5.245 max_occ_of_consecutive_tuples_of_values

DESCRIPTION LINKS

Origin Design.

Constraint max_occ_of_consecutive_tuples_of_values(MAX, K, VECTORS)

Type
VECTOR : collection(var−dvar)

Arguments

MAX	:	int
K	:	int
VECTORS	:	collection(vec − VECTOR)

Restrictions
required(VECTOR, var)
|VECTOR| ≥ 2
alldifferent(VECTOR)
MAX ≥ 1
K ≥ 2
K < |VECTOR|
required(VECTORS, vec)
|VECTORS| ≥ 1
same_size(VECTORS, vec)

Purpose MAX is equal to the maximum number of occurrences of identical vectors derived from the vectors VECTORS in the following way. To each vector $\langle v_1, v_2, \ldots, v_m \rangle$ of VECTORS (with $v_1, v_2, \ldots, v_m$ distinct) we generate all vectors $\langle u_1, u_2, \ldots, u_K \rangle$ such that $u_1 = v_p$, $u_2 = v_{p+1}$, $\ldots$, $u_K = v_{p+K-1}$ or $u_1 = v_{p+K-1}$, $u_2 = v_{p+K-2}$, $\ldots$, $u_K = v_p$ (with $1 \leq p \leq m - K + 1$).

Example $(1, 2, \langle \mathtt{vec} - \langle 4, 1, 3 \rangle, \mathtt{vec} - \langle 2, 7, 6 \rangle, \mathtt{vec} - \langle 5, 9, 8 \rangle \rangle)$

Given the three vectors of the example we respectively generate:

- the pairs $\langle 4, 1 \rangle$, $\langle 1, 4 \rangle$, $\langle 1, 3 \rangle$, $\langle 3, 1 \rangle$ from the triple $\langle 4, 1, 3 \rangle$,
- the pairs $\langle 2, 7 \rangle$, $\langle 7, 2 \rangle$, $\langle 7, 6 \rangle$, $\langle 6, 7 \rangle$ from the triple $\langle 2, 7, 6 \rangle$,
- the pairs $\langle 5, 9 \rangle$, $\langle 9, 5 \rangle$, $\langle 9, 8 \rangle$, $\langle 8, 9 \rangle$ from the triple $\langle 5, 9, 8 \rangle$.

Putting these pairs together, we get the set of pairs $\{\langle 1, 3 \rangle, \langle 1, 4 \rangle, \langle 2, 7 \rangle, \langle 3, 1 \rangle, \langle 4, 1 \rangle, \langle 5, 9 \rangle, \langle 6, 7 \rangle, \langle 7, 2 \rangle, \langle 7, 6 \rangle, \langle 8, 9 \rangle, \langle 9, 5 \rangle, \langle 9, 8 \rangle\}$. The max_occ_of_consecutive_tuples_of_values constraint holds since the components of each of the original three vectors are distinct, and since MAX is set to one and all the generated pairs are distinct.

Typical
MAX = 1
K = 2
|VECTORS| > 2

Arg. properties

- Functional dependency: `MAX` determined by `K` and `VECTORS`.
- Contractible wrt. `VECTORS` when `MAX` $= 1$.

Usage This constraint occurs in balanced block design problems [363].

See also **common keyword:** `max_occ_of_sorted_tuples_of_values`, `max_occ_of_tuples_of_values` *(vector)*.

Keywords **characteristic of a constraint:** vector.

modelling: functional dependency.