

5.59 colored_matrix

	DESCRIPTION	LINKS
Origin	KOALOG	
Constraint	colored_matrix(C, L, K, MATRIX, CPROJ, LPROJ)	
Synonyms	coloured_matrix, cardinality_matrix, card_matrix.	
Arguments	C : int L : int K : int MATRIX : collection(column-int, line-int, var-dvar) CPROJ : collection(column-int, val-int, nocc-dvar) LPROJ : collection(line-int, val-int, nocc-dvar)	
Restrictions	$C \geq 0$ $L \geq 0$ $K \geq 0$ required(MATRIX, [column, line, var]) increasing_seq(MATRIX, [column, line]) $ MATRIX = C * L + C + L + 1$ MATRIX.column ≥ 0 MATRIX.column $\leq C$ MATRIX.line ≥ 0 MATRIX.line $\leq L$ MATRIX.var ≥ 0 MATRIX.var $\leq K$ required(CPROJ, [column, val, nocc]) increasing_seq(CPROJ, [column, val]) $ CPROJ = C * K + C + K + 1$ CPROJ.column ≥ 0 CPROJ.column $\leq C$ CPROJ.val ≥ 0 CPROJ.val $\leq K$ required(LPROJ, [line, val, nocc]) increasing_seq(LPROJ, [line, val]) $ LPROJ = L * K + L + K + 1$ LPROJ.line ≥ 0 LPROJ.line $\leq L$ LPROJ.val ≥ 0 LPROJ.val $\leq K$	
Purpose	Given a matrix of domain variables, imposes a global_cardinality constraint involving cardinality variables on each column and each row of the matrix.	

Example

```

(
  1, 2, 4, <
    column - 0 line - 0 var - 3,
    column - 0 line - 1 var - 1,
    column - 0 line - 2 var - 3,
    column - 1 line - 0 var - 4,
    column - 1 line - 1 var - 4,
    column - 1 line - 2 var - 3
  >,
  column - 0 val - 0 nocc - 0,
  column - 0 val - 1 nocc - 1,
  column - 0 val - 2 nocc - 0,
  column - 0 val - 3 nocc - 2,
  <
    column - 0 val - 4 nocc - 0,
    column - 1 val - 0 nocc - 0,
  >,
  column - 1 val - 1 nocc - 0,
  column - 1 val - 2 nocc - 0,
  column - 1 val - 3 nocc - 1,
  column - 1 val - 4 nocc - 2
  line - 0 val - 0 nocc - 0,
  line - 0 val - 1 nocc - 0,
  line - 0 val - 2 nocc - 0,
  line - 0 val - 3 nocc - 1,
  line - 0 val - 4 nocc - 1,
  line - 1 val - 0 nocc - 0,
  <
    line - 1 val - 1 nocc - 1,
    line - 1 val - 2 nocc - 0,
  >,
  line - 1 val - 3 nocc - 0,
  line - 1 val - 4 nocc - 1,
  line - 2 val - 0 nocc - 0,
  line - 2 val - 1 nocc - 0,
  line - 2 val - 2 nocc - 0,
  line - 2 val - 3 nocc - 2,
  line - 2 val - 4 nocc - 0
)

```

Typical

```

C ≥ 1
L ≥ 1
K ≥ 1
range(MATRIX.var) > 1

```

Remark

Within [317] the `colored_matrix` constraint is called `cardinality_matrix`.

Algorithm

The filtering algorithm described in [317] is based on network flow and does not achieve arc-consistency in general. However, when the number of values is restricted to two, the algorithm [317] achieves [arc-consistency](#) on the variables of the matrix. This corresponds in fact to a generalisation of the problem called "Matrices composed of 0's and 1's" presented by Ford and Fulkerson [201].

See also

[common keyword: k_alldifferent](#) (*system of constraints*).

[part of system of constraints: global_cardinality](#).

[related to a common problem: same](#) (*matrix reconstruction problem*).

Keywords

constraint type: system of constraints, predefined constraint, timetabling constraint.

modelling: matrix, matrix model.

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