5.203   ith_pos_different_from_0

Origin   N. Beldiceanu

Constraint   ith_pos_different_from_0(ITH, POS, VARIABLES)

Arguments
```
ITH        :  int
POS        :  dvar
VARIABLES  :  collection(var−dvar)
```

Restrictions
ITH ≥ 1
ITH $\leq |\text{VARIABLES}|$
POS $\geq$ ITH
POS $\leq |\text{VARIABLES}|$
required(VARIABLES, var)

Purpose   POS is the position of the ITH^{th} non-zero item of the sequence of variables VARIABLES.

Example $(2, 4, \langle 3, 0, 0, 8, 6 \rangle)$

The ith_pos_different_from_0 constraint holds since 4 corresponds to the position of the 2th non-zero item of the sequence 3 0 0 8 6.

Typical
$|\text{VARIABLES}| > 1$
range(VARIABLES.var) > 1
atleast$(1, \text{VARIABLES}, 0)$

Symmetry   An occurrence of a value of VARIABLES.var that is different from 0 can be replaced by any other value that is also different from 0.

Arg. properties
Suffix-extensible wrt. VARIABLES.

Keywords   **characteristic of a constraint:** joker value, automaton, automaton with counters.

constraint network structure: alpha-acyclic constraint network(3).

constraint type: data constraint.

modelling: table.

Automaton

Figure 5.453 depicts the automaton associated with the `ith_pos_different_from_0` constraint. To each variable $\mathtt{VAR}_i$ of the collection `VARIABLES` corresponds a 0-1 signature variable S_i. The following signature constraint links $\mathtt{VAR}_i$ and S_i: $\mathtt{VAR}_i = 0 \Leftrightarrow S_i$.
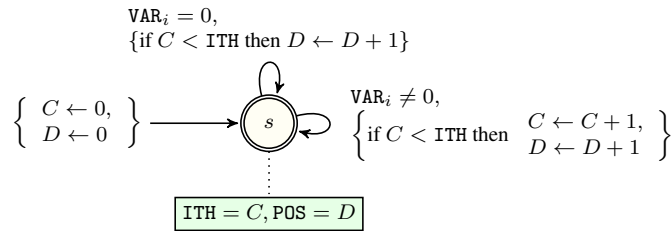

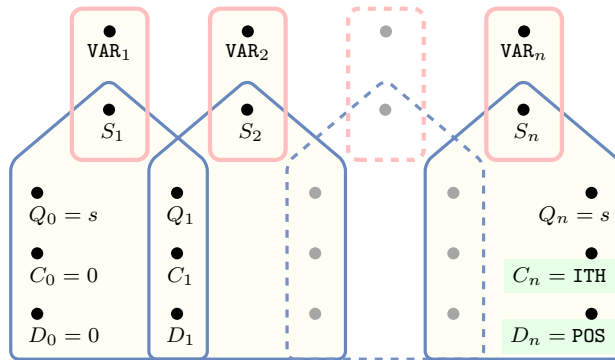Figure 5.453: Automaton of the `ith_pos_different_from_0` constraint

Figure 5.454: Hypergraph of the reformulation corresponding to the automaton of the `ith_pos_different_from_0` constraint