5.285 nset_of_consecutive_values

DESCRIPTION LINKS GRAPH

Origin N. Beldiceanu

Constraint nset_of_consecutive_values(N, VARIABLES)

Arguments

N	:	dvar
VARIABLES	:	collection(var−dvar)

Restrictions

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

Purpose N is the number of set of consecutive values used by the variables of the collection VARIABLES.

Example

$(2, \langle 3, 1, 7, 1, 1, 2, 8 \rangle)$
$(7, \langle 3, 1, 5, 7, 9, 11, 13 \rangle)$
$(1, \langle 3, 3, 3, 3, 3, 3, 3 \rangle)$

In the first example, the two parts $3, 1, 1, 1, 2$ and $7, 8$ take respectively their values in the following sets of consecutive values $\{1, 2, 3\}$ and $\{7, 8\}$. Consequently, the corresponding nset_of_consecutive_values constraint holds since its first argument $\texttt{N} = 2$ is set to the number of sets of consecutive values.

Typical

$\texttt{N} > 1$
$|\texttt{VARIABLES}| > 1$
$\texttt{range}(\texttt{VARIABLES.var}) > 1$

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

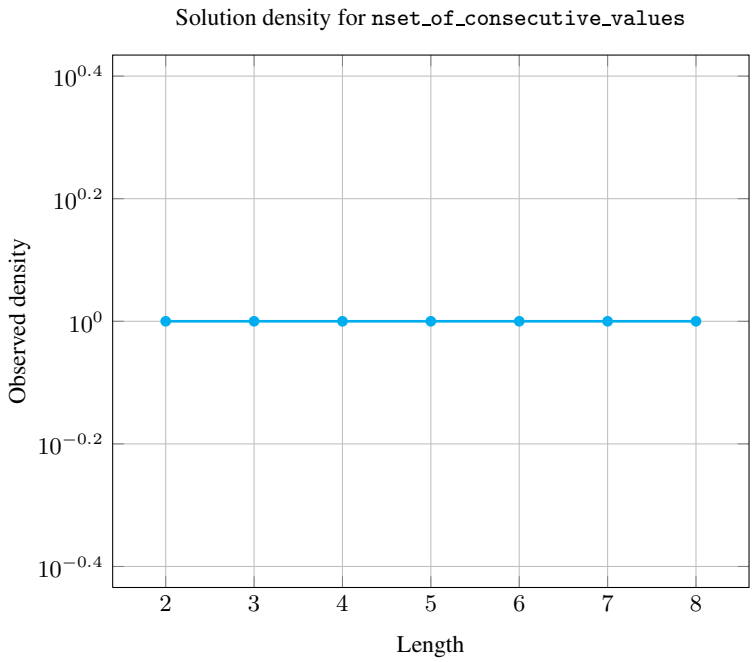
Functional dependency: N determined by VARIABLES.

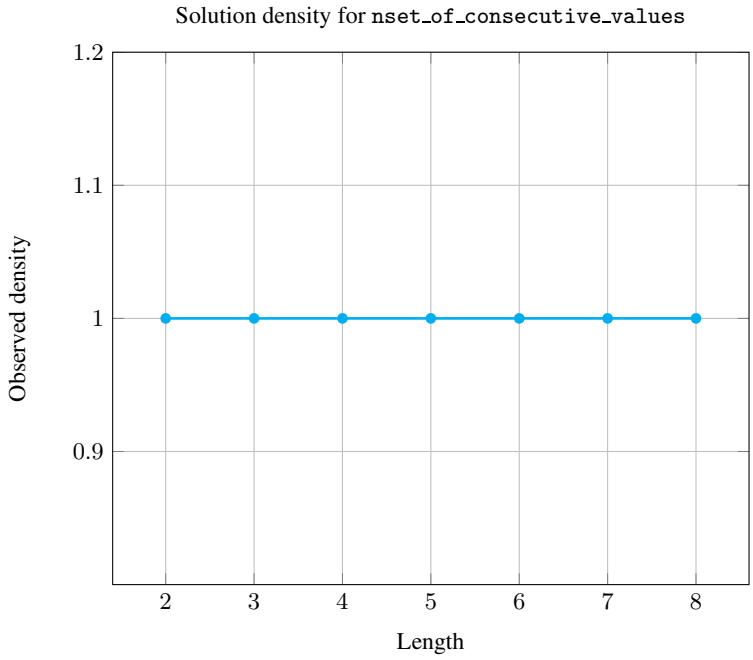
Usage Used for specifying the fact that the values have to be used in a compact way is achieved by setting N to 1.

Counting

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

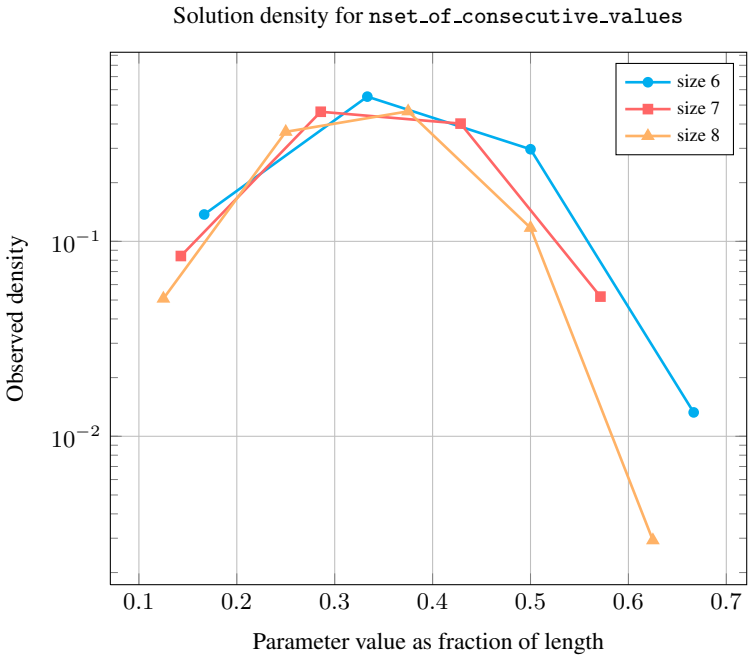
Number of solutions for nset_of_consecutive_values: domains $0..n$

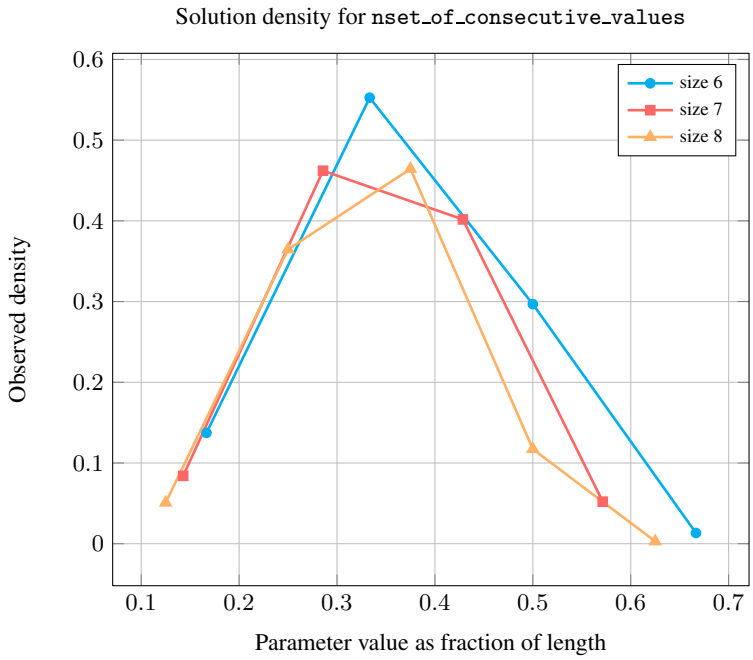

Solution density for nset_of_consecutive_values
Observed density
$10^{0.4}$
$10^{0.2}$
10^{0}
$10^{-0.2}$
$10^{-0.4}$
2
3
4
5
6
7
8
Length


Solution density for nset_of_consecutive_values
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	7	34	217	1716	16159	176366	2187637
	2	2	30	372	4740	65010	969066	15695624
	3	-	-	36	1320	34920	842520	19989900
	4	-	-	-	-	1560	109200	5047560
	5	-	-	-	-	-	-	126000

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





See also **common keyword:** `max_size_set_of_consecutive_var`, `min_size_set_of_consecutive_var` (*consecutive values*).

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

constraint arguments: pure functional dependency.

constraint type: value constraint.

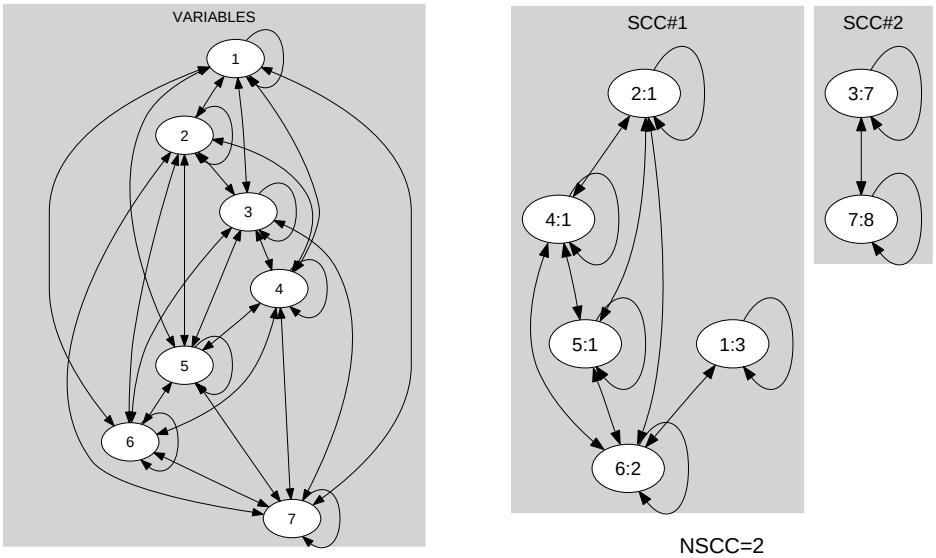
final graph structure: strongly connected component.

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)	NSCC = N

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 5.596 respectively show the initial and final graph associated with the first example of the **Example** slot. Since we use the **NSCC** graph property, we show the two strongly connected components of the final graph.



(A) **(B)**

Figure 5.596: Initial and final graph of the nset_of_consecutive_values constraint