5.281 nor

DESCRIPTION LINKS AUTOMATON

Origin Logic

Constraint nor(VAR, VARIABLES)

Synonym clause.

Arguments

VAR : dvar
VARIABLES : collection(var−dvar)

Restrictions

$\mathtt{VAR} \geq 0$
$\mathtt{VAR} \leq 1$
$|\mathtt{VARIABLES}| \geq 2$
required(VARIABLES, var)
$\mathtt{VARIABLES.var} \geq 0$
$\mathtt{VARIABLES.var} \leq 1$

Purpose

Let VARIABLES be a collection of 0-1 variables $\mathtt{VAR}_1, \mathtt{VAR}_2, \ldots, \mathtt{VAR}_n$ $(n \geq 2)$. Enforce $\mathtt{VAR} = \neg(\mathtt{VAR}_1 \vee \mathtt{VAR}_2 \vee \cdots \vee \mathtt{VAR}_n)$.

Example

$(1, \langle 0, 0\rangle)$
$(0, \langle 0, 1\rangle)$
$(0, \langle 1, 0\rangle)$
$(0, \langle 1, 1\rangle)$
$(0, \langle 1, 0, 1\rangle)$

Symmetry Items of VARIABLES are permutable.

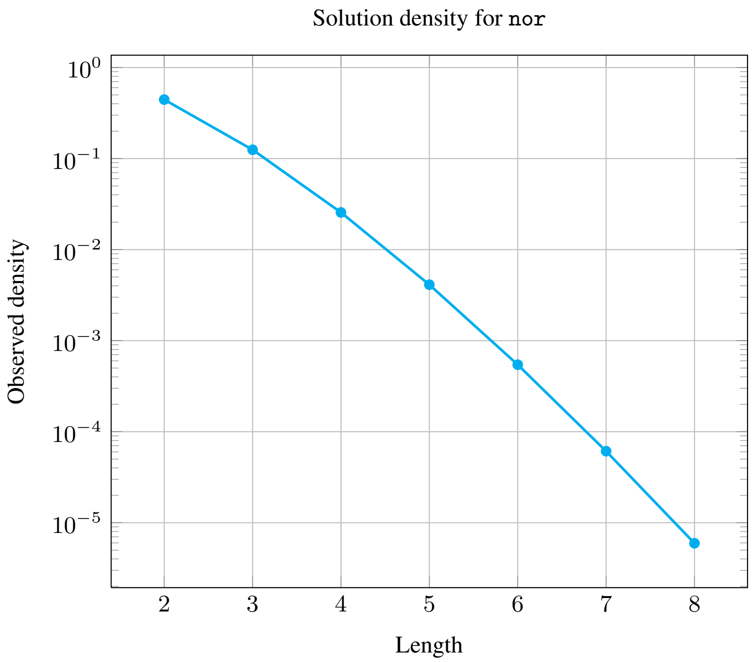
Arg. properties

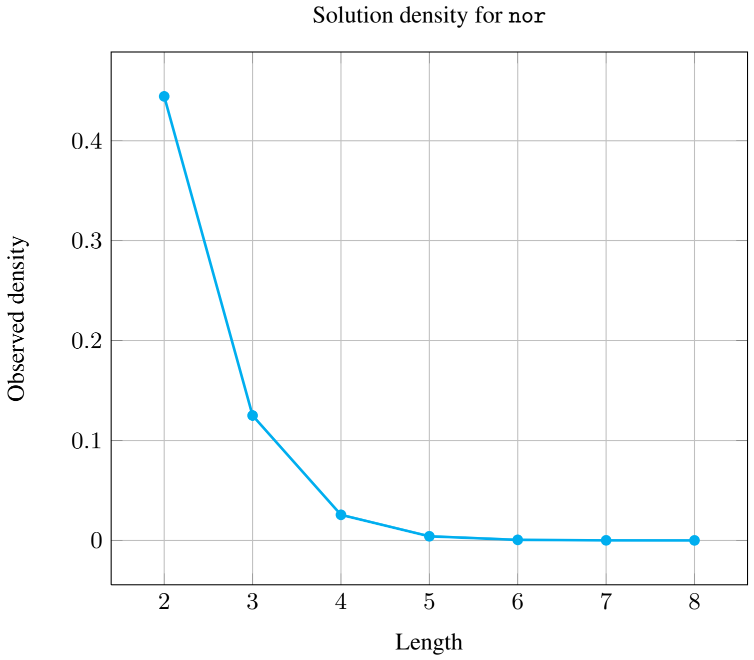
- Functional dependency: VAR determined by VARIABLES.
- Contractible wrt. VARIABLES when $\mathtt{VAR} = 1$.
- Extensible wrt. VARIABLES when $\mathtt{VAR} = 0$.
- Aggregate: $\mathtt{VAR}(\wedge)$, VARIABLES(union).

Counting

Length (n)	2	3	4	5	6	7	8
Solutions	4	8	16	32	64	128	256

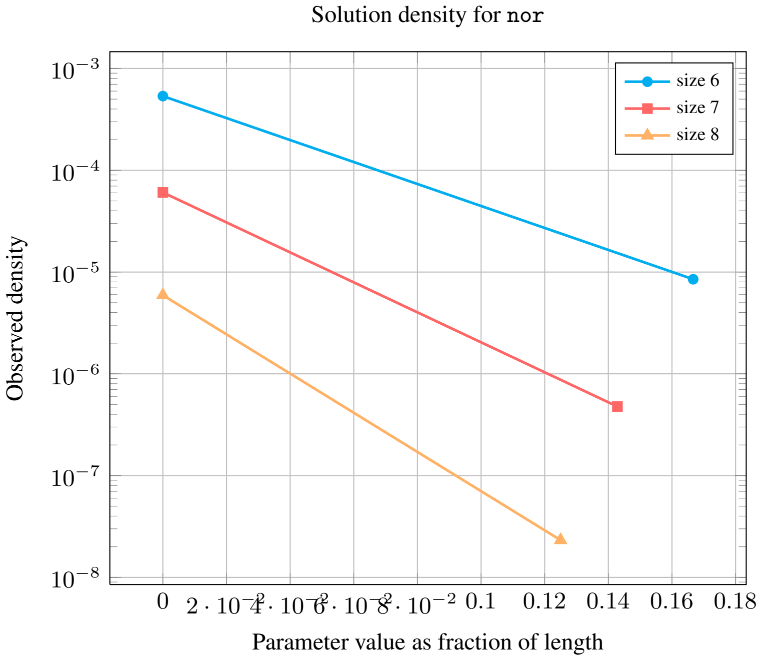
Number of solutions for nor: domains $0..n$

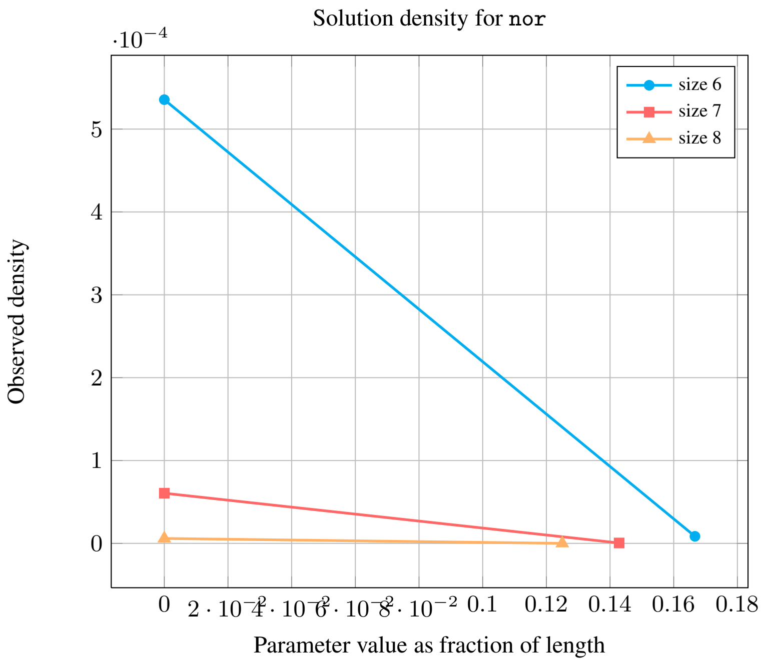

Solution density for `nor`
Observed density
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
2
3
4
5
6
7
8
Length


Solution density for `nor`
Observed density
0.4
0.3
0.2
0.1
0
2
3
4
5
6
7
8
Length

Length (n)		2	3	4	5	6	7	8
Total		4	8	16	32	64	128	256
Parameter value	0	3	7	15	31	63	127	255
	1	1	1	1	1	1	1	1

Solution count for `nor`: domains $0..n$





Systems reifiedXnor in **Choco**, clause in **Gecode**, # “/ in **SICStus**.

See also **common keyword:** `and`, `equivalent`, `imply`, `nand`, `or`, `xor` *(Boolean constraint)*.

implies: `atleast_nvalue`, `soft_all_equal_min_ctr`.

Keywords **characteristic of a constraint:** automaton, automaton without counters, reified automaton constraint.

constraint arguments: pure functional dependency.

constraint network structure: Berge-acyclic constraint network.

constraint type: Boolean constraint.

filtering: arc-consistency.

modelling: functional dependency.

Cond. implications `nor`(`VAR`, `VARIABLES`)
with $|\texttt{VARIABLES}| > 2$
implies `some_equal`(`VARIABLES`).

Automaton Figure 5.587 depicts the automaton associated with the `nor` constraint. To the first argument `VAR` of the `nor` constraint corresponds the first signature variable. To each variable $\texttt{VAR}_i$ of the second argument `VARIABLES` of the `nor` constraint corresponds the next signature variable. There is no signature constraint.

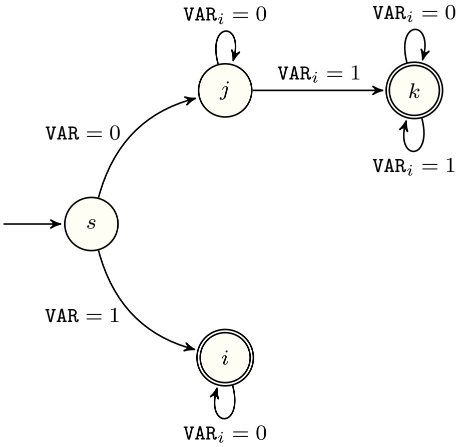


Figure 5.587: Automaton of the `nor` constraint

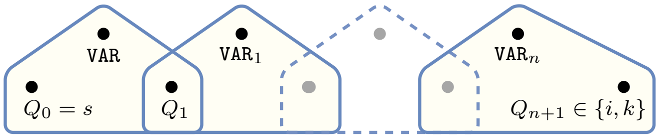


Figure 5.588: Hypergraph of the reformulation corresponding to the automaton of the `nor` constraint