5.296 open_among

DESCRIPTION LINKS GRAPH

Origin Derived from among and open_global_cardinality.

Constraint open_among(S, NVAR, VARIABLES, VALUES)

Arguments

S	:	svar
NVAR	:	dvar
VARIABLES	:	collection(var−dvar)
VALUES	:	collection(val−int)

Restrictions

$\texttt{S} \geq 1$
$\texttt{S} \leq |\texttt{VARIABLES}|$
$\texttt{NVAR} \geq 0$
$\texttt{NVAR} \leq |\texttt{VARIABLES}|$
required(VARIABLES, var)
required(VALUES, val)
distinct(VALUES, val)

Purpose Let $\mathcal{V}$ be the variables of the collection VARIABLES for which the corresponding position belongs to the set S. Positions are numbered from 1. NVAR is the number of variables of $\mathcal{V}$ that take their value in VALUES.

Example $(\{2,3,4,5\}, 3, \langle 8,5,5,4,1\rangle, \langle 1,5,8\rangle)$

The open_among constraint holds since within the last four values (i.e., $\texttt{S} = \{2,3,4,5\}$) of $\langle 8,5,5,4,1\rangle$ exactly 3 values belong to the set of values $\{1,5,8\}$.

Typical

$\texttt{NVAR} > 0$
$\texttt{NVAR} < |\texttt{VARIABLES}|$
$|\texttt{VARIABLES}| > 1$
$|\texttt{VALUES}| > 1$
$|\texttt{VARIABLES}| > |\texttt{VALUES}|$

Symmetries

- Items of VALUES are permutable.
- An occurrence of a value of VARIABLES.var that belongs to VALUES.val (resp. does not belong to VALUES.val) can be replaced by any other value in VALUES.val (resp. not in VALUES.val).

Arg. properties

- Functional dependency: NVAR determined by S, VARIABLES and VALUES.
- Suffix-contractible wrt. VARIABLES when $\texttt{NVAR} = 0$.

See also

common keyword: `open_atleast`, `open_atmost` (*open constraint*,*value constraint*), `open_global_cardinality` (*open constraint*,*counting constraint*).

hard version: `among`.

used in graph description: `in_set`.

Keywords

constraint arguments: constraint involving set variables.

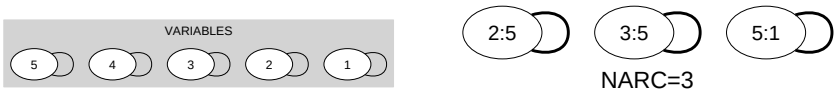
constraint type: open constraint, value constraint, counting constraint.

modelling: functional dependency.

Arc input(s)	VARIABLES
Arc generator	$SELF \mapsto$ collection(variables)
Arc arity	1
Arc constraint(s)	• in(variables.var, VALUES) • in_set(variables.key, S)
Graph property(ies)	**NARC**= NVAR

Graph model The arc constraint corresponds to the conjunction of unary constraints in(variables.var, VALUES) and in_set(variables.key, S) defined in this catalogue. Consequently we employ the $SELF$ arc generator in order to produce an initial graph with a single loop on each vertex.

Parts (A) and (B) of Figure 5.631 respectively show the initial and final graph associated with the **Example** slot. Since we use the **NARC** graph property, the loops of the final graph are stressed in bold.



(A) **(B)**

Figure 5.631: Initial and final graph of the open_among constraint