5.109 dag

DESCRIPTION LINKS GRAPH

Origin [142]

Constraint dag(NODES)

Argument NODES : collection(index−int, succ−svar)

Restrictions
required(NODES, [index, succ])
NODES.index ≥ 1
NODES.index ≤ |NODES|
distinct(NODES, index)
NODES.succ ≥ 1
NODES.succ ≤ |NODES|

Purpose Consider a digraph G described by the NODES collection. Select a subset of arcs of G so that the corresponding graph does not contain any circuit.

Example

$$\left\{ \left\langle \begin{array}{ll} \texttt{index} - 1 & \texttt{succ} - \{2,4\}, \\ \texttt{index} - 2 & \texttt{succ} - \{3,4\}, \\ \texttt{index} - 3 & \texttt{succ} - \emptyset, \\ \texttt{index} - 4 & \texttt{succ} - \emptyset, \\ \texttt{index} - 5 & \texttt{succ} - \{6\}, \\ \texttt{index} - 6 & \texttt{succ} - \emptyset \end{array} \right\rangle \right\}$$

The dag constraint holds since the NODES collection depicts a graph without circuit.

Typical |NODES| > 2

Symmetry Items of NODES are permutable.

Algorithm A filtering algorithm for the dag constraint is given in [142, page 90]. It removes potential arcs that would create a circuit of mandatory arcs.

See also **used in graph description:** in_set.

Keywords **constraint arguments:** constraint involving set variables.
constraint type: graph constraint.

Arc input(s)	NODES
Arc generator	$SELF \mapsto$ collection(nodes)
Arc arity	1
Arc constraint(s)	in_set(nodes.key, nodes.succ)
Graph property(ies)	**NARC** $= 0$

Arc input(s)	NODES
Arc generator	$CLIQUE \mapsto$ collection(nodes1, nodes2)
Arc arity	2
Arc constraint(s)	in_set(nodes2.index, nodes1.succ)
Graph property(ies)	**MAX_NSCC** ≤ 1

Graph model The first graph constraint removes the loop of each vertex. The second graph constraint forbids the creation of circuits involving more than one vertex.

Part (A) of Figure 5.258 shows the initial graph associated with the second graph constraint of the **Example** slot. This initial graph from which we start 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 5.258 gives the final graph associated with the **Example** slot.

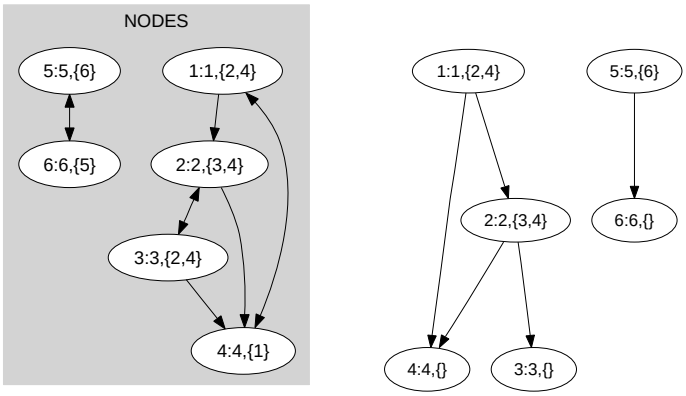

Figure 5.258: Initial and final graph of the dag set constraint