

5.65 change_vectors

	DESCRIPTION	LINKS
Origin	Derived from change	
Constraint	<code>change_vectors(NCHANGE, VECTORS, CTRS)</code>	
Types	VECTOR : <code>collection(var-dvar)</code> CTR : <code>atom</code>	
Arguments	NCHANGE : <code>dvar</code> VECTORS : <code>collection(vec - VECTOR)</code> CTRS : <code>collection(ctr - CTR)</code>	
Restrictions	$ \text{VECTOR} \geq 1$ <code>required(VECTOR, var)</code> $\text{CTR} \in [=, \neq, <, \geq, >, \leq]$ $\text{NCHANGE} \geq 0$ $\text{NCHANGE} < \text{VECTORS} $ <code>required(VECTORS, vec)</code> <code>same_size(VECTORS, vec)</code> <code>required(CTRS, ctr)</code> $ \text{CTRS} = \text{VECTOR} $	
Purpose	<p>Let us note $\text{VECTOR}_1, \text{VECTOR}_2, \dots, \text{VECTOR}_n$ the vectors of the <code>VECTORS</code> collection, and d the number of components of each vector (all vectors have the same size). <code>NCHANGE</code> is the number of times that the following disjunctions holds where $i \in [1, n - 1]$</p> $ \begin{aligned} &(\text{VECTOR}_i.\text{vec}[1] \text{ CTRS}[1] \text{ VECTOR}_{i+1}.\text{vec}[1]) \vee \\ &(\text{VECTOR}_i.\text{vec}[2] \text{ CTRS}[2] \text{ VECTOR}_{i+1}.\text{vec}[2]) \vee \\ &\dots \vee \\ &(\text{VECTOR}_i.\text{vec}[d] \text{ CTRS}[d] \text{ VECTOR}_{i+1}.\text{vec}[d]). \end{aligned} $	
Example	$ \left(\begin{array}{c} \text{vec} - \langle 4, 0 \rangle, \\ \text{vec} - \langle 4, 0 \rangle, \\ 3, \left\langle \begin{array}{c} \text{vec} - \langle 4, 5 \rangle, \\ \text{vec} - \langle 3, 4 \rangle, \\ \text{vec} - \langle 3, 4 \rangle, \\ \text{vec} - \langle 3, 4 \rangle, \\ \text{vec} - \langle 4, 0 \rangle \end{array} \right\rangle, \\ \langle \neq, \neq \rangle \end{array} \right) $	

In the example we have the following 3 changes:

- One change between $\langle 4, 0 \rangle$ and $\langle 4, 5 \rangle$ since $4 \neq 4 \vee 0 \neq 5$,
- One change between $\langle 4, 5 \rangle$ and $\langle 3, 4 \rangle$ since $4 \neq 3 \vee 5 \neq 4$,
- One change between $\langle 3, 4 \rangle$ and $\langle 4, 0 \rangle$ since $3 \neq 4 \vee 4 \neq 0$.

Consequently the `change_vectors` constraint holds since its first argument `NCHANGE` is assigned value 3.

Typical

```
CTR ∈ [≠]  
|VECTOR| > 1  
NCHANGE > 0  
|VECTORS| > 1
```

Arg. properties

Functional dependency: `NCHANGE` determined by `VECTORS` and `CTRS`.

See also

specialisation: `change` (*vector replaced by variable*), `change_pair` (*vector replaced by pair of variables*).

Keywords

characteristic of a constraint: automaton, automaton with counters, vector.

constraint arguments: pure functional dependency.

constraint network structure: Berge-acyclic constraint network.

modelling: number of changes, functional dependency.