5.305 soft_same_interval_var

DESCRIPTION LINKS GRAPH

Origin Derived from same_interval

Constraint soft_same_interval_var(C, VARIABLES1, VARIABLES2, SIZE_INTERVAL)

Synonym soft_same_interval.

Arguments

C	:	dvar
VARIABLES1	:	collection(var−dvar)
VARIABLES2	:	collection(var−dvar)
SIZE_INTERVAL	:	int

Restrictions

$C \geq 0$
$C \leq |\text{VARIABLES1}|$
$|\text{VARIABLES1}| = |\text{VARIABLES2}|$
required(VARIABLES1, var)
required(VARIABLES2, var)
$\text{SIZE\_INTERVAL} > 0$

Purpose Let N_i (respectively M_i) denote the number of variables of the collection VARIABLES1 (respectively VARIABLES2) that take a value in the interval $[\text{SIZE\_INTERVAL} \cdot i, \text{SIZE\_INTERVAL} \cdot i + \text{SIZE\_INTERVAL} - 1$. C is the minimum number of values to change in the VARIABLES1 and VARIABLES2 collections so that for all integer i we have $N_i = M_i$.

Example

$$\left(\begin{array}{l} \left\langle \begin{array}{l} \text{var} - 9, \\ \text{var} - 9, \\ \text{var} - 9, \\ \text{var} - 9, \\ \text{var} - 9, \\ \text{var} - 1 \end{array} \right\rangle, \\ 4, \\ \left\langle \begin{array}{l} \text{var} - 9, \\ \text{var} - 1, \\ \text{var} - 1, \\ \text{var} - 1, \\ \text{var} - 1, \\ \text{var} - 8 \end{array} \right\rangle, 3 \end{array}\right)$$

In the example, the fourth argument SIZE_INTERVAL $= 3$ defines the following family of intervals $[3 \cdot k, 3 \cdot k + 2]$, where k is an integer. Consequently the values of the collections $\langle 9, 9, 9, 9, 9, 1 \rangle$ and $\langle 9, 1, 1, 1, 1, 8 \rangle$ are respectively located within intervals $[9, 11]$, $[9, 11]$, $[9, 11]$, $[9, 11]$, $[9, 11]$, $[0, 2]$ and intervals $[9, 11]$, $[0, 2]$, $[0, 2]$, $[0, 2]$, $[0, 2]$, $[6, 8]$. Since there is a correspondence between two pairs of intervals we must unset at least $6 - 2$ items (6 is the number of items of the VARIABLES1 and VARIABLES2 collections). Consequently, the soft_same_interval_var constraint holds since its first argument C is set to $6 - 2$.

Symmetries

- Arguments are permutable w.r.t. permutation (C) (VARIABLES1, VARIABLES2) (SIZE_INTERVAL).
- Items of VARIABLES1 are permutable.
- Items of VARIABLES2 are permutable.
- An occurrence of a value of VARIABLES1.var that belongs to the k-th interval, of size SIZE_INTERVAL, can be replaced by any other value of the same interval.
- An occurrence of a value of VARIABLES2.var that belongs to the k-th interval, of size SIZE_INTERVAL, can be replaced by any other value of the same interval.

Usage A soft same_interval constraint.

Algorithm See algorithm of the soft_same_var constraint.

See also **hard version:** same_interval.

implies: soft_used_by_interval_var.

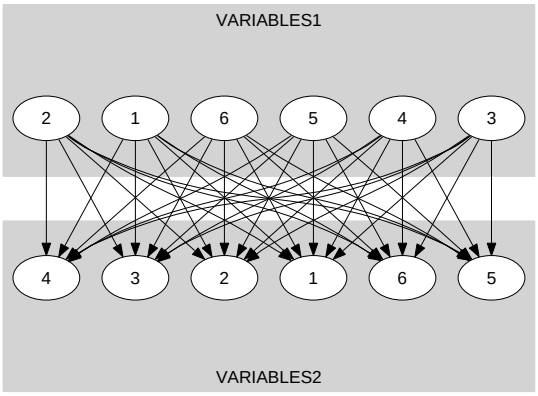
Keywords **constraint arguments:** constraint between two collections of variables.

constraint type: soft constraint, relaxation, variable-based violation measure.

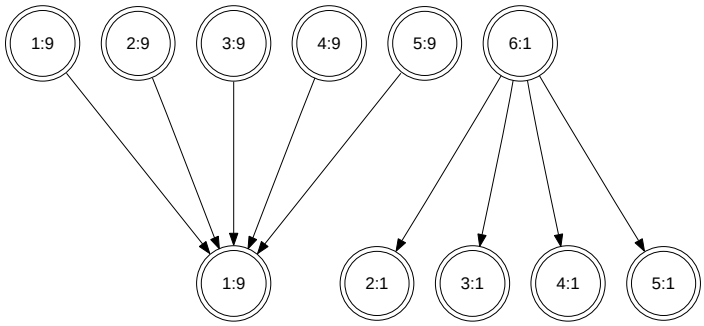
modelling: interval.

Arc input(s)	VARIABLES1 VARIABLES2
Arc generator	$PRODUCT \mapsto$ collection(variables1, variables2)
Arc arity	2
Arc constraint(s)	variables1.var/SIZE_INTERVAL = variables2.var/SIZE_INTERVAL
Graph property(ies)	**NSINK_NSOURCE**= |VARIABLES1| − C

Graph model Parts (A) and (B) of Figure 5.547 respectively show the initial and final graph associated with the **Example** slot. Since we use the **NSINK_NSOURCE** graph property, the source and sink vertices of the final graph are stressed with a double circle. The soft_same_interval_var constraint holds since the cost 4 corresponds to the difference between the number of variables of VARIABLES1 and the sum over the different connected components of the minimum number of sources and sinks.



(A)



(B)

Figure 5.547: Initial and final graph of the soft_same_interval_var constraint