5.259 min_size_set_of_consecutive_var

DESCRIPTION LINKS GRAPH

Origin N. Beldiceanu

Constraint min_size_set_of_consecutive_var(MIN, VARIABLES)

Arguments

MIN	:	dvar
VARIABLES	:	collection(var−dvar)

Restrictions

MIN ≥ 1
MIN $\leq |$VARIABLES$|$
required(VARIABLES, var)

Purpose MIN is the size of the smallest set of variables of the collection VARIABLES that all take their value in a set of consecutive values.

Example

$(4, \langle 3, 1, 3, 7, 4, 1, 2, 8, 7, 6\rangle)$
$(4, \langle 3, 1, 3, 2\rangle)$

In the first example, the two parts $3, 1, 3, 4, 1, 2$ and $7, 8, 7, 6$ take respectively their values in the two following sets of consecutive values $\{1, 2, 3, 4\}$ and $\{6, 7, 8\}$. Consequently, the corresponding min_size_set_of_consecutive_var constraint holds since the cardinality of the smallest set of variables is 4.

Typical

MIN > 1
MIN $< |$VARIABLES$|$
$|$VARIABLES$| > 0$
range(VARIABLES.var) > 1

Symmetries

- Items of VARIABLES are permutable.
- All occurrences of two distinct values of VARIABLES.var can be swapped.
- One and the same constant can be added to the var attribute of all items of VARIABLES.

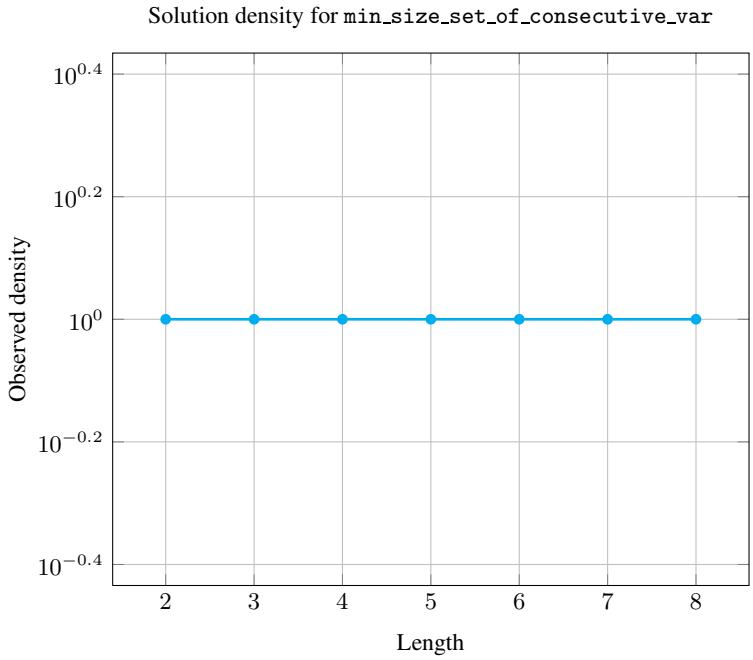
Arg. properties

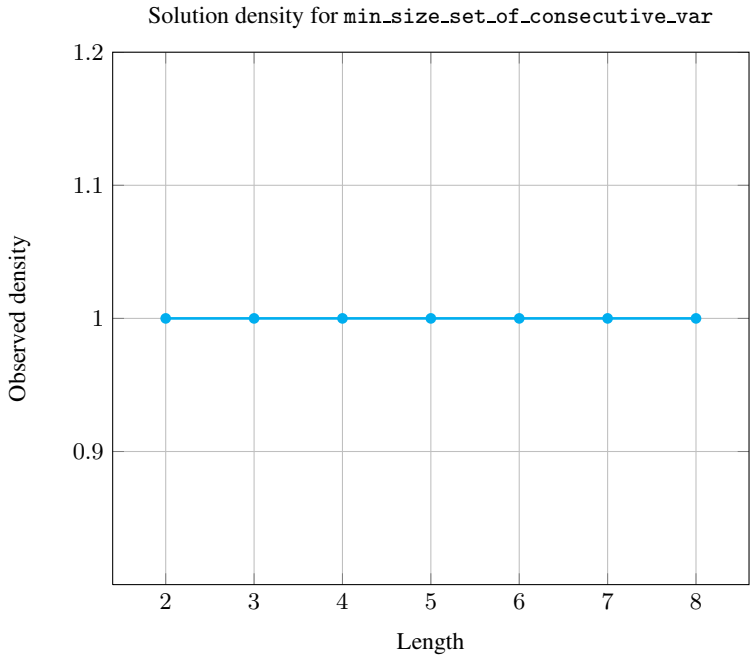
Functional dependency: MIN determined by VARIABLES.

Counting

Length (n)	2	3	4	5	6	7	8
Solutions	9	64	625	7776	117649	2097152	43046721

Number of solutions for min_size_set_of_consecutive_var: domains $0..n$

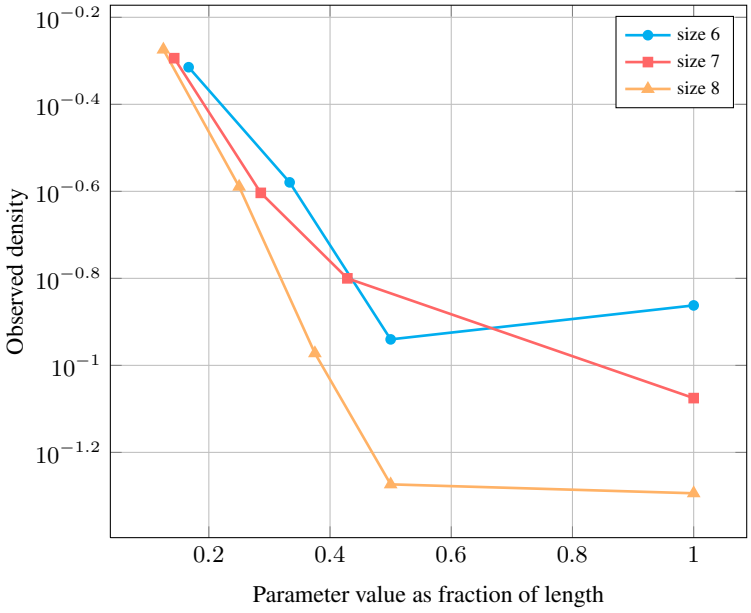

Solution density for min_size_set_of_consecutive_var
Observed density
$10^{0.4}$
$10^{0.2}$
10^{0}
$10^{-0.2}$
$10^{-0.4}$
2
3
4
5
6
7
8
Length

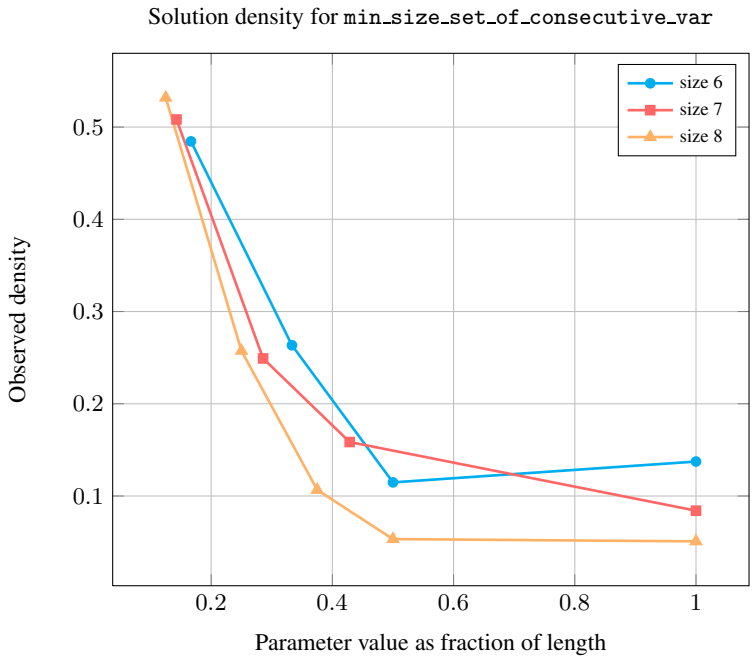

Solution density for min_size_set_of_consecutive_var
Observed density
1.2
1.1
1
0.9
2
3
4
5
6
7
8
Length

Length (n)		2	3	4	5	6	7	8
Total		9	64	625	7776	117649	2097152	43046721
Parameter value	1	2	30	276	3580	57000	1065834	22894984
	2	7	-	132	2480	30990	522522	11080412
	3	-	34	-	-	13500	332430	4590208
	4	-	-	217	-	-	-	2293480
	5	-	-	-	1716	-	-	-
	6	-	-	-	-	16159	-	-
	7	-	-	-	-	-	176366	-
	8	-	-	-	-	-	-	2187637

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

Solution density for `min_size_set_of_consecutive_var`





See also **common keyword:** `nset_of_consecutive_values` (*consecutive values*).

Keywords **application area:** assignment.

characteristic of a constraint: consecutive values, minimum.

constraint arguments: pure functional dependency.

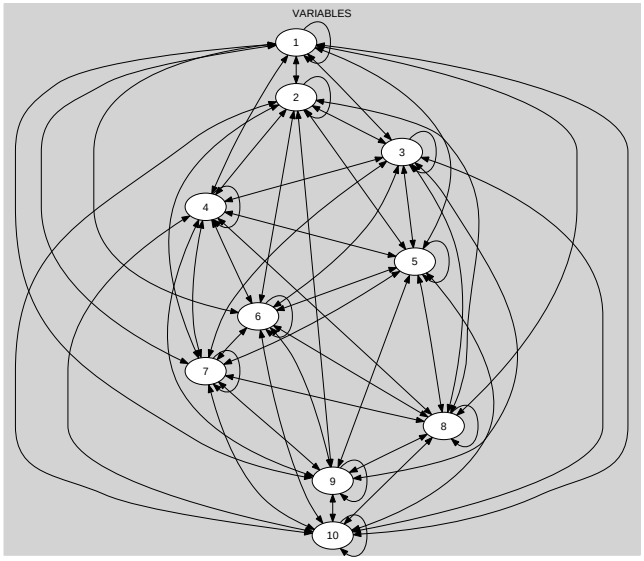
constraint type: value constraint.

modelling: functional dependency.

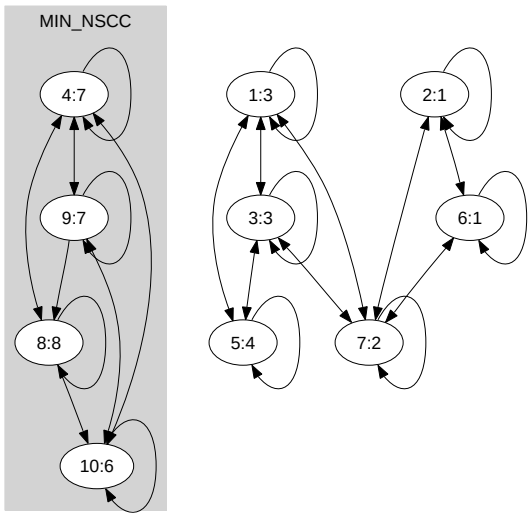
Arc input(s)	VARIABLES
Arc generator	$CLIQUE \mapsto$ collection(variables1, variables2)
Arc arity	2
Arc constraint(s)	abs(variables1.var − variables2.var) ≤ 1
Graph property(ies)	MIN_NSCC = MIN

Graph model Since the arc constraint is symmetric each strongly connected component of the final graph corresponds exactly to one connected component of the final graph.

Parts (A) and (B) of Figure 5.544 respectively show the initial and final graph associated with the first example of the **Example** slot. Since we use the **MIN_NSCC** graph property, we show the smallest strongly connected component of the final graph.



(A)



(B)

Figure 5.544: Initial and final graph of the `min_size_set_of_consecutive_var` constraint