5.362 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 $(4, \langle 9, 9, 9, 9, 9, 1\rangle, \langle 9, 1, 1, 1, 1, 8\rangle, 3)$

In the example, the fourth argument $\text{SIZE\_INTERVAL} = 3$ 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 $6 - 2$.

Typical

$C > 0$
$|\text{VARIABLES1}| > 1$
$\text{range}(\text{VARIABLES1.var}) > 1$
$\text{range}(\text{VARIABLES2.var}) > 1$
$\text{SIZE\_INTERVAL} > 1$
$\text{SIZE\_INTERVAL} < \text{range}(\text{VARIABLES1.var})$
$\text{SIZE\_INTERVAL} < \text{range}(\text{VARIABLES2.var})$

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.

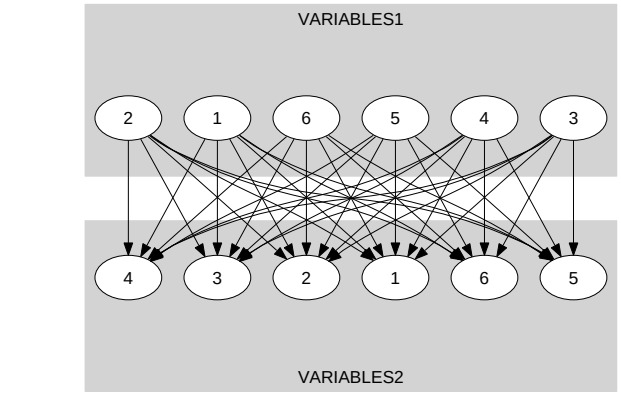
Keywords **constraint arguments:** constraint between two collections of variables.

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

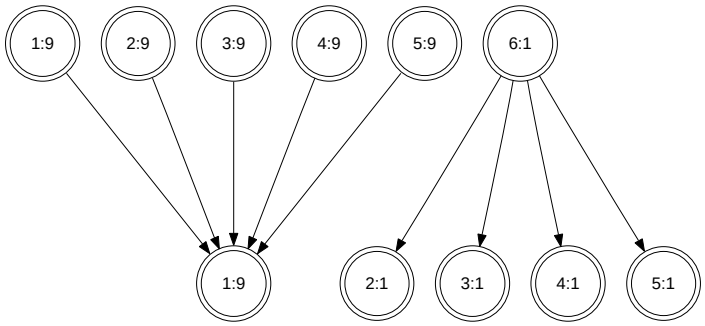
modelling: interval.

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 5.704 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)



NSINK_NSOURCE=min(5,1)+min(1,4)=2

(B)

Figure 5.704: Initial and final graph of the soft_same_interval_var constraint