

5.285   **npair**

	DESCRIPTION	LINKS	GRAPH
Origin	Derived from <a href="#">nvalue</a> .		
Constraint	<code>npair(NPAIRS, PAIRS)</code>		
Arguments	NPAIRS    : <a href="#">dvar</a> PAIRS     : <a href="#">collection</a> ( <a href="#">x-dvar</a> , <a href="#">y-dvar</a> )		
Restrictions	NPAIRS ≥ min(1,  PAIRS ) NPAIRS ≤  PAIRS  <a href="#">required</a> (PAIRS, [x, y])		
Purpose	NPAIRS is the number of distinct pairs of values assigned to the pairs of variables of the collection PAIRS.		
Example	<div><math display="block">\left( 2, \left\langle \begin{array}{cc} x-3 &amp; y-1, \\ x-1 &amp; y-5, \\ x-3 &amp; y-1, \\ x-3 &amp; y-1, \\ x-1 &amp; y-5 \end{array} \right\rangle \right)</math></div> <p>The <code>npair</code> constraint holds since its first argument <code>NPAIRS = 2</code> is set to the number of distinct pairs <math>\langle x-3 \ y-1 \rangle</math> and <math>\langle x-1 \ y-5 \rangle</math> of its second argument <code>PAIRS</code>.</p>		
Typical	NPAIRS > 1 NPAIRS <  PAIRS   PAIRS  > 1 <a href="#">range</a> (PAIRS.x) > 1 <a href="#">range</a> (PAIRS.y) > 1		
Symmetries	<ul style="list-style-type: none"><li>Items of PAIRS are <a href="#">permutable</a>.</li><li>Attributes of PAIRS are <a href="#">permutable</a> w.r.t. permutation (x, y) (<i>permutation applied to all items</i>).</li><li>All occurrences of two distinct tuples of values of NPAIRS can be <a href="#">swapped</a>; all occurrences of a tuple of values of NPAIRS can be <a href="#">renamed</a> to any unused tuple of values.</li></ul>		
Arg. properties	<ul style="list-style-type: none"><li><a href="#">Functional dependency</a>: NPAIRS determined by PAIRS.</li><li><a href="#">Contractible</a> wrt. PAIRS when NPAIRS = 1 and  PAIRS  &gt; 0.</li><li><a href="#">Contractible</a> wrt. PAIRS when NPAIRS =  PAIRS .</li></ul>		
Remark	This is an example of a <i>number of distinct values</i> 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  $\in$  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 arguments:** pure functional dependency.  
**constraint type:** counting constraint, value partitioning constraint.  
**final graph structure:** strongly connected component, equivalence.  
**modelling:** number of distinct equivalence classes, functional dependency.

Arc input(s)	PAIRS
Arc generator	<i>CLIQUE</i> $\mapsto$ collection(pairs1,pairs2)
Arc arity	2
Arc constraint(s)	<ul style="list-style-type: none"><li>• pairs1.x = pairs2.x</li><li>• pairs1.y = pairs2.y</li></ul>
Graph property(ies)	<i>NSCC</i> = NPAIRS

**Graph model** Parts (A) and (B) of Figure 5.614 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:  $\langle x - 3 \ y - 1 \rangle$  and  $\langle x - 1 \ y - 5 \rangle$ .

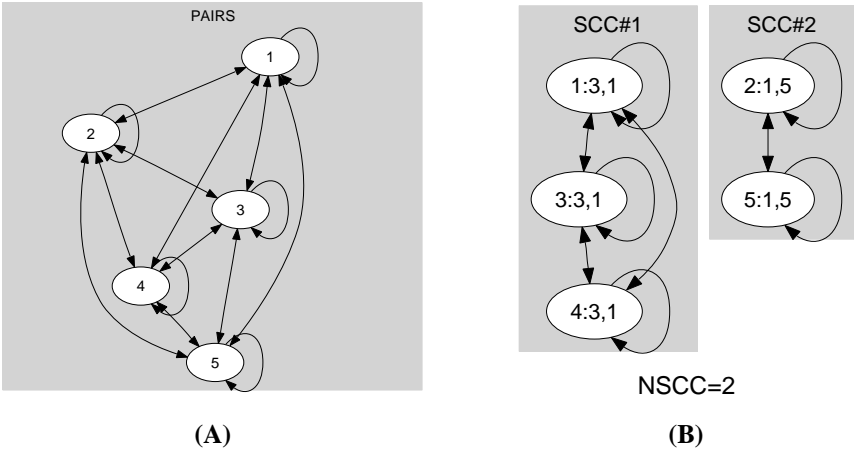


Figure 5.614: Initial and final graph of the npair constraint

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