

5.321 period_except_0

	DESCRIPTION	LINKS								
Origin	Derived from <code>period</code> .									
Constraint	<code>period_except_0(PERIOD, VARIABLES, CTR)</code>									
Arguments	PERIOD : <code>dvar</code> VARIABLES : <code>collection(var—dvar)</code> CTR : <code>atom</code>									
Restrictions	PERIOD ≥ 1 PERIOD ≤ VARIABLES <code>required(VARIABLES, var)</code> CTR ∈ [=, ≠, <, ≥, >, ≤]									
Purpose	Let us note V_0, V_1, \dots, V_{m-1} the variables of the VARIABLES collection. PERIOD is the <i>period</i> of the sequence $V_0 V_1 \dots V_{m-1}$ according to constraint CTR. This means that PERIOD is the smallest natural number such that $V_i \text{ CTR } V_{i+\text{PERIOD}} \vee V_i = 0 \vee V_{i+\text{PERIOD}} = 0$ holds for all $i \in 0, 1, \dots, m - \text{PERIOD} - 1$.									
Example	<div>$(3, \langle 1, 1, 4, 1, 1, 0, 1, 1 \rangle, =)$</div> <p>The <code>period_except_0</code> constraint holds since, as depicted by Figure 5.669, its first argument PERIOD = 3 is equal (i.e., since CTR is set to =) to the period of the sequence 1 1 4 1 1 0 1 1; value 0 is assumed to be equal to any other value.</p> <table><tr><td>1</td><td>1</td><td>4</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td></tr></table> <p>Figure 5.669: A sequence that has a period of 3 when we assume that value 0 can match to any other value</p>		1	1	4	1	1	0	1	1
1	1	4	1	1	0	1	1			
Typical	PERIOD > 1 PERIOD < VARIABLES VARIABLES > 2 <code>range(VARIABLES.var) > 1</code> <code>atleast(1, VARIABLES, 0)</code> CTR ∈ [=]									
Symmetries	<ul style="list-style-type: none">Items of VARIABLES can be <code>reversed</code>.Items of VARIABLES can be <code>shifted</code>.All occurrences of two distinct values of VARIABLES.var that are both different from 0 can be <code>swapped</code>; all occurrences of a value of VARIABLES.var that is different from 0 can be <code>renamed</code> to any unused value that is also different from 0.									

Arg. properties

- **Functional dependency**: PERIOD determined by VARIABLES and CTR.
- **Contractible** wrt. VARIABLES when $CTR \in [=]$ and $PERIOD = 1$.
- **Prefix-contractible** wrt. VARIABLES.
- **Suffix-contractible** wrt. VARIABLES.

Usage

Useful for timetabling problems where a person should repeat some work pattern over an over except when he is unavailable for some reason. The value 0 represents the fact that he is unavailable, while the other values are used in the work pattern.

Algorithm

See [54].

See also

hard version: period.

implied by: period.

Keywords

characteristic of a constraint: joker value.

combinatorial object: periodic, sequence.

constraint arguments: pure functional dependency.

constraint type: predefined constraint, timetabling constraint, scheduling constraint.

modelling: functional dependency.