5.227 lex_different

DESCRIPTION LINKS GRAPH AUTOMATON

Origin Used for defining lex_alldifferent.

Constraint lex_different(VECTOR1, VECTOR2)

Synonyms different, diff.

Arguments

VECTOR1	:	collection(var−dvar)
VECTOR2	:	collection(var−dvar)

Restrictions

required(VECTOR1, var)
required(VECTOR2, var)
|VECTOR1| > 0
|VECTOR1| = |VECTOR2|

Purpose Vectors VECTOR1 and VECTOR2 differ in at least one component.

Example $(\langle 5,2,7,1\rangle, \langle 5,3,7,1\rangle)$

The lex_different constraint holds since VECTOR1 $= \langle 5,2,7,1\rangle$ and VECTOR2 $= \langle 5,3,7,1\rangle$ differ in their second component.

Typical

|VECTOR1| > 1
range(VECTOR1.var) > 1
range(VECTOR2.var) > 1

Symmetries

- Arguments are permutable w.r.t. permutation (VECTOR1, VECTOR2).
- Items of VECTOR1 and VECTOR2 are permutable (*same permutation used*).

Arg. properties

Extensible wrt. VECTOR1 and VECTOR2 (*add items at same position*).

Reformulation The lex_different($\langle$var $- U_1$, var $- U_2, \ldots,$ var $- U_{|\text{VECTOR1}|}\rangle, \langle$var $- V_1$, var $- V_2, \ldots,$ var $- V_{|\text{VECTOR2}|}\rangle$) constraint can be expressed in term of the following disjunction of disequality constraints $U_1 \neq V_1 \vee U_2 \neq V_2 \vee \cdots \vee U_{|\text{VECTOR1}|} \neq V_{|\text{VECTOR2}|}$.

Used in lex_alldifferent, sort_permutation.

See also

common keyword: lex_greatereq, lex_lesseq (*vector*).

implied by: disjoint, incomparable, lex_greater, lex_less.

negation: lex_equal.

system of constraints: lex_alldifferent.

Keywords

characteristic of a constraint: vector, disequality, automaton, automaton without counters, reified automaton constraint.

constraint network structure: Berge-acyclic constraint network.

filtering: arc-consistency.

Arc input(s)	VECTOR1 VECTOR2
Arc generator	$PRODUCT(=) \mapsto$ collection(vector1, vector2)
Arc arity	2
Arc constraint(s)	vector1.var $\neq$ vector2.var
Graph property(ies)	**NARC**≥ 1

Graph model Parts (A) and (B) of Figure 5.482 respectively show the initial and final graph associated with the **Example** slot. Since we use the **NARC** graph property, the unique arc of the final graph is stressed in bold. It corresponds to a component where the two vectors differ.

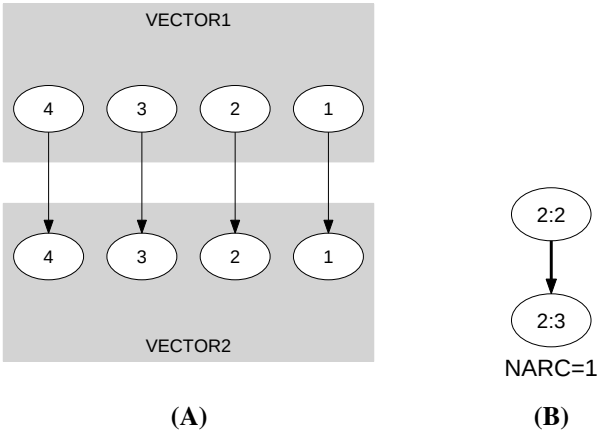

Figure 5.482: Initial and final graph of the lex_different constraint

Automaton

Figure 5.483 depicts the automaton associated with the `lex_different` constraint. Let $\texttt{VAR1}_i$ and $\texttt{VAR2}_i$ respectively be the `var` attributes of the i^{th} items of the `VECTOR1` and the `VECTOR2` collections. To each pair $(\texttt{VAR1}_i, \texttt{VAR2}_i)$ corresponds a 0-1 signature variable S_i as well as the following signature constraint: $\texttt{VAR1}_i = \texttt{VAR2}_i \Leftrightarrow S_i$.

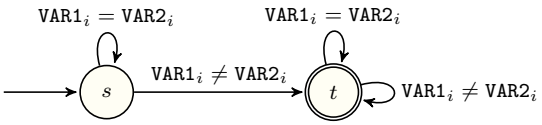

Figure 5.483: Automaton of the `lex_different` constraint

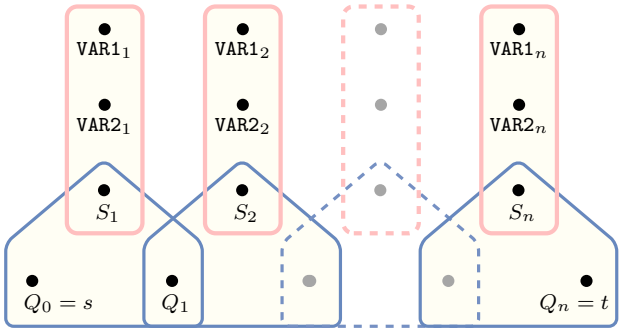

Figure 5.484: Hypergraph of the reformulation corresponding to the automaton of the `lex_different` constraint