

5.44 bipartite

	DESCRIPTION	LINKS	GRAPH
Origin	[126]		
Constraint	bipartite(NODES)		
Argument	NODES : collection(index-int, succ-svar)		
Restrictions	<pre>required(NODES, [index, succ]) NODES.index ≥ 1 NODES.index ≤ NODES distinct(NODES, index) NODES.succ ≥ 1 NODES.succ ≤ NODES </pre>		
Purpose	<p>Consider a digraph G described by the NODES collection. Select a subset of arcs of G so that the corresponding graph is symmetric (i.e., if there is an arc from i to j, there is also an arc from j to i) and bipartite (i.e., there is no cycle involving an odd number of vertices).</p>		
Example	$\left(\begin{array}{ll} \text{index} - 1 & \text{succ} - \{2, 3\}, \\ \text{index} - 2 & \text{succ} - \{1, 4\}, \\ \text{index} - 3 & \text{succ} - \{1, 4, 5\}, \\ \text{index} - 4 & \text{succ} - \{2, 3, 6\}, \\ \text{index} - 5 & \text{succ} - \{3, 6\}, \\ \text{index} - 6 & \text{succ} - \{4, 5\} \end{array} \right)$		
	<p>The bipartite constraint holds since the NODES collection depicts a symmetric graph with no cycle involving an odd number of vertices. The corresponding graph is depicted by Figure 5.82.</p>		
Typical	NODES > 2		
Symmetry	Items of NODES are permutable .		
Algorithm	The sketch of a filtering algorithm for the bipartite constraint is given in [126, page 91]. Beside enforcing the fact that the graph is symmetric, it checks that the subset of mandatory vertices and arcs is bipartite and removes all potential arcs that would make the previous graph non-bipartite.		

Figure 5.82: The bipartite graph associated with the example

See also

used in graph description: `in_set`.

Keywords

constraint arguments: constraint involving set variables.

constraint type: graph constraint.

filtering: DFS-bottleneck.

final graph structure: bipartite, symmetric.

Arc input(s)	NODES
Arc generator	<code>CLIQUE</code> \mapsto <code>collection</code> (nodes1, nodes2)
Arc arity	2
Arc constraint(s)	<code>in_set</code> (nodes2.index, nodes1.succ)
Graph class	<ul style="list-style-type: none"> • SYMMETRIC • BIPARTITE

Graph model

Part (A) of Figure 5.83 shows the initial graph from which we start. It is derived from the set associated with each vertex. Each set describes the potential values of the `succ` attribute of a given vertex. Part (B) of Figure 5.83 gives the final graph associated with the **Example** slot.

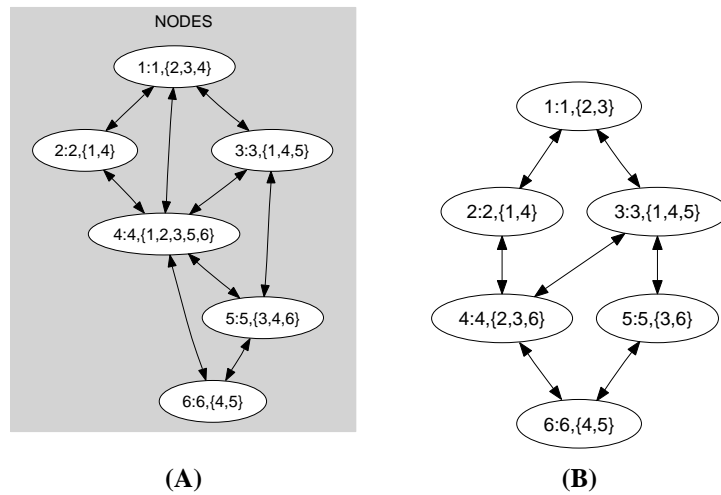


Figure 5.83: Initial and final graph of the bipartite set constraint

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