

Inference for SRL Report

Capita Selecta AI (Probabilistic Programming) 2016-2017

Alexander Tang s0189509

Daniel Andrés Pérez Pérez r0605947

proposal: change all e_1, e_2, e_3 to e_h, e_m, e_n

table III: for variable A, the bottom half of the CNF rules should have θ_{a2} , not θ_{a1} (copy paste mistake probably)

table IV: is this needed? The $A \models B$ implicitly means $A \models B$ and $B \models A$.

table IV: comma's are sometimes wrongly placed and there's a disjunction without an implication in the middle

table V: maybe add $W(\theta_{a2} = 1) = 1$ just to cover everything?

table VII: what's the difference with table VI?

table VIII: $W(\text{not } e_2) = 1 - 0.19 = 0.81$ (it currently says $1 - 0.01$)

table VIII: I'm not sure if $W(e_2) = 0.19 / (1 - 0.01)$; is it not just 0.19? Because it's a parent node and does not have any conditionals. I may be very wrong on this; I'm not sure about this.

I. PROBABILISTIC INFERENCE USING WEIGHTED MODEL COUNTING

A. PGM to CNF

Not sure if the 6th clause of the network variable A in IV is correctly substituted due to the property describe in the paper "Consider again Figure 1 and imagine that the parameter $\theta_{c1|a1}$ were 0. Given that this parameter is known to be 0, all models that set this parameter variable to true will have weight 0."

For VII, should we also change the closure that contains a probability of 0, like we did in the ENC1 encoding? Look comment above

Tables I and II show the logical variables used for encoded the Bayesian Network in [1].

Tables III and IV represent the encoded Bayesian Network using ENC1 and table V contains the corresponding weights.

Likewise, tables VI and VII represent the encoded Bayesian Network using ENC2 and table VIII contains the corresponding weights.

REFERENCES

[1] Bayesian networks.

Table I. LOGICAL VARIABLES USING ENC1

Network variables	Indicator Variable	CTP
B	$\lambda_{b1}, \lambda_{b2}$	θ_{b1}, θ_{b2}
E	$\lambda_{e1}, \lambda_{e2}, \lambda_3$	$\theta_{e1}, \theta_{e2}, \theta_3$
A	$\lambda_{a1}, \lambda_{a2}$	$\theta_{a1 b1,e1}, \theta_{a1 b1,e2}, \theta_{a1 b1,e3},$ $\theta_{a1 b2,e1}, \theta_{a1 b2,e2}, \theta_{a1 b2,e3},$ $\theta_{a2 b1,e1}, \theta_{a2 b1,e2}, \theta_{a2 b1,e3},$ $\theta_{a2 b2,e1}, \theta_{a2 b2,e2}, \theta_{a2 b2,e3}$
J	$\lambda_{j1}, \lambda_{j2}$	$\theta_{j1 a1}, \theta_{j2 a1}, \theta_{j1 a2}, \theta_{j2 a2}$
M	$\lambda_{m1}, \lambda_{m2}$	$\theta_{m1 a1}, \theta_{m2 a1}, \theta_{m1 a2}, \theta_{m2 a2}$

Table II. INDICATOR VARIABLES USING ENC2

Variables	Indicator Variable	CTP
B	$\lambda_{b1}, \lambda_{b2}$	ρ_{b1}
E	$\lambda_{e1}, \lambda_{e2}, \lambda_{e3}$	ρ_{e1}, ρ_{e2}
A	$\lambda_{a1}, \lambda_{a2}$	$\rho_{a1 b1,c1}, \rho_{a1 b1,c2}, \rho_{a1 b1,c3},$ $\rho_{a1 b2,c1}, \rho_{a1 b2,c2}, \rho_{a1 b2,c3}$
J	$\lambda_{j1}, \lambda_{j2}$	$\rho_{j1 a1}, \rho_{j1 a2}$
M	$\lambda_{m1}, \lambda_{m2}$	$\rho_{m1 a1}, \rho_{m1 a2}$

Table III. CNF REPRESENTATION OF Δ USING ENC1

Variables	CNF	
B	$\lambda_{b1} \vee \lambda_{b2}$	$\lambda_{b1} \Leftrightarrow \theta_{b1}$
	$\neg \lambda_{b1} \vee \neg \lambda_{b2}$	$\lambda_{b2} \Leftrightarrow \theta_{b2}$
E	$\lambda_{e1} \vee \lambda_{e2} \vee \lambda_{e3}$	$\lambda_{e1} \Leftrightarrow \theta_{e1}$
	$\neg \lambda_{e1} \vee \neg \lambda_{e2}$	$\lambda_{e2} \Leftrightarrow \theta_{e2}$
	$\neg \lambda_{e1} \vee \neg \lambda_{e3}$	$\lambda_{e3} \Leftrightarrow \theta_{e3}$
	$\neg \lambda_{e2} \vee \neg \lambda_{e3}$	
A	$\lambda_{a1} \vee \lambda_{a2}$ $\neg \lambda_{a1} \vee \neg \lambda_{a2}$	$\lambda_{a1} \wedge \lambda_{b1} \wedge \lambda_{e1} \Leftrightarrow \theta_{a1 b1,e1}$
		$\lambda_{a1} \wedge \lambda_{b1} \wedge \lambda_{e2} \Leftrightarrow \theta_{a1 b1,e2}$
		$\lambda_{a1} \wedge \lambda_{b1} \wedge \lambda_{e3} \Leftrightarrow \theta_{a1 b1,e3}$
		$\lambda_{a1} \wedge \lambda_{b2} \wedge \lambda_{e1} \Leftrightarrow \theta_{a1 b2,e1}$
		$\lambda_{a1} \wedge \lambda_{b2} \wedge \lambda_{e2} \Leftrightarrow \theta_{a1 b2,e2}$
		$\lambda_{a1} \wedge \lambda_{b2} \wedge \lambda_{e3} \Leftrightarrow \theta_{a1 b2,e3}$
		$\lambda_{a2} \wedge \lambda_{b1} \wedge \lambda_{e1} \Leftrightarrow \theta_{a2 b1,e1}$
		$\lambda_{a2} \wedge \lambda_{b1} \wedge \lambda_{e2} \Leftrightarrow \theta_{a2 b1,e2}$
		$\lambda_{a2} \wedge \lambda_{b1} \wedge \lambda_{e3} \Leftrightarrow \theta_{a2 b1,e3}$
		$\lambda_{a2} \wedge \lambda_{b2} \wedge \lambda_{e1} \Leftrightarrow \theta_{a2 b2,e1}$
		$\lambda_{a2} \wedge \lambda_{b2} \wedge \lambda_{e2} \Leftrightarrow \theta_{a2 b2,e2}$
		$\lambda_{a2} \wedge \lambda_{b2} \wedge \lambda_{e3} \Leftrightarrow \theta_{a2 b2,e3}$
J	$\lambda_{j1} \vee \lambda_{j2}$ $\neg \lambda_{j1} \vee \neg \lambda_{j2}$	$\lambda_{j1} \wedge \lambda_{a1} \Leftrightarrow \theta_{j1 a1}$
		$\lambda_{j1} \wedge \lambda_{a2} \Leftrightarrow \theta_{j1 a2}$
		$\lambda_{j2} \wedge \lambda_{a1} \Leftrightarrow \theta_{j2 a1}$
		$\lambda_{j2} \wedge \lambda_{a2} \Leftrightarrow \theta_{j2 a2}$
M	$\lambda_{m1} \vee \lambda_{m2}$ $\neg \lambda_{m1} \vee \neg \lambda_{m2}$	$\lambda_{m1} \wedge \lambda_{a1} \Leftrightarrow \theta_{m1 a1}$
		$\lambda_{m1} \wedge \lambda_{a2} \Leftrightarrow \theta_{m1 a2}$
		$\lambda_{m2} \wedge \lambda_{a1} \Leftrightarrow \theta_{m2 a1}$
		$\lambda_{m2} \wedge \lambda_{a2} \Leftrightarrow \theta_{m2 a2}$

Table IV. BAYESIAN NETWORK ENCODED USING ENC1

Network variable	Indicator Clauses	ENC1 Parameter Clauses
B	$\lambda_{b1} \vee \lambda_{b2},$ $\neg \lambda_{b1} \vee \neg \lambda_{b2}$	$\lambda_{b1} \Rightarrow \theta_{b1}, \theta_{b1} \Rightarrow \lambda_{b1}$ $\lambda_{b2} \Rightarrow \theta_{b2}, \theta_{b2} \Rightarrow \lambda_{b2}$
E	$\lambda_{e1} \vee \lambda_{e2} \vee \lambda_{e3},$ $\neg \lambda_{e1} \vee \neg \lambda_{e2},$ $\neg \lambda_{e1} \vee \neg \lambda_{e3},$ $\neg \lambda_{e2} \vee \neg \lambda_{e3}$	$\lambda_{e1} \Rightarrow \theta_{e1}, \theta_{e1} \Rightarrow \lambda_{e1}$ $\lambda_{e2} \Rightarrow \theta_{e2}, \theta_{e2} \Rightarrow \lambda_{e2}$ $\lambda_{e3} \Rightarrow \theta_{e3}, \theta_{e3} \Rightarrow \lambda_{e3}$
A	$\lambda_{a1} \vee \lambda_{a2},$ $\neg \lambda_{a1} \vee \neg \lambda_{a2}$	$\lambda_{a1} \wedge \lambda_{b1} \wedge \lambda_{e1} \Rightarrow \theta_{a1 b1,e1}, \theta_{a1 b1,e1} \Rightarrow \lambda_{a1}, \theta_{a1 b1,e1} \Rightarrow \lambda_{b1}, \theta_{a1 b1,e1} \Rightarrow \lambda_{e1}$ $\lambda_{a1} \wedge \lambda_{b1} \wedge \lambda_{e2} \Rightarrow \theta_{a1 b1,e2}, \theta_{a1 b1,e2} \Rightarrow \lambda_{a1}, \theta_{a1 b1,e2} \Rightarrow \lambda_{b1}, \theta_{a1 b1,e2} \Rightarrow \lambda_{e2}$ $\lambda_{a1} \wedge \lambda_{b1} \wedge \lambda_{e3} \Rightarrow \theta_{a1 b1,e3}, \theta_{a1 b1,e3} \Rightarrow \lambda_{a1}, \theta_{a1 b1,e3} \Rightarrow \lambda_{b1}, \theta_{a1 b1,e3} \Rightarrow \lambda_{e3}$ $\lambda_{a1} \wedge \lambda_{b2} \wedge \lambda_{e1} \Rightarrow \theta_{a1 b2,e1}, \theta_{a1 b2,e1} \Rightarrow \lambda_{a1}, \theta_{a1 b2,e1} \Rightarrow \lambda_{b2}, \theta_{a1 b2,e1} \Rightarrow \lambda_{e1}$ $\lambda_{a1} \wedge \lambda_{b2} \wedge \lambda_{e2} \Rightarrow \theta_{a1 b2,e2}, \theta_{a1 b2,e2} \Rightarrow \lambda_{a1}, \theta_{a1 b2,e2} \Rightarrow \lambda_{b2}, \theta_{a1 b2,e2} \Rightarrow \lambda_{e2}$ $\neg \lambda_{a1} \vee \neg \lambda_{b2} \vee \neg \lambda_{e3}$ $\lambda_{a2} \wedge \lambda_{b1} \wedge \lambda_{e1} \Rightarrow \theta_{a2 b1,e1}, \theta_{a2 b1,e1} \Rightarrow \lambda_{a2}, \theta_{a2 b1,e1} \Rightarrow \lambda_{b1}, \theta_{a2 b1,e1} \Rightarrow \lambda_{e1}$ $\lambda_{a2} \wedge \lambda_{b1} \wedge \lambda_{e2} \Rightarrow \theta_{a2 b1,e2}, \theta_{a2 b1,e2} \Rightarrow \lambda_{a2}, \theta_{a2 b1,e2} \Rightarrow \lambda_{b1}, \theta_{a2 b1,e2} \Rightarrow \lambda_{e2}$ $\lambda_{a2} \wedge \lambda_{b1} \wedge \lambda_{e3} \Rightarrow \theta_{a2 b1,e3}, \theta_{a2 b1,e3} \Rightarrow \lambda_{a2}, \theta_{a2 b1,e3} \Rightarrow \lambda_{b1}, \theta_{a2 b1,e3} \Rightarrow \lambda_{e3}$ $\lambda_{a2} \wedge \lambda_{b2} \wedge \lambda_{e1} \Rightarrow \theta_{a2 b2,e1}, \theta_{a2 b2,e1} \Rightarrow \lambda_{a2}, \theta_{a2 b2,e1} \Rightarrow \lambda_{b2}, \theta_{a2 b2,e1} \Rightarrow \lambda_{e1}$ $\lambda_{a2} \wedge \lambda_{b2} \wedge \lambda_{e2} \Rightarrow \theta_{a2 b2,e2}, \theta_{a2 b2,e2} \Rightarrow \lambda_{a2}, \theta_{a2 b2,e2} \Rightarrow \lambda_{b2}, \theta_{a2 b2,e2} \Rightarrow \lambda_{e2}$ $\lambda_{a2} \wedge \lambda_{b2} \wedge \lambda_{e3} \Rightarrow \theta_{a2 b2,e3}, \theta_{a2 b2,e3} \Rightarrow \lambda_{a2}, \theta_{a2 b2,e3} \Rightarrow \lambda_{b2}, \theta_{a2 b2,e3} \Rightarrow \lambda_{e3}$
J	$\lambda_{j1} \vee \lambda_{j2},$ $\neg \lambda_{j1} \vee \neg \lambda_{j2}$	$\lambda_{j1} \wedge \lambda_{a1} \Rightarrow \theta_{j1 a1}, \theta_{j1 a1} \Rightarrow \lambda_{j1}, \theta_{j1 a1} \Rightarrow \lambda_{a1}$ $\lambda_{j1} \wedge \lambda_{a2} \Rightarrow \theta_{j1 a2}, \theta_{j1 a2} \Rightarrow \lambda_{j1}, \theta_{j1 a2} \Rightarrow \lambda_{a2}$ $\lambda_{j2} \wedge \lambda_{a1} \Rightarrow \theta_{j2 a1}, \theta_{j2 a1} \Rightarrow \lambda_{j2}, \theta_{j2 a1} \Rightarrow \lambda_{a1}$ $\lambda_{j2} \wedge \lambda_{a2} \Rightarrow \theta_{j2 a2}, \theta_{j2 a2} \Rightarrow \lambda_{j2}, \theta_{j2 a2} \Rightarrow \lambda_{a2}$
M	$\lambda_{m1} \vee \lambda_{m2},$ $\neg \lambda_{m1} \vee \neg \lambda_{m2}$	$\lambda_{m1} \wedge \lambda_{a1} \Rightarrow \theta_{m1 a1}, \theta_{m1 a1} \Rightarrow \lambda_{m1}, \theta_{m1 a1} \Rightarrow \lambda_{a1}$ $\lambda_{m1} \wedge \lambda_{a2} \Rightarrow \theta_{m1 a2}, \theta_{m1 a2} \Rightarrow \lambda_{m1}, \theta_{m1 a2} \Rightarrow \lambda_{a2}$ $\lambda_{m2} \wedge \lambda_{a1} \Rightarrow \theta_{m2 a1}, \theta_{m2 a1} \Rightarrow \lambda_{m2}, \theta_{m2 a1} \Rightarrow \lambda_{a1}$ $\lambda_{m2} \wedge \lambda_{a2} \Rightarrow \theta_{m2 a2}, \theta_{m2 a2} \Rightarrow \lambda_{m2}, \theta_{m2 a2} \Rightarrow \lambda_{a2}$

Table V. WEIGHTS ASSOCIATION USING ENC1 WHERE MISSING WEIGHTS ARE SET TO ONE

Weights	Value
$W(\theta_{b1})$	0.7
$W(\theta_{b2})$	0.3
$W(\theta_{e1})$	0.01
$W(\theta_{e2})$	0.19
$W(\theta_{e3})$	0.80
$W(\theta_{a1 b1,e1})$	0.90
$W(\theta_{a1 b1,e2})$	0.85
$W(\theta_{a1 b1,e3})$	0.80
$W(\theta_{a1 b2,e1})$	0.30
$W(\theta_{a1 b2,e2})$	0.10
$W(\theta_{a1 b2,e3})$	0
$W(\theta_{a2 b1,e1})$	0.10
$W(\theta_{a2 b1,e2})$	0.15
$W(\theta_{a2 b1,e3})$	0.20
$W(\theta_{a2 b2,e1})$	0.70
$W(\theta_{a2 b2,e2})$	0.90
$W(\theta_{j1 a1})$	0.80
$W(\theta_{j1 a2})$	0.10
$W(\theta_{j2 a1})$	0.20
$W(\theta_{j2 a2})$	0.90
$W(\theta_{m1 a1})$	0.80
$W(\theta_{m1 a2})$	0.10
$W(\theta_{m2 a1})$	0.20
$W(\theta_{m2 a2})$	0.90

Table VI. CNF REPRESENTATION OF Δ USING ENC2

Variables	CNF
B	$\lambda_{b1} \vee \lambda_{b2}$
	$\neg \lambda_{b1} \vee \neg \lambda_{b2}$
E	$\lambda_{e1} \vee \lambda_{e2} \vee \lambda_{e3}$
	$\neg \lambda_{e1} \vee \neg \lambda_{e2}$
	$\neg \lambda_{e1} \vee \neg \lambda_{e3}$
	$\neg \lambda_{e2} \vee \neg \lambda_{e3}$
A	$\lambda_{b1} \wedge \lambda_{c1} \wedge \rho_{a1 b1,c1} \Rightarrow \lambda_{a1}$
	$\lambda_{b1} \wedge \lambda_{c2} \wedge \rho_{a1 b1,c2} \Rightarrow \lambda_{a1}$
	$\lambda_{b1} \wedge \lambda_{c3} \wedge \rho_{a1 b1,c3} \Rightarrow \lambda_{a1}$
	$\lambda_{b2} \wedge \lambda_{c1} \wedge \rho_{a1 b2,c1} \Rightarrow \lambda_{a1}$
	$\lambda_{b2} \wedge \lambda_{c2} \wedge \rho_{a1 b2,c2} \Rightarrow \lambda_{a1}$
	$\lambda_{b2} \wedge \lambda_{c3} \wedge \rho_{a1 b2,c3} \Rightarrow \lambda_{a1}$
	$\lambda_{b1} \wedge \lambda_{c1} \wedge \neg \rho_{a1 b1,c1} \Rightarrow \lambda_{a2}$
	$\lambda_{b1} \wedge \lambda_{c2} \wedge \neg \rho_{a1 b1,c2} \Rightarrow \lambda_{a2}$
	$\lambda_{b1} \wedge \lambda_{c3} \wedge \neg \rho_{a1 b1,c3} \Rightarrow \lambda_{a2}$
	$\lambda_{b2} \wedge \lambda_{c1} \wedge \neg \rho_{a1 b2,c1} \Rightarrow \lambda_{a2}$
	$\lambda_{b2} \wedge \lambda_{c2} \wedge \neg \rho_{a1 b2,c2} \Rightarrow \lambda_{a2}$
	$\lambda_{b2} \wedge \lambda_{c3} \wedge \neg \rho_{a1 b2,c3} \Rightarrow \lambda_{a2}$
J	$\lambda_{a1} \wedge \rho_{j1 a1} \Rightarrow \lambda_{j1}$
	$\lambda_{a2} \wedge \rho_{j1 a2} \Rightarrow \lambda_{j1}$
	$\lambda_{a1} \wedge \neg \rho_{j1 a1} \Rightarrow \lambda_{j2}$
	$\lambda_{a2} \wedge \neg \rho_{j1 a2} \Rightarrow \lambda_{j2}$
M	$\lambda_{a1} \wedge \rho_{m1 a1} \Rightarrow \lambda_{m1}$
	$\lambda_{a2} \wedge \rho_{m1 a2} \Rightarrow \lambda_{m1}$
	$\lambda_{a1} \wedge \neg \rho_{m1 a1} \Rightarrow \lambda_{m2}$
	$\lambda_{a2} \wedge \neg \rho_{m1 a2} \Rightarrow \lambda_{m2}$

Table VII. BAYESIAN NETWORK ENCODED USING ENC2

Network variable	Indicator Clauses	ENC1 Parameter Clauses
B	$\lambda_{b1} \vee \lambda_{b2},$ $\neg\lambda_{b1} \vee \neg\lambda_{b2}$	$\rho_{b1} \Rightarrow \lambda_{b1}$ $\neg\rho_{b1} \Rightarrow \lambda_{b2}$
E	$\lambda_{e1} \vee \lambda_{e2} \vee \lambda_{e3},$ $\neg\lambda_{e1} \vee \neg\lambda_{e2},$ $\neg\lambda_{e1} \vee \neg\lambda_{e3},$ $\neg\lambda_{e2} \vee \neg\lambda_{e3}$	$\rho_{e1} \Rightarrow \lambda_{e1}$ $\neg\rho_{e1} \wedge \rho_{e2} \Rightarrow \lambda_{e2}$ $\neg\rho_{e1} \wedge \neg\rho_{e2} \Rightarrow \lambda_{e3}$
A	$\lambda_{a1} \vee \lambda_{a2},$ $\neg\lambda_{a1} \vee \neg\lambda_{a2}$	$\lambda_{b1} \wedge \lambda_{e1} \wedge \rho_{a1 b1,e1} \Rightarrow \lambda_{a1}$ $\lambda_{b1} \wedge \lambda_{e2} \wedge \rho_{a1 b1,e2} \Rightarrow \lambda_{a1}$ $\lambda_{b1} \wedge \lambda_{e3} \wedge \rho_{a1 b1,e3} \Rightarrow \lambda_{a1}$ $\lambda_{b2} \wedge \lambda_{e1} \wedge \rho_{a1 b2,e1} \Rightarrow \lambda_{a1}$ $\lambda_{b2} \wedge \lambda_{e2} \wedge \rho_{a1 b2,e2} \Rightarrow \lambda_{a1}$ $\lambda_{b2} \wedge \lambda_{e3} \wedge \rho_{a1 b2,e3} \Rightarrow \lambda_{a1}$ $\lambda_{b1} \wedge \lambda_{e1} \wedge \neg\rho_{a1 b1,e1} \Rightarrow \lambda_{a2}$ $\lambda_{b1} \wedge \lambda_{e2} \wedge \neg\rho_{a1 b1,e2} \Rightarrow \lambda_{a2}$ $\lambda_{b1} \wedge \lambda_{e3} \wedge \neg\rho_{a1 b1,e3} \Rightarrow \lambda_{a2}$ $\lambda_{b2} \wedge \lambda_{e1} \wedge \neg\rho_{a1 b2,e1} \Rightarrow \lambda_{a2}$ $\lambda_{b2} \wedge \lambda_{e2} \wedge \neg\rho_{a1 b2,e2} \Rightarrow \lambda_{a2}$ $\lambda_{b2} \wedge \lambda_{e3} \wedge \neg\rho_{a1 b2,e3} \Rightarrow \lambda_{a2}$
J	$\lambda_{j1} \vee \lambda_{j2},$ $\neg\lambda_{j1} \vee \neg\lambda_{j2}$	$\lambda_{a1} \wedge \rho_{j1 a1} \Rightarrow \lambda_{j1}$ $\lambda_{a2} \wedge \rho_{j1 a2} \Rightarrow \lambda_{j1}$ $\lambda_{a1} \wedge \neg\rho_{j1 a1} \Rightarrow \lambda_{j2}$ $\lambda_{a2} \wedge \neg\rho_{j1 a2} \Rightarrow \lambda_{j2}$
M	$\lambda_{m1} \vee \lambda_{m2},$ $\neg\lambda_{m1} \vee \neg\lambda_{m2}$	$\lambda_{a1} \wedge \rho_{m1 a1} \Rightarrow \lambda_{m1}$ $\lambda_{a2} \wedge \rho_{m1 a2} \Rightarrow \lambda_{m1}$ $\lambda_{a1} \wedge \neg\rho_{m1 a1} \Rightarrow \lambda_{m2}$ $\lambda_{a2} \wedge \neg\rho_{m1 a2} \Rightarrow \lambda_{m2}$

Table VIII. WEIGHTS ASSOCIATION USING ENC2 WHERE MISSING WEIGHTS ARE SET TO ONE

Weights	Value
$W(\rho_{b1})$	0.7
$W(\neg\rho_{b1})$	0.3
$W(\rho_{e1})$	0.01
$W(\rho_{e2})$	$0.19/(1-0.01) = 0.19$
$W(\neg\rho_{e1})$	$1-0.01 = 0.99$
$W(\neg\rho_{e2})$	$1-0.01 = 0.81$
$W(\rho_{a1 b1,e1})$	0.90
$W(\neg\rho_{a1 b1,e1})$	$1-0.90=0.10$
$W(\rho_{a1 b1,e2})$	0.85
$W(\neg\rho_{a1 b1,e2})$	$1-0.85=0.15$
$W(\rho_{a1 b1,e3})$	0.80
$W(\neg\rho_{a1 b1,e3})$	$1-0.80=0.20$
$W(\rho_{a1 b2,e1})$	0.30
$W(\neg\rho_{a1 b2,e1})$	$1-0.30=0.70$
$W(\rho_{a1 b2,e2})$	0.10
$W(\neg\rho_{a1 b2,e2})$	$1-0-10=0.90$
$W(\rho_{a1 b2,e3})$	0
$W(\neg\rho_{a1 b2,e3})$	$1-0=1$
$W(\rho_{j1 a1})$	0.80
$W(\neg\rho_{j1 a1})$	$1-0.80=0.20$
$W(\rho_{j1 a2})$	0.10
$W(\neg\rho_{j1 a2})$	$1-0.10=0.90$