5.249 max_size_set_of_consecutive_var

DESCRIPTION LINKS GRAPH

Origin N. Beldiceanu

Constraint max_size_set_of_consecutive_var(MAX, VARIABLES)

Arguments

MAX	:	dvar
VARIABLES	:	collection(var−dvar)

Restrictions

$\texttt{MAX} \geq 1$
$\texttt{MAX} \leq |\texttt{VARIABLES}|$
required(VARIABLES, var)

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

Example $(6, \langle 3, 1, 3, 7, 4, 1, 2, 8, 7, 6\rangle)$
$(2, \langle 2, 6, 7, 3, 0, 9\rangle)$

In the first example, the two sets $\{3, 1, 3, 4, 1, 2\}$ 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 max_size_set_of_consecutive_var constraint holds since the cardinality of the largest set of variables is 6.

Typical

$\texttt{MAX} < |\texttt{VARIABLES}|$
$|\texttt{VARIABLES}| > 0$
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.

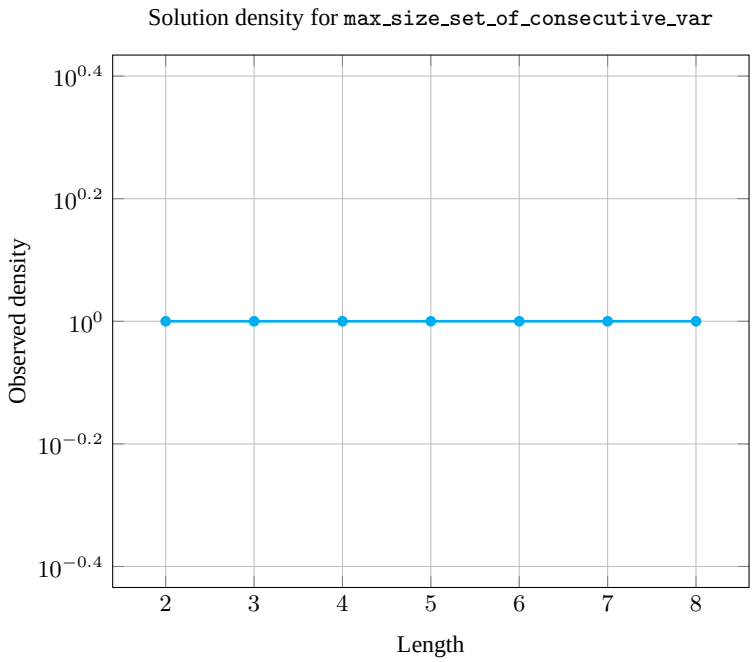
Arg. properties

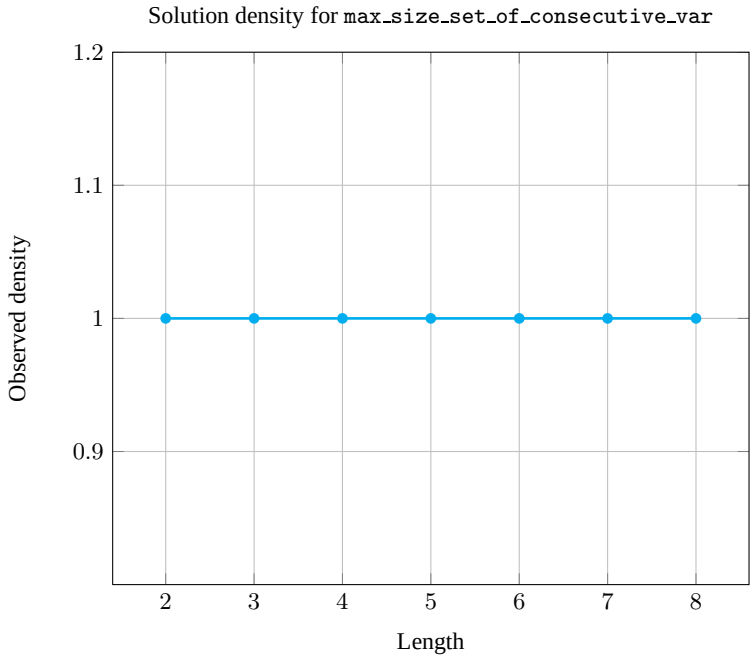
Functional dependency: MAX determined by VARIABLES.

Counting

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

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

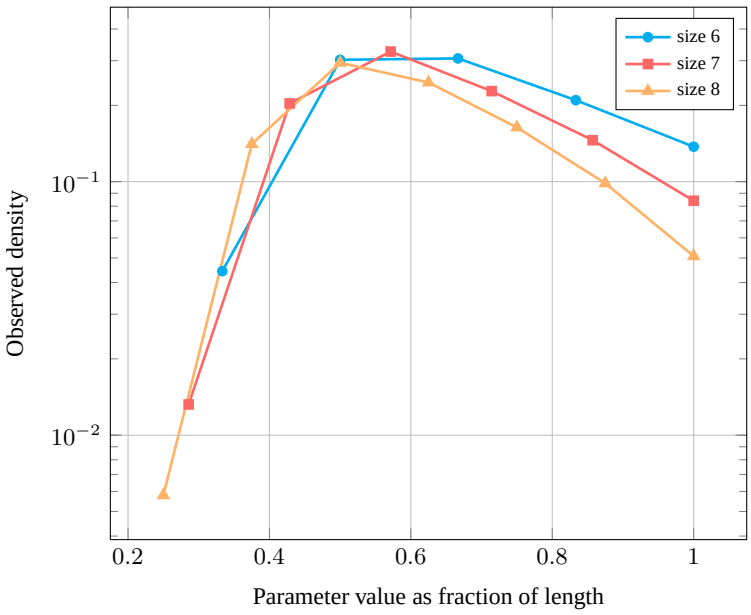

Solution density for max_size_set_of_consecutive_var
Observed density
$10^{0.4}$
$10^{0.2}$
10^{0}
$10^{-0.2}$
$10^{-0.4}$
2
3
4
5
6
7
8
Length


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

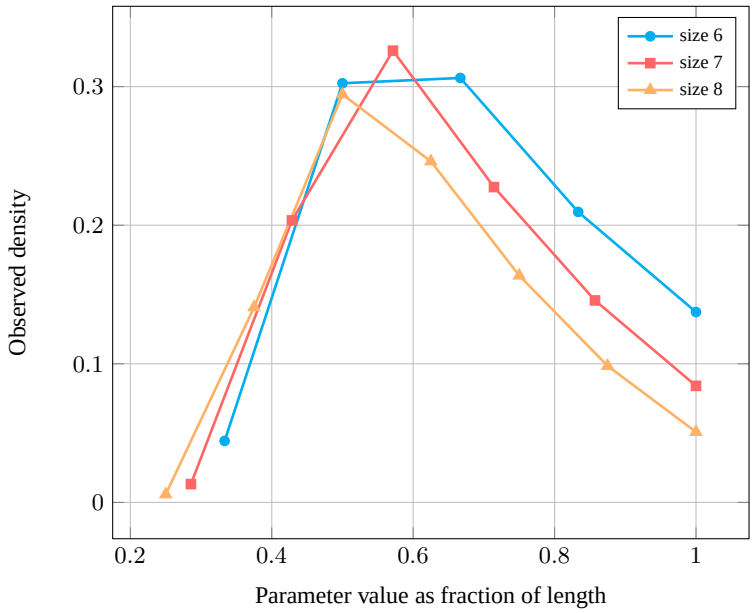
Length (n)		2	3	4	5	6	7	8
Total		9	64	625	7776	117649	2097152	43046721
Parameter value	1	2	-	-	-	-	-	-
	2	7	30	168	720	5220	27720	249480
	3	-	34	240	3080	35580	426720	6059760
	4	-	-	217	2260	36030	683550	12672940
	5	-	-	-	1716	24660	477162	10592848
	6	-	-	-	-	16159	305634	7044632
	7	-	-	-	-	-	176366	4239424
	8	-	-	-	-	-	-	2187637

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

Solution density for `max_size_set_of_consecutive_var`



Solution density for `max_size_set_of_consecutive_var`



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

Keywords **characteristic of a constraint:** consecutive values, maximum.

constraint arguments: pure functional dependency.

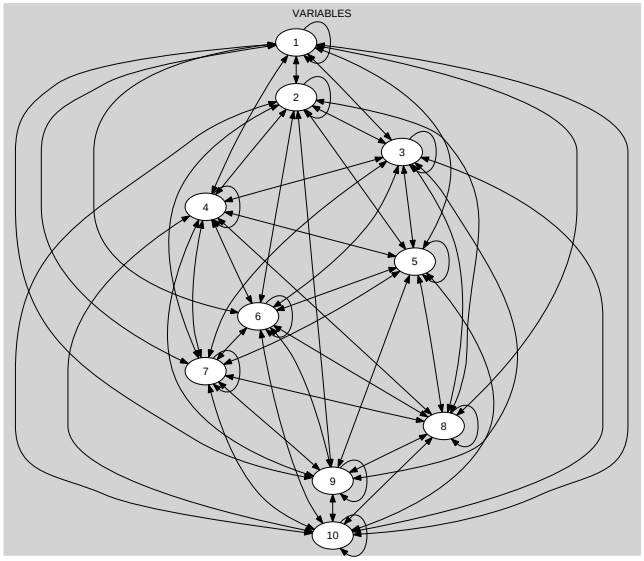
constraint type: value constraint.

modelling: functional dependency.

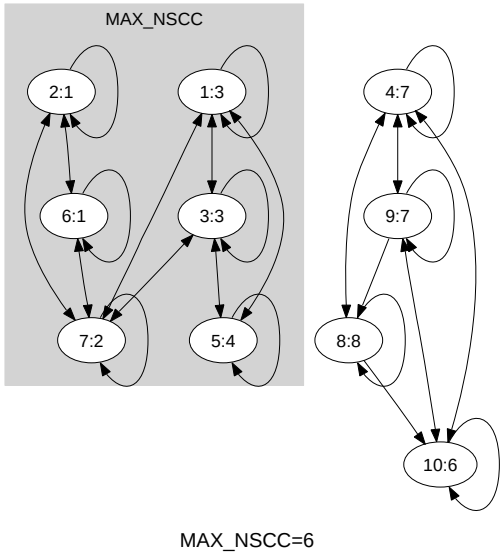
Arc input(s)	VARIABLES
Arc generator	$CLIQUE \mapsto$ collection(variables1, variables2)
Arc arity	2
Arc constraint(s)	abs(variables1.var − variables2.var) ≤ 1
Graph property(ies)	MAX_NSCC = MAX

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 5.538 respectively show the initial and final graph associated with the first example of the **Example** slot. Since we use the **MAX_NSCC** graph property, we show the largest strongly connected component of the final graph.



(A)



(B)

Figure 5.538: Initial and final graph of the `max_size_set_of_consecutive_var` constraint