SUBJEKTÍVNY BAYESOV MODEL ŠÍRENIA NEURČITOSTI V INFERENČNEJ SIETI

Majme dané tieto pravdepodobnosti a odhady:

P(H) = 0.7

P(H|¬E1) = 0.34, P(H|E1) = 0.86, P(E1) = 0.3, od1 = -3

P(H|¬E2) = 0.1, P(H|E2) = 0.9, P(E2) = 0.1, od2 = 0

P(H|¬E3) = 0.18, P(H|E3) = 0.53, P(E3) = 0.5, od3 = 4

Vypočítajte výslednú aposteriórnu pravdepodobnosť *P(H|E1', E2', E3')*.

RIEŠENIE

INTERVALY

$$\boxed{od \in \langle -5, 0 \rangle}$$

$$P(E|E') = P(E) + \frac{P(E)}{5} od$$

$$P(E1|E1') = P(E1) + \frac{P(E1)}{5} od1 = 0.3 + \frac{0.3}{5}(-3) = 0.12$$

$$P(E2|E2') = P(E2) + \frac{P(E2)}{5} od2 = 0.1 + \frac{0.1}{5}0 = 0.1$$

$$\boxed{od \in \langle 0, 5 \rangle}$$

$$P(E|E') = P(E) + \frac{1 - P(E)}{5} od$$

$$P(E3|E3') = P(E3) + \frac{1 - P(E3)}{5} od3 = 0.5 + \frac{1 - 0.5}{5}4 = 0.9$$

$$P(E2|E2') = P(E2) + \frac{1 - P(E2)}{5} od2 = 0.1 + \frac{1 - 0.1}{5}0 = 0.1$$

CTR

$$Pre\ 0 \leq P(E|E') \leq P(E)$$

$$P(H|E') = P(H|\neg E) + \frac{P(H) - P(H|\neg E)}{P(E)} P(E|E')$$

$$Pre\ P(E) \leq P(E|E') \leq 1$$

$$P(H|E') = P(H) + \frac{P(H|E) - P(H)}{1 - P(E)} [P(E|E') - P(E)]$$

$$P(E1|E1') = 0.12 \in \langle 0, P(E1) \rangle = \langle 0, 0.3 \rangle$$

$$P(H|E1') = P(H|\neg E1) + \frac{P(H) - P(H|\neg E1)}{P(E1)} P(E1|E1')$$

$$P(H|E1') = 0.34 + \frac{0.7 - 0.34}{0.3} 0.12 = 0.34 + \frac{0.36}{0.3} 0.12 = 0.34 + 0.144 = 0.484$$

$$P(E2|E2') = 0.1 \in \langle 0, P(E2) \rangle = \langle 0, 0.1 \rangle$$

$$P(H|E2') = P(H|\neg E2) + \frac{P(H) - P(H|\neg E2)}{P(E2)} P(E2|E2')$$

$$P(H|E2') = 0.1 + \frac{0.7 - 0.1}{0.1} 0.1 = 0.1 + 0.7 - 0.1 = 0.7$$

$$P(E2|E2') = 0.1 \in \langle P(E2), 1 \rangle = \langle 0.1, 1 \rangle$$

$$P(H|E2') = P(H) + \frac{P(H|E2) - P(H)}{1 - P(E2)} [P(E|E3') - P(E3)]$$

$$P(H|E2') = 0.7 + \frac{0.9 - 0.7}{1 - 0.1} [0.1 - 0.1] = 0.7$$

$$P(E3|E3') = 0.9 \in \langle P(E3), 1 \rangle = \langle 0.5, 1 \rangle$$

$$P(H|E3') = P(H) + \frac{P(H|E3) - P(H)}{1 - P(E3)} [P(E3|E3')] - P(E3)]$$

$$P(H|E3') = 0.7 + \frac{0.53 - 0.7}{1 - 0.5} [0.9 - 0.5] = 0.7 - \frac{0.17}{0.5} 0.4 = 0.7 - 0.136 = 0.564$$

GLOB

$$P(H|E1') = 0.484 \rightarrow O(H|E1') = \frac{P(H|E1')}{1 - P(H|E1')} = \frac{0.484}{1 - 0.484} = 0.938$$

$$P(H|E2') = 0.1 \rightarrow O(H|E2') = \frac{P(H|E2')}{1 - P(H|E2')} = \frac{0.7}{1 - 0.7} = 2.333$$

$$P(H|E3') = 0.564 \rightarrow O(H|E3') = \frac{P(H|E3')}{1 - P(H|E3')} = \frac{0.564}{1 - 0.564} = 1.294$$

$$P(H) = 0.7 \rightarrow O(H) = \frac{P(H)}{1 - P(H)} = \frac{0.7}{1 - 0.7} = 2.333$$

$$O(H|E1'E2'E3') = L1 * \ L2 * L3 * O(H) = \frac{O(H|E1')}{O(H)} \frac{O(H|E2')}{O(H)} \frac{O(H|E3')}{O(H)} O(H)$$

$$O(H|E1'E2'E3') \cong 0.52$$

$$P(H|E1'E2'E3') = \frac{O(H|E1'E2'E3')}{1 + O(H|E1'E2'E3')} = \frac{0.52}{1 + 0.52} = \frac{0.52}{1.52} \cong 0.342$$