A2

$(A \land B) \models_{?} (A \Leftrightarrow B)$

A	B	$A \land B$	$A \Leftrightarrow B$
0	0	0	1
0	1	0	0
1	0	0	0
1	1	1	1

$M(A \land B) \subset M(A \Leftrightarrow B)$!

B2

$(A \lor B) \to (A \text{ xor } B)$

A	B	$A \lor B$ (·)	A xor B (··)	(·) → (··)	$A \land B$
0	0	0	0	1	0
0	1	1	1	1	0
1	0	1	1	1	0
1	1	1	0	0	1

NEM

3 modell

$M((A \lor B) \to (A \text{ xor } B)) \not\subset M(A \land B)$

NEM

A7/B7

$P(P|A) = .98$

$P(N|\neg A) = .9 \quad = P(\neg P|\neg A) = .9$

$P(A) = .1$

$P(A|P) = ? \longrightarrow \quad P(A|P) = \dfrac{P(P|A)\,P(A)}{P(P|A)P(A) + P(P|\neg A)P(\neg A)}$

$P(P|\neg A) = ? \quad = .1$

$P(\neg P|A) = ? \quad = .02$

$= \dfrac{.98 \times \cancel{.1}}{.98 \times \cancel{.1} + \cancel{.1} \times .9} =$

$\cong .5$

$P(P|A) = .95$

$P(N|\neg A) = .99$

$P(A) = .05$

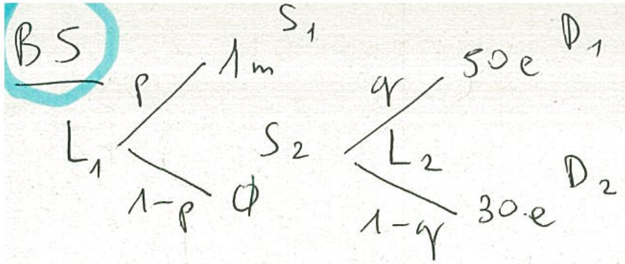
$P(A|P) = \dfrac{.95 \times .05}{.95 \times .05 + .01 \times .95} =$

$\simeq 0{,}83$

$P(P|\neg A) = .01$

$P(\neg P|A) = .05$

B5



$$pU(S_1)+(1-p)U(S_2) \lesseqgtr q\,U(D_1)+(1-q)U(D_2)$$

$R = 500$ Ft.

$$p(1-\cancel{e^{-2000}}) + \phi \gtrless q(1-\cancel{e^{-100}}) + (1-q) \times (1-\cancel{e^{-60}})$$

$\sim\phi \qquad \sim\phi \qquad \sim\phi$

$$p < 1$$

$\underline{L_2}$

$R = 500$ e Ft.

$$p(1-e^{-2}) \gtrless q(1-e^{-.1}) + (1-q)(1-e^{-.06})$$

$$.1 \times .8647 \gtrless .2 \times .095 + .8 \times .0582$$

$$0.08647 > 0.0655$$

$\underline{L_1}$

A5

$$U(1000) = U(L) =$$

$$pU(1\,\text{milli}) + (1-p)\,U(\phi)$$

$$R(1-e^{-2}) = Rp(1-e^{-2000}) + R(1-p)\cancel{(1-e^{-0})}$$

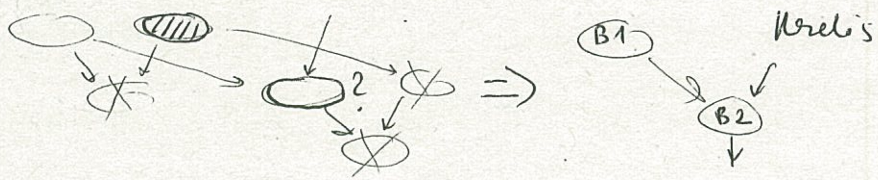
$\sim\phi \qquad 1$

$$1-e^{-2} \simeq p$$

$$p \simeq 1-e^{-2} \simeq 0.865$$

A10 / B10

Kezelés vizsgálatához a redukált háló



$$P(\text{Beteg } 2)\Big|_{\substack{\text{Kezelés}\\ \text{van/nincs}}} = \sum_{\text{beteg } 1} P(\text{Beteg } 2 \mid \text{beteg } 1) \, P(\text{beteg } 1)\Big|_{\text{Kezelés}}$$

$= \; .99 \times .1 + .02 \times .9 = 0.117$ Kezelés nincs

$ \; .2 \times .1 + .01 \times .9 = 0.029$ Kezelés van

Kezelés nincs:

$U(K) = \phi$

$U(B) = 3000 \times .117 + 20000 \times .883$

$\Sigma = 18011$

A kezelés túl drága!

Kezelés van:

$U(K) = -8000$

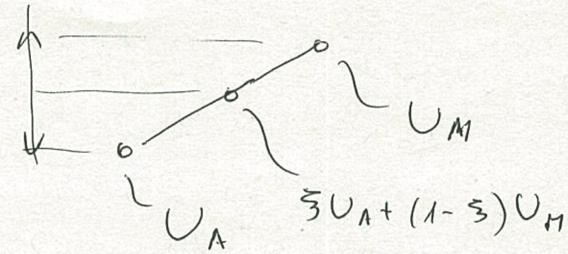
$U(B) = 3000 \times .029 + 20000 \times .971$

$\Sigma = 11507$

A11 / B11

$$U_A = R_A + \gamma \max\left(U_M, \beta U_A + (1-\beta) U_M, U_A\right)$$

$$U_M = R_M + \gamma \max\left(U_M, \alpha U_M + (1-\alpha) U_A\right)$$



1) Legyen rejtés: $U_A < U_M$

$U_A = R_A + \gamma U_M \longrightarrow U_A = 8$

$U_M = R_M + \gamma U_M \longrightarrow U_M = 10$

2) Legyen rejtés: $U_M < U_A$

$U_A = R_A + \gamma U_A \longrightarrow U_A = -10$

$U_M = R_M + \gamma(\alpha U_M + (1-\alpha) U_A)$

$U_M = 1 + .9 \alpha U_M - .9 (1-\alpha) 10$

$U_M = \dfrac{1 - 9 + 9\alpha}{1 - .9\alpha} < -10$

....

$-8 < -10$ $\quad \emptyset$

B8

1. $\neg B(x_1) \vee \neg A(x_1)$
2. $\neg C(x_2) \vee B(x_2)$

---

3. $\neg(\forall x\, C(x) \rightarrow \neg A(x))$

$\exists x\, C(x_3) \wedge A(x)$

3a. $C(\xi)$

3b. $A(\xi)$

Skolemisiert

4: 1+3b	$\neg B(\xi)$	x_1/ξ
5: 4+2	$\neg C(\xi)$	x_2/ξ
6: 5+3a	$\emptyset$	

A8

1. $\neg B(x_1) \vee A(x_1)$
2. $\neg C(x_2) \vee \neg A(x_2)$

---

3. $\neg(\forall x\, C(x) \rightarrow \neg B(x))$

$\exists x\, (C(x) \wedge B(x))$

3a. $C(\xi)$

3b. $B(\xi)$

Skolemisiert

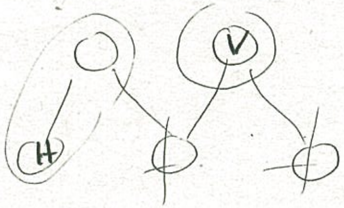
4: 2+3a	$\neg A(\xi)$	x_2/ξ
5: 1+4	$\neg B(\xi)$	x_1/ξ
6: 5+3b	$\emptyset$	

B9/

$P(V|H)$

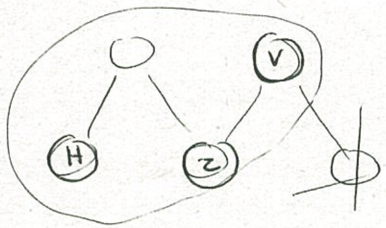
$= P(V)$

Redukció:



$P(V|H,Z)$

Redukció



$$P(V|H,Z) = \alpha \sum_m P(VHZm)$$

$$= \alpha \sum_m P(H|m)\, P(Z|Vm)\, P(m)$$

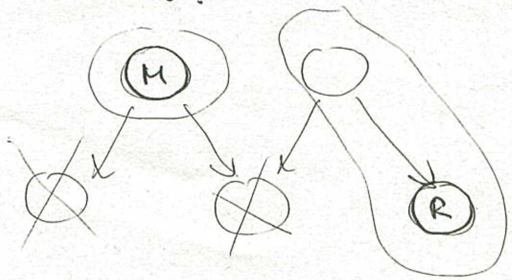
$= \ldots$

Szokásos módon

A9

$P(M|R)$

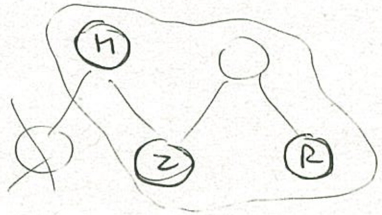
Redukció:



$P(M|R) = P(M) = .1$

$P(M|R,Z)$

Redukció:



$$P(M|R,Z) = \alpha \sum_v P(MRZv) =$$

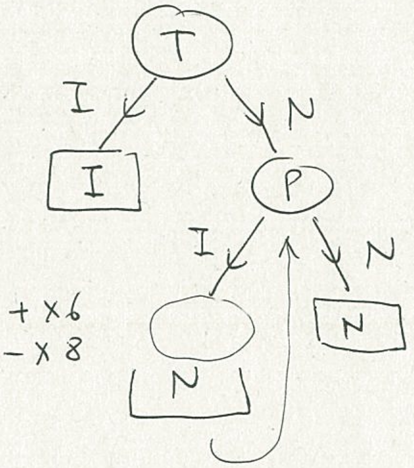
$$= \alpha \sum_v P(Z|Mv)\, P(R|v)\, P(v)$$

$= \ldots$ Szokásos módon

B12

$Ny(T) = I - \frac{5}{8}\cancel{I}(0,1) - \frac{3}{8} I\left(\frac{1}{3}, \frac{2}{3}\right) = I - \underline{.344} \rightarrow$ gyökér

$Ny(P) = I - \frac{1}{2} I\left(\frac{1}{4}, \frac{3}{4}\right) - \frac{1}{2} I\left(\frac{1}{4}, \frac{3}{4}\right) = I - .8113$



Csak P maradt

többségi besorolás

A12

$I = I\left(\frac{3}{5}, \frac{2}{5}\right) = .9710$

$Ny(H) = I - \frac{3}{5} I\left(\frac{1}{3}, \frac{2}{3}\right) - \frac{2}{5} I\left(\frac{1}{2}, \frac{1}{2}\right)$

$Ny(V) = I - \frac{1}{2} I\left(\frac{1}{5}, \frac{4}{5}\right) - \frac{1}{2} I\left(\frac{2}{5}, \frac{3}{5}\right)$

$Ny(P) = I - \frac{2}{5} I\left(\frac{1}{4}, \frac{3}{4}\right) - \frac{3}{10} I\left(\frac{1}{3}, \frac{2}{3}\right) - \frac{3}{10} I\left(\frac{1}{3}, \frac{2}{3}\right)$

$= I - .951$

$= I - .846 \longrightarrow$ max nyereség (Vanília)

$= I - .8755$