5.259 min_size_full_zero_stretch

DESCRIPTION LINKS AUTOMATON

Origin Derived from the unit commitment problem

Constraint min_size_full_zero_stretch(MINSIZE, VARIABLES)

Arguments

MINSIZE : int
VARIABLES : collection(var−dvar)

Restrictions

$\texttt{MINSIZE} \geq 0$
$\texttt{MINSIZE} \leq |\texttt{VARIABLES}|$
required(VARIABLES, var)

Purpose

Given an integer MINSIZE and a sequence of variables VARIABLES enforce MINSIZE to be greater than or equal to the size of the smallest full stretch of zero of VARIABLES or to |VARIABLES| if no full stretch of zero exists.
A *stretch of zero* is a maximum sequence of zero, while a *full stretch of zero* is a stretch of zero that is neither located at the leftmost nor at the rightmost border of the sequence of variables VARIABLES. The *size of a stretch of zero* is the number of zero of the stretch.

Example

$(2, \langle 0, 2, 0, 0, 0, 2, 1, 0, 0, 3\rangle)$

Figure 5.560 shows the smallest full stretch of zero associated with the example. The min_size_full_zero_stretch constraint holds since the size of the smallest full stretch of zero of the sequence 0 2 0 0 0 2 1 0 0 3 is greater than or equal to 2.

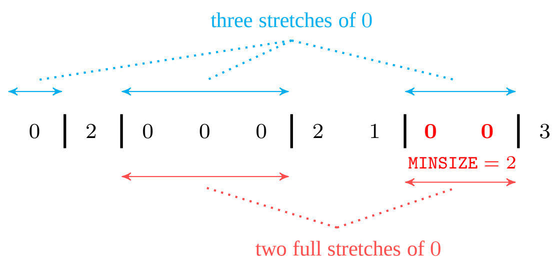


Figure 5.560: Illustration of the **Example** slot: smallest full stretch of zero in bold and red ($\texttt{MINSIZE} = 2$); note that the leftmost stretch of zero of size 1 is ignored since it is located at one of the two extremities of the sequence 0 2 0 0 0 2 1 0 0 3.

Typical

$|\texttt{VARIABLES}| > 2$
$\texttt{range}(\texttt{VARIABLES.var}) > 1$
$|\texttt{VARIABLES}| - \texttt{among\_diff\_0}(\texttt{VARIABLES.var}) > 1$

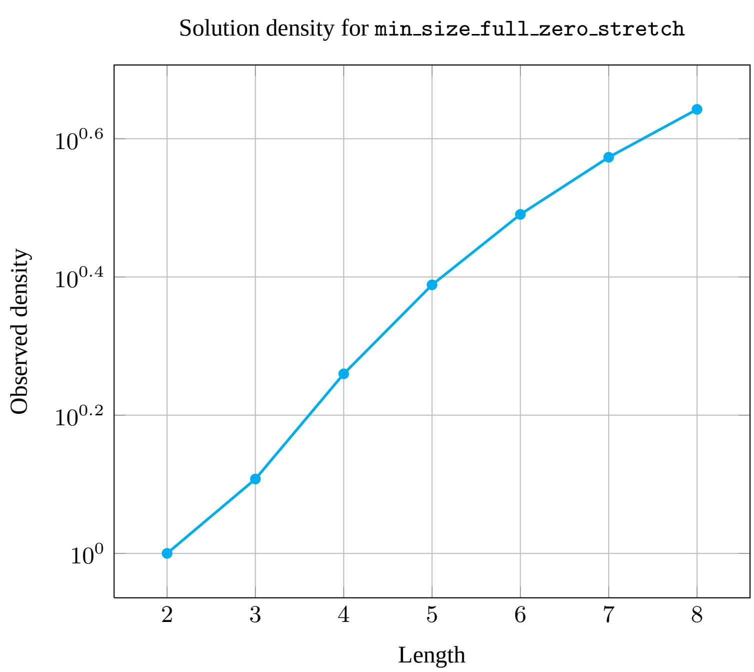
Symmetries

- Items of `VARIABLES` can be reversed.
- An occurrence of a value of `VARIABLES.var` that is different from 0 can be replaced by any other value that is also different from 0.

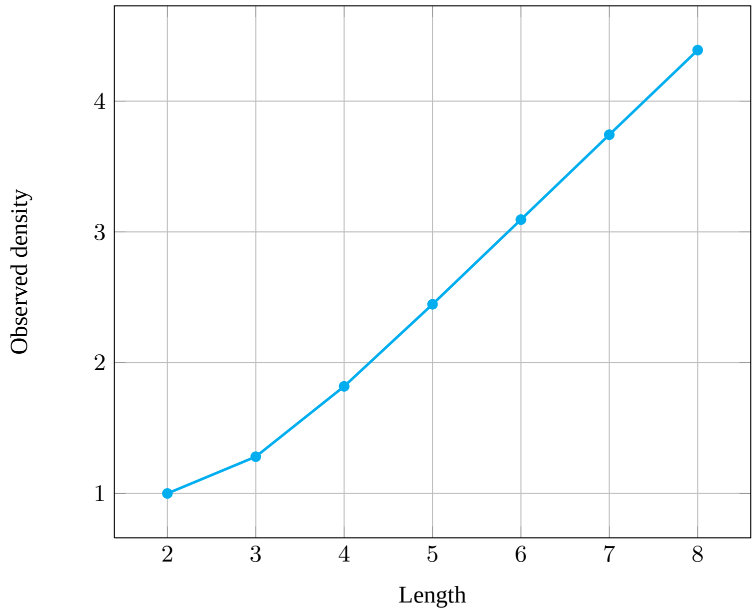
Counting

Length (n)	2	3	4	5	6	7	8
Solutions	9	82	1137	19026	364033	7850291	188987201

Number of solutions for `min_size_full_zero_stretch`: domains $0..n$



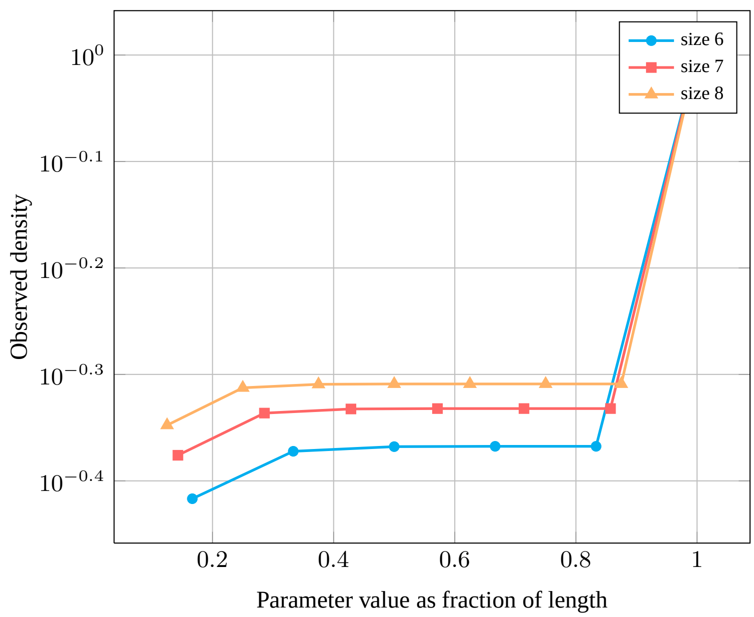
Solution density for `min_size_full_zero_stretch`



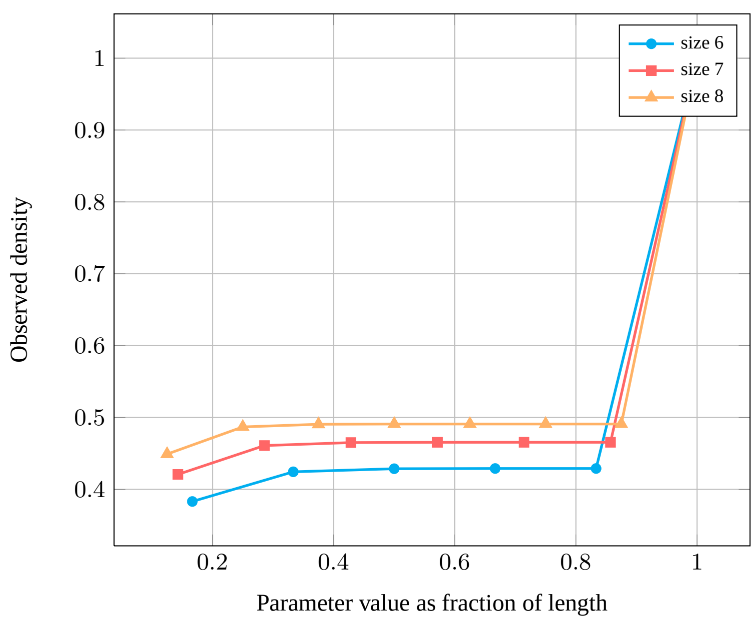
Length (n)		2	3	4	5	6	7	8
Total		9	82	1137	19026	364033	7850291	188987201
Parameter value	1	-	9	160	2575	45072	882441	19330432
	2	9	9	176	2875	49932	966672	20958912
	3	-	64	176	2900	50436	975394	21117888
	4	-	-	625	2900	50472	976178	21132416
	5	-	-	-	7776	50472	976227	21133568
	6	-	-	-	-	117649	976227	21133632
	7	-	-	-	-	-	2097152	21133632
	8	-	-	-	-	-	-	43046721

Solution count for `min_size_full_zero_stretch`: domains $0..n$

Solution density for `min_size_full_zero_stretch`



Solution density for `min_size_full_zero_stretch`



See also **common keyword:** `stretch_path` (*sequence*).

Keywords **characteristic of a constraint:** joker value, automaton, automaton with counters, automaton with same input symbol.

combinatorial object: sequence.

constraint network structure: alpha-acyclic constraint network(3).

Automaton Figure 5.561 depicts the automaton associated with the `min_size_full_zero_stretch` constraint.

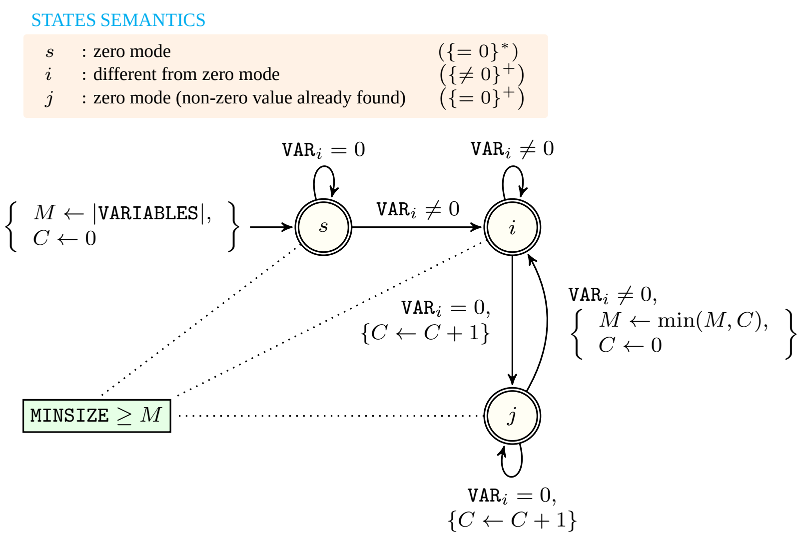


Figure 5.561: Automaton of the `min_size_full_zero_stretch` constraint

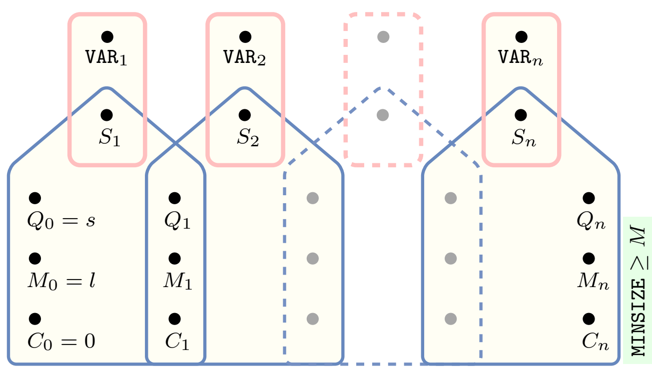


Figure 5.562: Hypergraph of the reformulation corresponding to the automaton (with two counters) of the `min_size_full_zero_stretch` constraint where $l = |\texttt{VARIABLES}|$ (since all states of the automaton are accepting there is no restriction on the last variable Q_n)