5.240 nvalues

DESCRIPTION LINKS GRAPH

Origin Inspired by nvalue and count.

Constraint nvalues(VARIABLES, RELOP, LIMIT)

Arguments

VARIABLES	:	collection(var−dvar)
RELOP	:	atom
LIMIT	:	dvar

Restrictions

required(VARIABLES, var)
RELOP $\in [=, \neq, <, \geq, >, \leq]$

Purpose Let N be the number of distinct values assigned to the variables of the VARIABLES collection. Enforce condition N RELOP LIMIT to hold.

Example

$$\left\langle \begin{array}{l} \mathtt{var}-4, \\ \mathtt{var}-5, \\ \mathtt{var}-5, \\ \mathtt{var}-4, \\ \mathtt{var}-1, \\ \mathtt{var}-5 \end{array} \right\rangle, =, 3$$

The nvalues constraint holds since the number of distinct values occurring within the collection $\langle 4, 5, 5, 4, 1, 5 \rangle$ is equal (i.e., RELOP is set to $=$) to its third argument LIMIT $= 3$.

Symmetries

- Items of VARIABLES are permutable.
- All occurrences of two distinct values of VARIABLES.var can be swapped; all occurrences of a value of VARIABLES.var can be renamed to any unused value.

Usage Used in the **Constraint(s) on sets** slot for defining some constraints like assign_and_nvalues, circuit_cluster or coloured_cumulative.

Reformulation The nvalues(VARIABLES, RELOP , LIMIT) constraint can be expressed in term of the conjunction nvalue(NV, VARIABLES) $\wedge$ NV RELOP LIMIT.

Used in assign_and_nvalues, circuit_cluster, coloured_cumulative, coloured_cumulatives.

See also

assignment dimension added: assign_and_nvalues.

common keyword: nvalues_except_0 (*counting constraint*,*number of distinct values*).

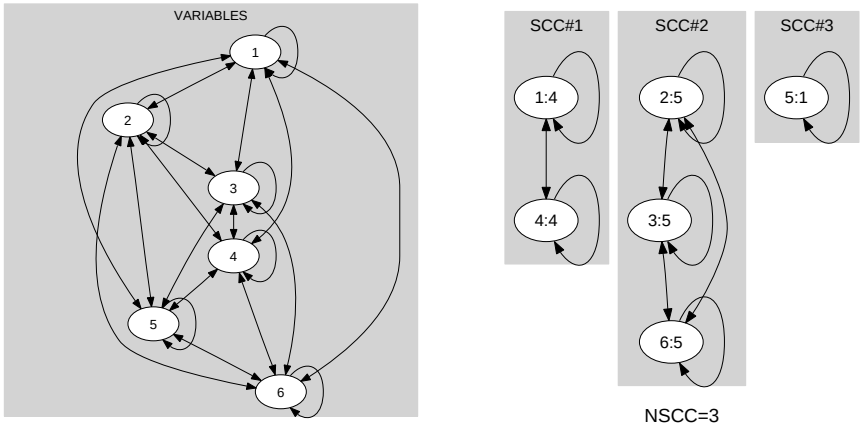
specialisation: nvalue (*replace a comparison with the number of distinct values by an equality with the number of distinct values*).

Keywords

constraint type: counting constraint, value partitioning constraint.
final graph structure: strongly connected component, equivalence.
modelling: number of distinct equivalence classes, number of distinct values.
problems: domination.

Arc input(s)	VARIABLES
Arc generator	$CLIQUE \mapsto$ collection(variables1, variables2)
Arc arity	2
Arc constraint(s)	variables1.var = variables2.var
Graph property(ies)	NSCC RELOP LIMIT
Graph class	EQUIVALENCE

Graph model Parts (A) and (B) of Figure 5.457 respectively show the initial and final graph associated with the **Example** slot. Since we use the **NSCC** graph property we show the different strongly connected components of the final graph. Each strongly connected component corresponds to a value that is assigned to some variables of the VARIABLES collection. The 3 following values 1, 4 and 5 are used by the variables of the VARIABLES collection.



(A) **(B)**

Figure 5.457: Initial and final graph of the nvalues constraint