TDT4171 Assignment 3

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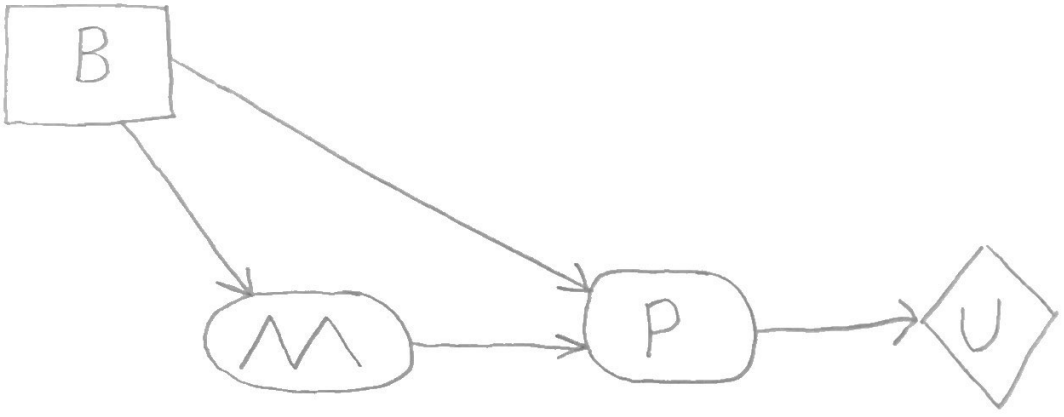
1. a)

- Chance-nodes represented as ovals
- Decision-nodes represented as rectangles
- Utility-nodes represented as diamonds



b) $P(P|B,M) = 0,9$ $\quad P(M|B) = 0,9$

$P(P|B,\bar{M}) = 0,4$ $\quad P(M|\bar{B}) = 0,65$

$P(P|\bar{B},M) = 0,7$

$P(P|\bar{B},\bar{M}) = 0,2$

16.1: $EU(a|e) = \sum_{s'} P(Result(a) = s' | a, e) U(s')$

$B = true$: $\quad P(x_1, \dots, x_n) = \prod_{i=1}^{n} P(x_i | parents(x_i))$

$EU(B = true) = P(P,M|B) \cdot U(P,M,B)$

$+ P(\bar{P},M|B) \cdot U(\bar{P},M,B) + P(P,\bar{M}|B) \cdot U(P,\bar{M},B)$

$+ P(\bar{P},\bar{M}|B) \cdot U(\bar{P},\bar{M},B)$

$P(P,M|B) = P(P|M,B) \cdot P(M|B) = 0,9^2 = 0,81$

$P(\bar{P},M|B) = P(\bar{P}|M,B) \cdot P(M|B) = 0,1 \cdot 0,9 = 0,09$

$P(P,\bar{M}|B) = P(P|B,\bar{M}) \cdot P(\bar{M}|B) = 0,4 \cdot 0,1 = 0,04$

$P(\bar{P},\bar{M}|B) = P(\bar{P}|\bar{M},B) \cdot P(\bar{M}|B) = 0,6 \cdot 0,1 = 0,06$

B er gift $\Rightarrow U(B=true) = -150$

Dermed vil U for uttrykket for $EU(B=true)$ være -150 når $P=false$, og $2100-150=1950$ når $P=true$.

$$\Rightarrow EU(B=true) = 0{,}81 \cdot 1950 + 0{,}09 \cdot -150 + 0{,}04 \cdot 1950 + 0{,}06 \cdot -150 = \underline{1635}$$

$B=false$:

$$EU(B=false) = P(P,M|\bar{B}) \cdot U(P,M,\bar{B}) + P(P,\bar{M}|\bar{B}) \cdot U(P,\bar{M},\bar{B}) + P(\bar{P},M|\bar{B}) \cdot U(\bar{P},M,\bar{B}) + P(\bar{P},\bar{M}|\bar{B}) \cdot U(\bar{P},\bar{M},\bar{B})$$

$$P(P,M|\bar{B}) = P(P|M,\bar{B}) \cdot P(M|\bar{B}) = 0{,}7 \cdot 0{,}65 = 0{,}455$$

$$P(P,\bar{M}|\bar{B}) = P(P|\bar{M},\bar{B}) \cdot P(\bar{M}|\bar{B}) = 0{,}2 \cdot 0{,}35 = 0{,}07$$

$$P(\bar{P},M|\bar{B}) = P(\bar{P}|M,\bar{B}) \cdot P(M|\bar{B}) = 0{,}3 \cdot 0{,}65 = 0{,}195$$

$$P(\bar{P},\bar{M}|\bar{B}) = P(\bar{P}|\bar{M},\bar{B}) \cdot P(\bar{M}|\bar{B}) = 0{,}8 \cdot 0{,}35 = 0{,}28$$

- gitt. $U(B=false) = 0$

D. vmed vil U i utregnet for $EU(B=false)$ være 2100 når P=true, og 0 når P=false.

$\Rightarrow$ $EU(B=false) = 0{,}455 \cdot 2100 + 0{,}07 \cdot 2100$

$+0{,}195 \cdot 0 + 0{,}28 \cdot 0 = \underline{1102{,}5}$