5.236 npair

DESCRIPTION LINKS GRAPH

Origin Derived from nvalue.

Constraint npair(NPAIRS, PAIRS)

Arguments

NPAIRS	:	dvar
PAIRS	:	collection(x−dvar, y−dvar)

Restrictions

NPAIRS ≥ min(1, |PAIRS|)
NPAIRS ≤ |PAIRS|
required(PAIRS, [x, y])

Purpose NPAIRS is the number of distinct pairs of values assigned to the pairs of variables of the collection PAIRS.

Example

$$\left(\begin{array}{cc} & \mathtt{x}-3 \quad \mathtt{y}-1, \\ 2, \left\langle \begin{array}{cc} \mathtt{x}-1 & \mathtt{y}-5, \\ \mathtt{x}-3 & \mathtt{y}-1, \\ \mathtt{x}-3 & \mathtt{y}-1, \end{array} \right\rangle & \\ & \mathtt{x}-1 \quad \mathtt{y}-5 \end{array}\right)$$

The npair constraint holds since its first argument NPAIRS $= 2$ is set to the number of distinct pairs $\langle \mathtt{x}-3\ \mathtt{y}-1 \rangle$ and $\langle \mathtt{x}-1\ \mathtt{y}-5 \rangle$ of its second argument PAIRS.

Symmetries

- Items of PAIRS are permutable.
- Attributes of PAIRS are permutable w.r.t. permutation (x, y) (*permutation applied to all items*).
- All occurrences of two distinct tuples of values of NPAIRS can be swapped; all occurrences of a tuple of values of NPAIRS can be renamed to any unused tuple of values.

Remark This is an example of a *number of distinct values* constraint where there is more than one attribute that is associated with each vertex of the final graph.

See also **related:** nclass (pair *of* variables *replaced by* variable ∈ partition), nequivalence (pair *of* variables *replaced by* variable mod constant), ninterval (pair *of* variables *replaced by* variable/constant).

specialisation: nvalue (pair *of* variables *replaced by* variable).

Keywords **characteristic of a constraint:** pair.

constraint type: counting constraint, value partitioning constraint.

final graph structure: strongly connected component, equivalence.

modelling: number of distinct equivalence classes.

Arc input(s)	PAIRS
Arc generator	$CLIQUE \mapsto$ collection(pairs1, pairs2)
Arc arity	2
Arc constraint(s)	• pairs1.x = pairs2.x • pairs1.y = pairs2.y
Graph property(ies)	NSCC= NPAIRS

Graph model Parts (A) and (B) of Figure 5.451 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 pair of values that is assigned to some pairs of variables of the PAIRS collection. In our example we have the following pairs of values: $\langle \mathtt{x}-3\ \mathtt{y}-1\rangle$ and $\langle \mathtt{x}-1\ \mathtt{y}-5\rangle$.

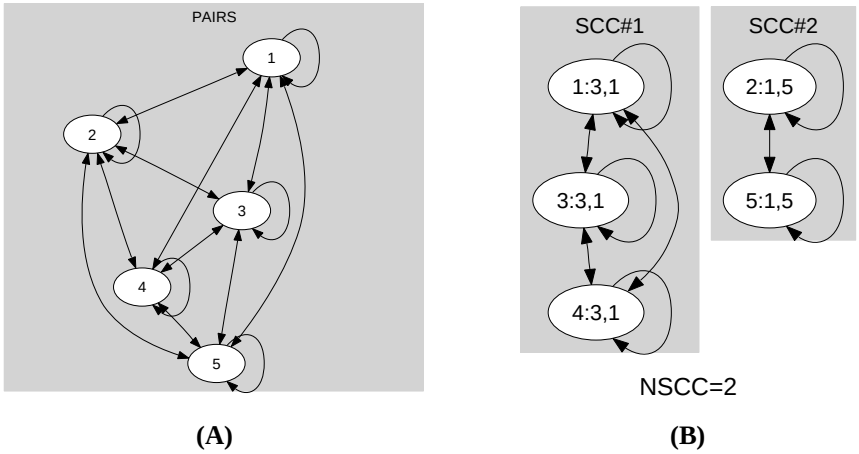

Figure 5.451: Initial and final graph of the npair constraint