5.350 sliding_distribution

DESCRIPTION LINKS GRAPH

Origin [351]

Constraint sliding_distribution(SEQ, VARIABLES, VALUES)

Arguments

SEQ	:	int
VARIABLES	:	collection(var−dvar)
VALUES	:	collection(val−int, omin−int, omax−int)

Restrictions

$\texttt{SEQ} > 0$
$\texttt{SEQ} \leq |\texttt{VARIABLES}|$
required(VARIABLES, var)
$|\texttt{VALUES}| > 0$
required(VALUES, [val, omin, omax])
distinct(VALUES, val)
$\texttt{VALUES.omin} \geq 0$
$\texttt{VALUES.omax} \leq \texttt{SEQ}$
$\texttt{VALUES.omin} \leq \texttt{VALUES.omax}$

Purpose For each sequence of SEQ consecutive variables of the VARIABLES collection, each value $\texttt{VALUES}[i].\texttt{val}$ $(1 \leq i \leq |\texttt{VALUES}|)$ should be taken by at least $\texttt{VALUES}[i].\texttt{omin}$ and at most $\texttt{VALUES}[i].\texttt{omax}$ variables.

Example

$$\left(\begin{array}{l} 4, \langle 0,5,0,6,5,0,0\rangle, \\ \quad \texttt{val}-0 \quad \texttt{omin}-1 \quad \texttt{omax}-2, \\ \left\langle \begin{array}{lll} \texttt{val}-1 & \texttt{omin}-0 & \texttt{omax}-4, \\ \texttt{val}-4 & \texttt{omin}-0 & \texttt{omax}-4, \\ \texttt{val}-5 & \texttt{omin}-1 & \texttt{omax}-2, \end{array} \right\rangle \\ \quad \texttt{val}-6 \quad \texttt{omin}-0 \quad \texttt{omax}-2 \end{array}\right)$$

The sliding_distribution constraint holds since:

- On the first sequence of 4 consecutive values 0 5 0 6 values 0, 1, 4, 5 and 6 are respectively used 2, 0, 0, 1 and 1 times.
- On the second sequence of 4 consecutive values 5 0 6 5 values 0, 1, 4, 5 and 6 are respectively used 1, 0, 0, 2 and 1 times.
- On the third sequence of 4 consecutive values 0 6 5 0 values 0, 1, 4, 5 and 6 are respectively used 2, 0, 0, 1 and 1 times.
- On the fourth sequence of 4 consecutive values 6 5 0 0 values 0, 1, 4, 5 and 6 are respectively used 2, 0, 0, 1 and 1 times.

Typical

$\texttt{SEQ} > 1$
$\texttt{SEQ} < |\texttt{VARIABLES}|$
$|\texttt{VARIABLES}| > |\texttt{VALUES}|$

Symmetries

- Items of VARIABLES can be reversed.
- An occurrence of a value of VARIABLES.var that does not belong to VALUES.val can be replaced by any other value that also does not belong to VALUES.val.
- Items of VALUES are permutable.
- VALUES.omin can be decreased to any value ≥ 0.
- VALUES.omax can be increased to any value $\leq$ SEQ.
- All occurrences of two distinct values in VARIABLES.var or VALUES.val can be swapped; all occurrences of a value in VARIABLES.var or VALUES.val can be renamed to any unused value.

Arg. properties

- Contractible wrt. VARIABLES when SEQ $= 1$.
- Prefix-contractible wrt. VARIABLES.
- Suffix-contractible wrt. VARIABLES.
- Contractible wrt. VALUES.

See also

common keyword: pattern, sliding_sum, stretch_circuit, stretch_path *(sliding sequence constraint)*.

part of system of constraints: global_cardinality_low_up.

specialisation: among_seq *(individual values replaced by single set of values)*.

used in graph description: global_cardinality_low_up.

Keywords

characteristic of a constraint: hypergraph.

combinatorial object: sequence.

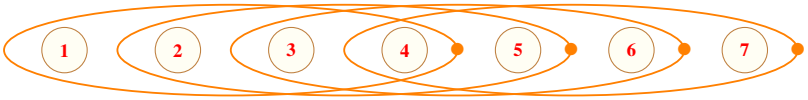
constraint type: decomposition, sliding sequence constraint, system of constraints.

Arc input(s)	VARIABLES
Arc generator	$PATH \mapsto$ collection
Arc arity	SEQ
Arc constraint(s)	global_cardinality_low_up(collection, VALUES)
Graph property(ies)	**NARC** $=$ |VARIABLES| $-$ SEQ $+ 1$

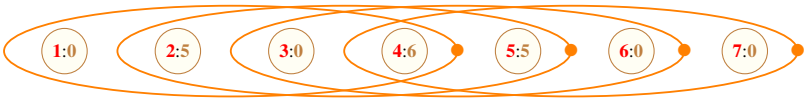
Graph model

Note that the sliding_distribution constraint is a constraint where the arc constraints do not have an arity of 2.

Parts (A) and (B) of Figure 5.686 respectively show the initial and final graph associated with the **Example** slot. Since all arc constraints hold (i.e., because of the graph property **NARC** $=$ \|VARIABLES\| $-$ SEQ $+ 1$) the final graph corresponds to the initial graph.



(A)



(B)

Figure 5.686: (A) Initial and (B) final graph of the sliding_distribution(4, ⟨0, 5, 0, 6, 5, 0, 0⟩, ⟨0 1 2, 1 0 4, 4 0 4, 5 1 2, 6 0 2⟩) constraint of the **Example** slot where each ellipse represents an hyperedge involving SEQ $=$ 4 vertices (to each ellipse corresponds a global_cardinality_low_up constraint)