

Inference for SRL

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Chapter 1

Probabilistic Inference Using Weighted Model Counting

1.1

1.1.1 ENC 1

Indicator clauses:

$$\begin{aligned} &(\neg \lambda_{PollutionLow} \vee \neg \lambda_{PollutionHigh}) \wedge (\lambda_{PollutionLow} \vee \lambda_{PollutionHigh}) \wedge (\neg \\ &\quad \lambda_{SmokerTrue} \vee \neg \lambda_{SmokerFalse}) \wedge (\lambda_{SmokerTrue} \vee \lambda_{SmokerFalse}) \wedge (\neg \\ &\quad \lambda_{CancerTrue} \vee \neg \lambda_{CancerFalse}) \wedge (\lambda_{CancerTrue} \vee \lambda_{CancerFalse}) \wedge (\neg \\ &\quad \lambda_{XrayPositive} \vee \neg \lambda_{XrayNegative}) \wedge (\lambda_{XrayPositive} \vee \lambda_{XrayNegative}) \wedge (\neg \\ &\quad \lambda_{DyspnoeaTrue} \vee \neg \lambda_{DyspnoeaFalse}) \wedge (\lambda_{DyspnoeaTrue} \vee \lambda_{DyspnoeaFalse}) \end{aligned}$$

Parameter clauses:

$$\begin{aligned} &(\neg \lambda_{PollutionLow} \vee \theta_{PollutionLow}) \wedge (\lambda_{PollutionLow} \vee \neg \theta_{PollutionLow}) \wedge (\neg \\ &\quad \lambda_{PollutionHigh} \vee \theta_{PollutionHigh}) \wedge (\lambda_{PollutionHigh} \vee \neg \theta_{PollutionHigh}) \wedge (\neg \\ &\quad \lambda_{SmokerTrue} \vee \theta_{SmokerTrue}) \wedge (\lambda_{SmokerTrue} \vee \neg \theta_{SmokerTrue}) \wedge (\neg \\ &\quad \lambda_{SmokerFalse} \vee \theta_{SmokerFalse}) \wedge (\lambda_{SmokerFalse} \vee \neg \theta_{SmokerFalse}) \wedge (\neg \\ &\quad \lambda_{PollutionLow} \vee \neg \lambda_{SmokerTrue} \vee \neg \lambda_{CancerTrue} \vee \\ &\quad \theta_{CancerTrue|PollutionLow,SmokerTrue}) \wedge (\lambda_{PollutionLow} \vee \neg \\ &\quad \theta_{CancerTrue|PollutionLow,SmokerTrue}) \wedge (\lambda_{SmokerTrue} \vee \neg \\ &\quad \theta_{CancerTrue|PollutionLow,SmokerTrue}) \wedge (\lambda_{CancerTrue} \vee \neg \\ &\quad \theta_{CancerTrue|PollutionLow,SmokerTrue}) \wedge (\neg \lambda_{PollutionLow} \vee \neg \lambda_{SmokerTrue} \vee \neg \\ &\quad \lambda_{CancerFalse} \vee \theta_{CancerFalse|PollutionLow,SmokerTrue}) \wedge (\lambda_{PollutionLow} \vee \neg \\ &\quad \theta_{CancerFalse|PollutionLow,SmokerTrue}) \wedge (\lambda_{SmokerTrue} \vee \neg \\ &\quad \theta_{CancerFalse|PollutionLow,SmokerTrue}) \wedge (\lambda_{CancerFalse} \vee \neg \\ &\quad \theta_{CancerFalse|PollutionLow,SmokerTrue}) \wedge (\neg \lambda_{PollutionLow} \vee \neg \lambda_{SmokerFalse} \vee \neg \\ &\quad \lambda_{CancerTrue} \vee \theta_{CancerTrue|PollutionLow,SmokerFalse}) \wedge (\lambda_{PollutionLow} \vee \neg \\ &\quad \theta_{CancerTrue|PollutionLow,SmokerFalse}) \wedge (\lambda_{SmokerFalse} \vee \neg \\ &\quad \theta_{CancerTrue|PollutionLow,SmokerFalse}) \wedge (\lambda_{CancerTrue} \vee \neg \\ &\quad \theta_{CancerTrue|PollutionLow,SmokerFalse}) \wedge (\neg \lambda_{PollutionLow} \vee \neg \lambda_{SmokerFalse} \vee \neg \end{aligned}$$

$$\begin{aligned}
& \lambda_{CancerFalse} \vee \theta_{CancerFalse|PollutionLow,SmokerFalse}) \wedge (\lambda_{PollutionLow} \vee \neg \\
& \quad \theta_{CancerFalse|PollutionLow,SmokerFalse}) \wedge (\lambda_{SmokerFalse} \vee \neg \\
& \quad \theta_{CancerFalse|PollutionLow,SmokerFalse}) \wedge (\lambda_{CancerFalse} \vee \neg \\
& \theta_{CancerFalse|PollutionLow,SmokerFalse}) \wedge (\neg \lambda_{PollutionHigh} \vee \neg \lambda_{SmokerTrue} \vee \neg \\
& \quad \lambda_{CancerTrue} \vee \theta_{CancerTrue|PollutionHigh,SmokerTrue}) \wedge (\lambda_{PollutionHigh} \vee \neg \\
& \quad \theta_{CancerTrue|PollutionHigh,SmokerTrue}) \wedge (\lambda_{SmokerTrue} \vee \neg \\
& \quad \theta_{CancerTrue|PollutionHigh,SmokerTrue}) \wedge (\lambda_{CancerTrue} \vee \neg \\
& \theta_{CancerTrue|PollutionHigh,SmokerTrue}) \wedge (\neg \lambda_{PollutionHigh} \vee \neg \lambda_{SmokerTrue} \vee \neg \\
& \quad \lambda_{CancerFalse} \vee \theta_{CancerFalse|PollutionHigh,SmokerTrue}) \wedge (\lambda_{PollutionHigh} \vee \neg \\
& \quad \theta_{CancerFalse|PollutionHigh,SmokerTrue}) \wedge (\lambda_{SmokerTrue} \vee \neg \\
& \quad \theta_{CancerFalse|PollutionHigh,SmokerTrue}) \wedge (\lambda_{CancerFalse} \vee \neg \\
& \theta_{CancerFalse|PollutionHigh,SmokerTrue}) \wedge (\neg \lambda_{PollutionHigh} \vee \neg \lambda_{SmokerFalse} \vee \\
& \neg \lambda_{CancerTrue} \vee \theta_{CancerTrue|PollutionHigh,SmokerFalse}) \wedge (\lambda_{PollutionHigh} \vee \neg \\
& \quad \theta_{CancerTrue|PollutionHigh,SmokerFalse}) \wedge (\lambda_{SmokerFalse} \vee \neg \\
& \quad \theta_{CancerTrue|PollutionHigh,SmokerFalse}) \wedge (\lambda_{CancerTrue} \vee \neg \\
& \theta_{CancerTrue|PollutionHigh,SmokerFalse}) \wedge (\neg \lambda_{PollutionHigh} \vee \neg \lambda_{SmokerFalse} \vee \\
& \neg \lambda_{CancerFalse} \vee \theta_{CancerFalse|PollutionHigh,SmokerFalse}) \wedge (\lambda_{PollutionHigh} \vee \neg \\
& \quad \theta_{CancerFalse|PollutionHigh,SmokerFalse}) \wedge (\lambda_{SmokerFalse} \vee \neg \\
& \quad \theta_{CancerFalse|PollutionHigh,SmokerFalse}) \wedge (\lambda_{CancerFalse} \vee \neg \\
& \theta_{CancerFalse|PollutionHigh,SmokerFalse}) \wedge (\neg \lambda_{CancerTrue} \vee \neg \lambda_{XrayPositive} \vee \\
& \quad \theta_{XrayPositive|CancerTrue}) \wedge (\lambda_{CancerTrue} \vee \neg \theta_{XrayPositive|CancerTrue}) \wedge \\
& \quad (\lambda_{XrayPositive} \vee \neg \theta_{XrayPositive|CancerTrue}) \wedge (\neg \lambda_{CancerTrue} \vee \neg \\
& \quad \lambda_{XrayNegative} \vee \theta_{XrayNegative|CancerTrue}) \wedge (\lambda_{CancerTrue} \vee \neg \\
& \theta_{XrayNegative|CancerTrue}) \wedge (\lambda_{XrayNegative} \vee \neg \theta_{XrayNegative|CancerTrue}) \wedge (\neg \\
& \lambda_{CancerFalse} \vee \neg \lambda_{XrayPositive} \vee \theta_{XrayPositive|CancerFalse}) \wedge (\lambda_{CancerFalse} \vee \neg \\
& \quad \theta_{XrayPositive|CancerFalse}) \wedge (\lambda_{XrayPositive} \vee \neg \theta_{XrayPositive|CancerFalse}) \wedge (\neg \\
& \lambda_{CancerFalse} \vee \neg \lambda_{XrayNegative} \vee \theta_{XrayNegative|CancerFalse}) \wedge (\lambda_{CancerFalse} \vee \\
& \neg \theta_{XrayNegative|CancerFalse}) \wedge (\lambda_{XrayNegative} \vee \neg \theta_{XrayNegative|CancerFalse}) \wedge \\
& (\neg \lambda_{CancerTrue} \vee \neg \lambda_{DyspnoeaTrue} \vee \theta_{DyspnoeaTrue|CancerTrue}) \wedge (\lambda_{CancerTrue} \\
& \vee \neg \theta_{DyspnoeaTrue|CancerTrue}) \wedge (\lambda_{DyspnoeaTrue} \vee \neg \theta_{DyspnoeaTrue|CancerTrue}) \\
& \wedge (\neg \lambda_{CancerTrue} \vee \neg \lambda_{DyspnoeaFalse} \vee \theta_{DyspnoeaFalse|CancerTrue}) \wedge \\
& \quad (\lambda_{CancerTrue} \vee \neg \theta_{DyspnoeaFalse|CancerTrue}) \wedge (\lambda_{DyspnoeaFalse} \vee \neg \\
& \quad \theta_{DyspnoeaFalse|CancerTrue}) \wedge (\neg \lambda_{CancerFalse} \vee \neg \lambda_{DyspnoeaTrue} \vee \\
& \theta_{DyspnoeaTrue|CancerFalse}) \wedge (\lambda_{CancerFalse} \vee \neg \theta_{DyspnoeaTrue|CancerFalse}) \wedge \\
& \quad (\lambda_{DyspnoeaTrue} \vee \neg \theta_{DyspnoeaTrue|CancerFalse}) \wedge (\neg \lambda_{CancerFalse} \vee \neg \\
& \quad \lambda_{DyspnoeaFalse} \vee \theta_{DyspnoeaFalse|CancerFalse}) \wedge (\lambda_{CancerFalse} \vee \neg \\
& \theta_{DyspnoeaFalse|CancerFalse}) \wedge (\lambda_{DyspnoeaFalse} \vee \neg \theta_{DyspnoeaFalse|CancerFalse})
\end{aligned}$$

Weights:

$$\begin{aligned}
W(\lambda_{PollutionLow}) &= 1.00 \\
W(\neg \lambda_{PollutionLow}) &= 1.00 \\
W(\lambda_{PollutionHigh}) &= 1.00 \\
W(\neg \lambda_{PollutionHigh}) &= 1.00 \\
W(\lambda_{SmokerTrue}) &= 1.00 \\
W(\neg \lambda_{SmokerTrue}) &= 1.00 \\
W(\lambda_{SmokerFalse}) &= 1.00 \\
W(\neg \lambda_{SmokerFalse}) &= 1.00 \\
W(\lambda_{CancerTrue}) &= 1.00 \\
W(\neg \lambda_{CancerTrue}) &= 1.00 \\
W(\lambda_{CancerFalse}) &= 1.00
\end{aligned}$$

$W(\neg\lambda_{CancerFalse}) = 1.00$
 $W(\lambda_{XrayPositive}) = 1.00$
 $W(\neg\lambda_{XrayPositive}) = 1.00$
 $W(\lambda_{XrayNegative}) = 1.00$
 $W(\neg\lambda_{XrayNegative}) = 1.00$
 $W(\lambda_{DyspnoeaTrue}) = 1.00$
 $W(\neg\lambda_{DyspnoeaTrue}) = 1.00$
 $W(\lambda_{DyspnoeaFalse}) = 1.00$
 $W(\neg\lambda_{DyspnoeaFalse}) = 1.00$
 $W(\theta_{PollutionLow}) = 0.90$
 $W(\neg\theta_{PollutionLow}) = 1.00$
 $W(\theta_{PollutionHigh}) = 0.10$
 $W(\neg\theta_{PollutionHigh}) = 1.00$
 $W(\theta_{SmokerTrue}) = 0.30$
 $W(\neg\theta_{SmokerTrue}) = 1.00$
 $W(\theta_{SmokerFalse}) = 0.70$
 $W(\neg\theta_{SmokerFalse}) = 1.00$
 $W(\theta_{CancerTrue|PollutionLow,SmokerTrue}) = 0.03$
 $W(\neg\theta_{CancerTrue|PollutionLow,SmokerTrue}) = 1.00$
 $W(\theta_{CancerFalse|PollutionLow,SmokerTrue}) = 0.97$
 $W(\neg\theta_{CancerFalse|PollutionLow,SmokerTrue}) = 1.00$
 $W(\theta_{CancerTrue|PollutionLow,SmokerFalse}) = 0.00$
 $W(\neg\theta_{CancerTrue|PollutionLow,SmokerFalse}) = 1.00$
 $W(\theta_{CancerFalse|PollutionLow,SmokerFalse}) = 1.00$
 $W(\neg\theta_{CancerFalse|PollutionLow,SmokerFalse}) = 1.00$
 $W(\theta_{CancerTrue|PollutionHigh,SmokerTrue}) = 0.05$
 $W(\neg\theta_{CancerTrue|PollutionHigh,SmokerTrue}) = 1.00$
 $W(\theta_{CancerFalse|PollutionHigh,SmokerTrue}) = 0.95$
 $W(\neg\theta_{CancerFalse|PollutionHigh,SmokerTrue}) = 1.00$
 $W(\theta_{CancerTrue|PollutionHigh,SmokerFalse}) = 0.02$
 $W(\neg\theta_{CancerTrue|PollutionHigh,SmokerFalse}) = 1.00$
 $W(\theta_{CancerFalse|PollutionHigh,SmokerFalse}) = 0.98$
 $W(\neg\theta_{CancerFalse|PollutionHigh,SmokerFalse}) = 1.00$
 $W(\theta_{XrayPositive|CancerTrue}) = 0.90$
 $W(\neg\theta_{XrayPositive|CancerTrue}) = 1.00$
 $W(\theta_{XrayNegative|CancerTrue}) = 0.10$
 $W(\neg\theta_{XrayNegative|CancerTrue}) = 1.00$
 $W(\theta_{XrayPositive|CancerFalse}) = 0.20$
 $W(\neg\theta_{XrayPositive|CancerFalse}) = 1.00$
 $W(\theta_{XrayNegative|CancerFalse}) = 0.80$
 $W(\neg\theta_{XrayNegative|CancerFalse}) = 1.00$
 $W(\theta_{DyspnoeaTrue|CancerTrue}) = 0.65$
 $W(\neg\theta_{DyspnoeaTrue|CancerTrue}) = 1.00$
 $W(\theta_{DyspnoeaFalse|CancerTrue}) = 0.35$
 $W(\neg\theta_{DyspnoeaFalse|CancerTrue}) = 1.00$
 $W(\theta_{DyspnoeaTrue|CancerFalse}) = 0.30$
 $W(\neg\theta_{DyspnoeaTrue|CancerFalse}) = 1.00$
 $W(\theta_{DyspnoeaFalse|CancerFalse}) = 0.70$
 $W(\neg\theta_{DyspnoeaFalse|CancerFalse}) = 1.00$

1.1.2 ENC 2

Indicator clauses

$$(\neg \lambda_{PollutionLow} \vee \neg \lambda_{PollutionHigh}) \wedge (\lambda_{PollutionLow} \vee \lambda_{PollutionHigh}) \wedge (\neg \lambda_{SmokerTrue} \vee \neg \lambda_{SmokerFalse}) \wedge (\lambda_{SmokerTrue} \vee \lambda_{SmokerFalse}) \wedge (\neg \lambda_{CancerTrue} \vee \neg \lambda_{CancerFalse}) \wedge (\lambda_{CancerTrue} \vee \lambda_{CancerFalse}) \wedge (\neg \lambda_{XrayPositive} \vee \neg \lambda_{XrayNegative}) \wedge (\lambda_{XrayPositive} \vee \lambda_{XrayNegative}) \wedge (\neg \lambda_{DyspnoeaTrue} \vee \neg \lambda_{DyspnoeaFalse}) \wedge (\lambda_{DyspnoeaTrue} \vee \lambda_{DyspnoeaFalse})$$

Parameter clauses

$$\begin{aligned} &(\neg \rho_{PollutionLow} \vee \lambda_{PollutionLow}) \wedge (\rho_{PollutionLow} \vee \lambda_{PollutionHigh}) \wedge (\neg \rho_{SmokerTrue} \vee \lambda_{SmokerTrue}) \wedge (\rho_{SmokerTrue} \vee \lambda_{SmokerFalse}) \wedge (\neg \lambda_{PollutionLow} \vee \neg \lambda_{SmokerTrue} \vee \neg \rho_{CancerTrue|PollutionLow,SmokerTrue} \vee \lambda_{CancerTrue}) \wedge (\neg \lambda_{PollutionLow} \vee \neg \lambda_{SmokerTrue} \vee \rho_{CancerTrue|PollutionLow,SmokerTrue} \vee \lambda_{CancerFalse}) \wedge (\neg \lambda_{PollutionLow} \vee \neg \lambda_{SmokerFalse} \vee \neg \rho_{CancerTrue|PollutionLow,SmokerFalse} \vee \lambda_{CancerTrue}) \wedge (\neg \lambda_{PollutionLow} \vee \neg \lambda_{SmokerFalse} \vee \rho_{CancerTrue|PollutionLow,SmokerFalse} \vee \lambda_{CancerFalse}) \wedge (\neg \lambda_{PollutionHigh} \vee \neg \lambda_{SmokerTrue} \vee \neg \rho_{CancerTrue|PollutionHigh,SmokerTrue} \vee \lambda_{CancerTrue}) \wedge (\neg \lambda_{PollutionHigh} \vee \neg \lambda_{SmokerTrue} \vee \rho_{CancerTrue|PollutionHigh,SmokerTrue} \vee \lambda_{CancerFalse}) \wedge (\neg \lambda_{PollutionHigh} \vee \neg \lambda_{SmokerFalse} \vee \neg \rho_{CancerTrue|PollutionHigh,SmokerFalse} \vee \lambda_{CancerTrue}) \wedge (\neg \lambda_{PollutionHigh} \vee \neg \lambda_{SmokerFalse} \vee \rho_{CancerTrue|PollutionHigh,SmokerFalse} \vee \lambda_{CancerFalse}) \wedge (\neg \lambda_{CancerTrue} \vee \neg \rho_{XrayPositive|CancerTrue} \vee \lambda_{XrayPositive}) \wedge (\neg \lambda_{CancerTrue} \vee \rho_{XrayPositive|CancerTrue} \vee \lambda_{XrayNegative}) \wedge (\neg \lambda_{CancerFalse} \vee \neg \rho_{XrayPositive|CancerFalse} \vee \lambda_{XrayPositive}) \wedge (\neg \lambda_{CancerFalse} \vee \rho_{XrayPositive|CancerFalse} \vee \lambda_{XrayNegative}) \wedge (\neg \lambda_{CancerTrue} \vee \neg \rho_{DyspnoeaTrue|CancerTrue} \vee \lambda_{DyspnoeaTrue}) \wedge (\neg \lambda_{CancerTrue} \vee \rho_{DyspnoeaTrue|CancerTrue} \vee \lambda_{DyspnoeaFalse}) \wedge (\neg \lambda_{CancerFalse} \vee \neg \rho_{DyspnoeaTrue|CancerFalse} \vee \lambda_{DyspnoeaTrue}) \wedge (\neg \lambda_{CancerFalse} \vee \rho_{DyspnoeaTrue|CancerFalse} \vee \lambda_{DyspnoeaFalse}) \end{aligned}$$

Weights

$$\begin{aligned} W(\lambda_{PollutionLow}) &= 1.00 \\ W(\neg \lambda_{PollutionLow}) &= 1.00 \\ W(\lambda_{PollutionHigh}) &= 1.00 \\ W(\neg \lambda_{PollutionHigh}) &= 1.00 \\ W(\lambda_{SmokerTrue}) &= 1.00 \\ W(\neg \lambda_{SmokerTrue}) &= 1.00 \\ W(\lambda_{SmokerFalse}) &= 1.00 \\ W(\neg \lambda_{SmokerFalse}) &= 1.00 \\ W(\lambda_{CancerTrue}) &= 1.00 \\ W(\neg \lambda_{CancerTrue}) &= 1.00 \\ W(\lambda_{CancerFalse}) &= 1.00 \\ W(\neg \lambda_{CancerFalse}) &= 1.00 \\ W(\lambda_{XrayPositive}) &= 1.00 \\ W(\neg \lambda_{XrayPositive}) &= 1.00 \\ W(\lambda_{XrayNegative}) &= 1.00 \\ W(\neg \lambda_{XrayNegative}) &= 1.00 \end{aligned}$$

$W(\lambda_{DyspnoeaTrue}) = 1.00$
 $W(\neg \lambda_{DyspnoeaTrue}) = 1.00$
 $W(\lambda_{DyspnoeaFalse}) = 1.00$
 $W(\neg \lambda_{DyspnoeaFalse}) = 1.00$
 $W(\rho_{PollutionLow}) = 0.90$
 $W(\neg \rho_{PollutionLow}) = 0.10$
 $W(\rho_{SmokerTrue}) = 0.30$
 $W(\neg \rho_{SmokerTrue}) = 0.70$
 $W(\rho_{CancerTrue|PollutionLow,SmokerTrue}) = 0.03$
 $W(\neg \rho_{CancerTrue|PollutionLow,SmokerTrue}) = 0.97$
 $W(\rho_{CancerTrue|PollutionLow,SmokerFalse}) = 0.00$
 $W(\neg \rho_{CancerTrue|PollutionLow,SmokerFalse}) = 1.00$
 $W(\rho_{CancerTrue|PollutionHigh,SmokerTrue}) = 0.05$
 $W(\neg \rho_{CancerTrue|PollutionHigh,SmokerTrue}) = 0.95$
 $W(\rho_{CancerTrue|PollutionHigh,SmokerFalse}) = 0.02$
 $W(\neg \rho_{CancerTrue|PollutionHigh,SmokerFalse}) = 0.98$
 $W(\rho_{XrayPositive|CancerTrue}) = 0.90$
 $W(\neg \rho_{XrayPositive|CancerTrue}) = 0.10$
 $W(\rho_{XrayPositive|CancerFalse}) = 0.20$
 $W(\neg \rho_{XrayPositive|CancerFalse}) = 0.80$
 $W(\rho_{DyspnoeaTrue|CancerTrue}) = 0.65$
 $W(\neg \rho_{DyspnoeaTrue|CancerTrue}) = 0.35$
 $W(\rho_{DyspnoeaTrue|CancerFalse}) = 0.30$
 $W(\neg \rho_{DyspnoeaTrue|CancerFalse}) = 0.70$

1.2

The CNF of the monty hall problem is given in image 1 TODO WEIGHTS

```

=====
CNF:
select_door(1)
^ win_keep v -prize(1)
^ -win_keep v prize(1)
^ open_door(2) v prize(2) v -prize(3)
^ -open_door(2) v -prize(2)
^ -open_door(2) v prize(3)
^ open_door(3) v prize(3) v -prize(2)
^ -open_door(3) v -prize(3)
^ -open_door(3) v prize(2)
^ win_switch v -prize(2) v open_door(2)
^ win_switch v -prize(3) v open_door(3)
^ -win_switch v prize(2) v prize(3)
^ -win_switch v prize(2) v -open_door(3)
^ -win_switch v -open_door(2) v prize(3)
^ -win_switch v -open_door(2) v -open_door(3)
Queries:
query(prize(1))
query(prize(2))
query(prize(3))
query(select_door(1))
query(win_keep)
query(win_switch)
=====

```

Figure 1.1: Grounded problog cnf

1.3

1.3.1

We will use mini2CD and Cachet as WMC counters.

mini2CD

- ENC1:

```
Constructing CNF... DONE
CNF stats:
  Vars=30 / Clauses=74
  CNF Time    0.000s
Constructing vtree (from primal graph)... DONE
Vtree stats:
  Vtree widths: con<=5, c_con=40 v_con=5
  Vtree Time   0.003s
Counting... DONE
  Learned clauses    0
Cache stats:
  hit rate    16.7%
  lookups     12
  ent count   10
  ent memory  0.5 KB
  ht memory   152.6 MB
  clists      1.0 ave, 1 max
  keys        4.2b ave, 6.0b max, 3.0b min
Count stats:
  Count Time    0.000s
  Count/Probability  1.00000
Total Time: 0.128s
```

Figure 1.2: Grounded problog cnf

- ENC2:

```
Constructing CNF... DONE
CNF stats:
  Vars=20 / Clauses=30
  CNF Time    0.000s
Constructing vtree (from primal graph)... DONE
Vtree stats:
  Vtree widths: con<=6, c_con=16 v_con=6
  Vtree Time   0.002s
Counting... DONE
  Learned clauses    0
Cache stats:
  hit rate    23.1%
  lookups     26
  ent count   20
  ent memory  1.0 KB
  ht memory   152.6 MB
  clists      1.0 ave, 1 max
  keys        1.8b ave, 3.0b max, 1.0b min
Count stats:
  Count Time    0.000s
  Count/Probability  1.00000
Total Time: 0.164s
```

Figure 1.3: Grounded problog cnf

- Prolog first:

Cachet

- ENC1:
- ENC2:
- Prolog first:

2. Difference between WMC's

The three WMC we will compare are C2D, Cachet and SharpSAT.

C2D Vs Cachet

The biggest difference between C2D and Cachet is that C2D keeps a track of the operation it has performed. This means that Cachet is not a compiler but C2D is. In [1] they note that Cachet could easily be transformed into a compiler. There are some other minor differences like they have a different way to implement decompositions but they also do variable splitting and caching in a different way.

SharpSAT vs Cachet

SharpSAT has an efficient way to cache components. This cache has a limited size and removes old entries using an utility function. It also uses implicit boolean constraint propagation (BCP). This results in a smaller search space and reduces the cache size further. SharpSAT also inherits different techniques from conventional SAT solvers. It inherits a clause learning and a fast BCP algorithm. It also has some things in common with Cachet: For selecting the branch variables, SharpSAT applies the VSADS algorithm from Cachet. Cachet uses a string representation for components while SharpSAT uses a smart coding to store its components in a cache. [2].

C2D vs SharpSAT

The biggest difference between these two is that C2D is a compiler. A point they have in common is that they both use things from the literature. C2D creates a tree while SharpSAT doesn't.

3 Overview of computational requirements

NOG DOEN.

Bibliography

- [1] Mark Chavira and Adnan Darwiche. On probabilistic inference by weighted model counting. *Artificial Intelligence*, 172(6):772 – 799, 2008.
- [2] Marc Thurley. sharpsat - counting models with advanced component caching and implicit bcp. *Proceedings of the 9th International Conference on Theory and Applications of Satisfiability Testing (SAT 2006)*, pages 424–429, 2006.