5.115 differ_from_at_least_k_pos

DESCRIPTION LINKS GRAPH AUTOMATON

Origin Inspired by [177].

Constraint differ_from_at_least_k_pos(K, VECTOR1, VECTOR2)

Type
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VECTOR : collection(var−dvar)
```

Arguments

K	:	int
VECTOR1	:	VECTOR
VECTOR2	:	VECTOR

Restrictions
$|\texttt{VECTOR}| \geq 1$
required(VECTOR, var)
$\texttt{K} \geq 0$
$\texttt{K} \leq |\texttt{VECTOR1}|$
$|\texttt{VECTOR1}| = |\texttt{VECTOR2}|$

Purpose Enforce two vectors VECTOR1 and VECTOR2 to differ from at least K positions.

Example $(2, \langle 2,5,2,0\rangle, \langle 3,6,2,1\rangle)$

The differ_from_at_least_k_pos constraint holds since the first and second vectors differ from 3 positions, which is greater than or equal to $\texttt{K} = 2$.

Typical
$\texttt{K} > 0$
$\texttt{K} < |\texttt{VECTOR1}|$
$|\texttt{VECTOR1}| > 1$

Symmetries
- Arguments are permutable w.r.t. permutation (K) (VECTOR1, VECTOR2).
- K can be decreased to any value ≥ 0.
- Items of VECTOR1 and VECTOR2 are permutable (*same permutation used*).

Arg. properties
Extensible wrt. VARIABLES1 and VARIABLES2 (*add items at same position*).

Remark Used in the **Arc constraint(s)** slot of the all_differ_from_at_least_k_pos constraint.

Used in all_differ_from_at_least_k_pos.

See also **implied by:** differ_from_exactly_k_pos ($\geq$ K *replaced by* $=$ K).
system of constraints: all_differ_from_at_least_k_pos.

Keywords **characteristic of a constraint:** vector, automaton, automaton with counters.
constraint network structure: alpha-acyclic constraint network(2).
constraint type: value constraint.

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**$\geq$ K

Graph model Parts (A) and (B) of Figure 5.272 respectively show the initial and final graph associated with the **Example** slot. Since we use the **NARC** graph property, the arcs of the final graph are stressed in bold.

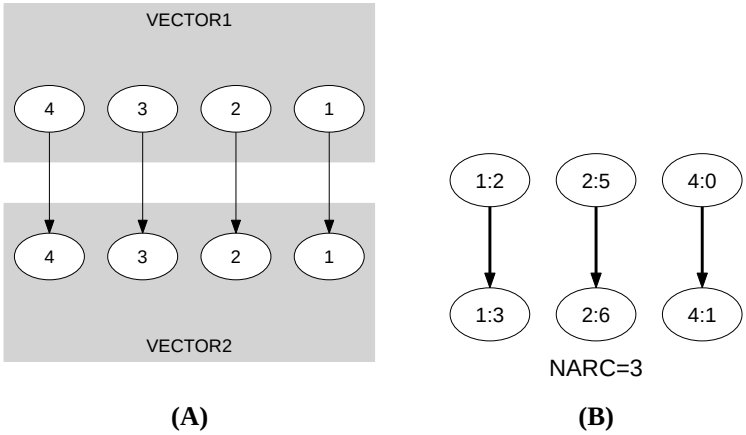

Figure 5.272: Initial and final graph of the differ_from_at_least_k_pos constraint

Automaton

Figure 5.273 depicts the automaton associated with the differ_from_at_least_k_pos constraint. Let $\texttt{VAR1}_i$ and $\texttt{VAR2}_i$ be the i^{th} variables of the VECTOR1 and VECTOR2 collections. To each pair of variables $(\texttt{VAR1}_i, \texttt{VAR2}_i)$ corresponds a signature variable S_i. The following signature constraint links $\texttt{VAR1}_i$, $\texttt{VAR2}_i$ and S_i: $\texttt{VAR1}_i = \texttt{VAR2}_i \Leftrightarrow S_i$.

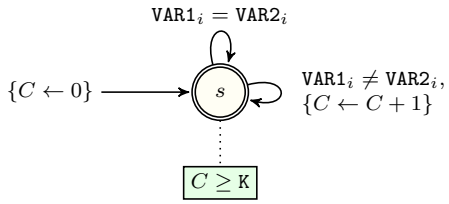

Figure 5.273: Automaton of the differ_from_at_least_k_pos constraint

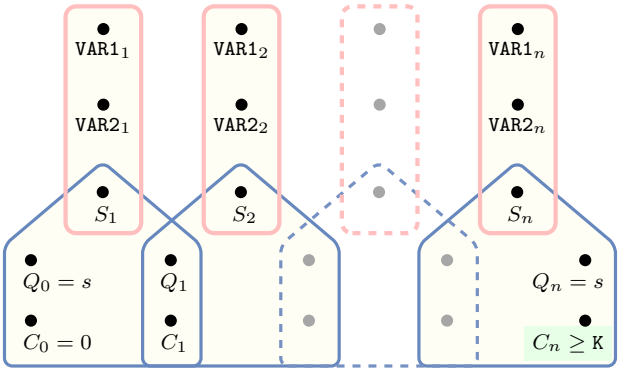

Figure 5.274: Hypergraph of the reformulation corresponding to the automaton of the differ_from_at_least_k_pos constraint