Typ}_1)}{\sum_{i=1}^3 P(\text{schwarz}/\text{Typ}_i) \cdot P(\text{Typ}_i)} \\ &= \frac{\frac{10}{25} \cdot \frac{2}{15}}{\frac{10}{25} \cdot \frac{2}{15} + \frac{8}{10} \cdot \frac{6}{15} + \frac{10}{16} \cdot \frac{7}{15}} \\ &= 0.0802... \end{aligned}$$

b)

$$\begin{aligned} P(\text{weiß}) &= \sum_{i=1}^3 P(\text{weiß}/\text{Typ}_i) \cdot P(\text{Typ}_i) \\ &= \frac{15}{25} \cdot \frac{2}{15} + \frac{2}{10} \cdot \frac{6}{15} + \frac{6}{16} \cdot \frac{7}{15} \\ &= 0.335 \end{aligned}$$

Aufgabe 11

a)

$$\begin{aligned}
 P(K_1/S_1) &= \frac{P(S_1/K_1) \cdot P(K_1)}{P(S_1/K_1) \cdot P(K_1) + P(S_1/K_2) \cdot P(K_2) + P(S_1/K_3) \cdot P(K_3)} \\
 &= \frac{(0.8) \cdot (0.3)}{(0.8)(0.3) + (0.2)(0.6) + (0.4)(0.1)} \\
 &= \frac{3}{5} \\
 P(K_2/S_1) &= \frac{3}{10} \\
 P(K_3/S_1) &= \frac{1}{10}
 \end{aligned}$$

$$\begin{aligned}
 P(K_1/S_2) &= \frac{P(S_2/K_1) \cdot P(K_1)}{P(S_2/K_1) \cdot P(K_1) + P(S_2/K_2) \cdot P(K_2) + P(S_2/K_3) \cdot P(K_3)} \\
 &= \frac{(0.3) \cdot (0.3)}{(0.3)(0.3) + (0.9)(0.6) + (0.6)(0.1)} \\
 &= 0.1304 \\
 P(K_2/S_2) &= \frac{P(S_2/K_2) \cdot P(K_2)}{P(S_2/K_1) \cdot P(K_1) + P(S_2/K_2) \cdot P(K_2) + P(S_2/K_3) \cdot P(K_3)} \\
 &= 0.702 \\
 P(K_3/S_2) &= 0.0869
 \end{aligned}$$

b)

$$\begin{aligned}
 P(K_1/S_1 \cap \bar{S}_2) &= \\
 &= \frac{P(S_1 \cap \bar{S}_2/K_1) \cdot P(K_1)}{P(S_1 \cap \bar{S}_2/K_1) \cdot P(K_1) + P(S_1 \cap \bar{S}_2/K_2) \cdot P(K_2) + P(S_1 \cap \bar{S}_2/K_3) \cdot P(K_3)} \\
 &= \frac{(P(S_1|K_1) - P(S_1 \cap S_2|K_1)) \cdot P(K_1)}{\sum_{i=1}^3 P(S_1/K_i) - P(S_1 \cap S_2/K_i)} \\
 &= \frac{(0.8 - 0.2) \cdot (0.3)}{(0.8 - 0.2) \cdot (0.3) + (0.4 - 0.3) \cdot (0.1) + (0.2 - 0.1) \cdot (0.6)} \\
 &= 0.72 \\
 P(K_2/S_1 \cap \bar{S}_2) &= 0.24 \\
 P(K_3/S_1 \cap \bar{S}_2) &= 0.04
 \end{aligned}$$