

5.146 graph_isomorphism

	DESCRIPTION	LINKS
Origin	[248]	
Constraint	graph_isomorphism(NODES_PATTERN, NODES_TARGET, FUNCTION)	
Arguments	NODES_PATTERN : collection(index-int, succ-sint) NODES_TARGET : collection(index-int, succ-sint) FUNCTION : collection(image-dvar)	
Restrictions	<pre> required(NODES_PATTERN, [index, succ]) NODES_PATTERN.index ≥ 1 NODES_PATTERN.index ≤ NODES_PATTERN distinct(NODES_PATTERN, index) NODES_PATTERN.succ ≥ 1 NODES_PATTERN.succ ≤ NODES_PATTERN required(NODES_TARGET, [index, succ]) NODES_TARGET.index ≥ 1 NODES_TARGET.index ≤ NODES_TARGET distinct(NODES_TARGET, index) NODES_TARGET.succ ≥ 1 NODES_TARGET.succ ≤ NODES_TARGET NODES_TARGET = NODES_PATTERN required(FUNCTION, [image]) FUNCTION.image ≥ 1 FUNCTION.image ≤ NODES_TARGET distinct(FUNCTION, image) FUNCTION = NODES_PATTERN </pre>	
Purpose	<p>Given two directed graphs PATTERN and TARGET enforce a one to one correspondence, defined by the function FUNCTION, between the vertices of the graph PATTERN and the vertices of the graph TARGET so that:</p> <ol style="list-style-type: none"> 1. if there is an arc from u to v in the graph PATTERN, then there is also an arc from the image of u to the image of v in the graph TARGET, 2. if there is no arc from u to v in the graph PATTERN, then there is also no arc from the image of u to the image of v in the graph TARGET. <p>Both, the PATTERN and TARGET are fixed, and the vertices of both graphs are respectively defined by the two collections of vertices NODES_PATTERN and NODES_TARGET.</p>	

Example

$$\left(\begin{array}{l} \left\langle \begin{array}{ll} \text{index} - 1 & \text{succ} - \{2, 4\}, \\ \text{index} - 2 & \text{succ} - \{1, 3, 4\}, \\ \text{index} - 3 & \text{succ} - \emptyset, \\ \text{index} - 4 & \text{succ} - \emptyset \end{array} \right\rangle, \\ \left\langle \begin{array}{ll} \text{index} - 1 & \text{succ} - \emptyset, \\ \text{index} - 2 & \text{succ} - \{1, 3, 4\}, \\ \text{index} - 3 & \text{succ} - \emptyset, \\ \text{index} - 4 & \text{succ} - \{1, 2\} \end{array} \right\rangle, \\ \langle 4, 2, 3, 1 \rangle \end{array} \right)$$

Figure 5.282 gives the pattern (see Part (A)) and target graph (see Part (B)) of the **Example** slot as well as the one to one correspondence (see Part (C)) between the pattern graph and the target graph. The `graph_isomorphism` constraint since the pattern and target graphs have the same number of vertices and arcs and since:

- To the arc from vertex 1 to vertex 4 in the pattern graph corresponds the arc from vertex 4 to 1 in the target graph.
- To the arc from vertex 1 to vertex 2 in the pattern graph corresponds the arc from vertex 4 to 2 in the target graph.
- To the arc from vertex 2 to vertex 1 in the pattern graph corresponds the arc from vertex 2 to 4 in the target graph.
- To the arc from vertex 2 to vertex 4 in the pattern graph corresponds the arc from vertex 2 to 1 in the target graph.
- To the arc from vertex 2 to vertex 3 in the pattern graph corresponds the arc from vertex 2 to 3 in the target graph.

Typical

`|NODES_PATTERN| > 1`

Symmetries

- Items of `NODES_PATTERN` are [permutable](#).
- Items of `NODES_TARGET` are [permutable](#).

Algorithm

A constraint approach is described in [360].

See also

[related: subgraph_isomorphism.](#)

Keywords

[constraint arguments: constraint involving set variables.](#)
[constraint type: predefined constraint, graph constraint.](#)

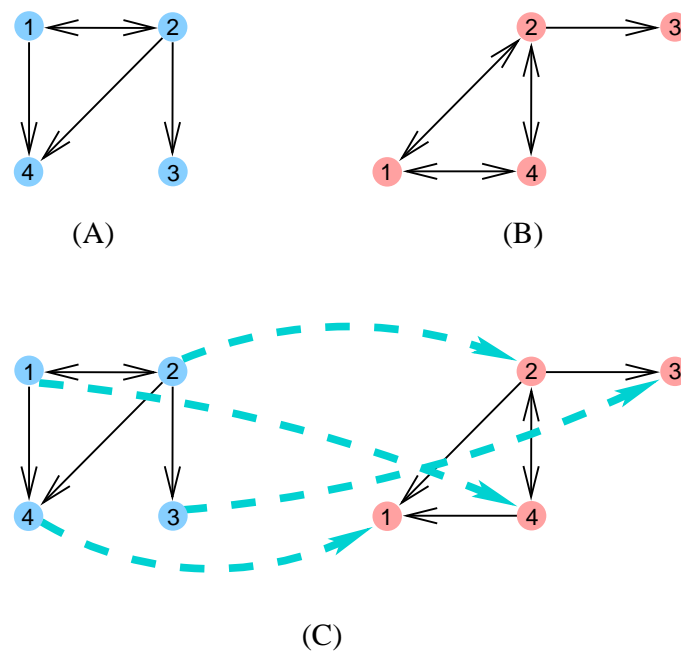


Figure 5.282: (A) The pattern graph, (B) the target graph and (C) the correspondence between the vertices of the pattern graph and the vertices of the target graph

