equalize.cpp

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/* FILE: equalize.cpp   last change: 30-Jul-2013   author: Romeo Rizzi
 * a linear time solver for problem equalize.
 */

#define NDEBUG   // NDEBUG definita nella versione che consegno
#include <cassert>
#ifndef NDEBUG
#  include <iostream>  // uso di cin e cout non consentito in versione finale
#endif
#include <fstream>
#include <stack>

using namespace std;

const int MAX_M = 20;
const int MAX_N = 1000000;
int m, n;
int A[MAX_M+1][MAX_N+1]; // to store the instance mxn matrix
bool deletedCol[MAX_N+1]; // tells whether a column has already been deleted
stack<int> columns[MAX_N+1]; // to quickly locate all columns containing a given up number
stack<int> morituriNums; // when a number disappers entirely from some row, then we know we must gi
ve up this number, whence we insert it here
int freq[MAX_N+1][MAX_M+1]; // freq[i][r] = the number of occurrences of num i in row r


int main( void ) {
  ifstream fin("input.txt"); assert( fin );
  fin >> m >> n;
  for( int r = 1; r <= m; r++ )
     for( int c = 1; c <= n; c++ ) {
        fin >> A[r][c];
        columns[ A[r][c] ].push( c );
         ++freq[ A[r][c] ][r];
     }
  fin.close();

  for( int r = 1; r <= m; r++ )
     for( int i = 1; i <= n; i++ )
       if( freq[i][r] == 0 ) {
          morituriNums.push( i );
          //cout << i << " devi morire!" << endl;
       }

  int opt = 0;
  while( !morituriNums.empty() ) {
     int number = morituriNums.top(); morituriNums.pop();
     while( !columns[number].empty() ) {
        //cout << "Si seppellisca " << number << endl;
        int col = columns[number].top(); columns[number].pop();
        if( !deletedCol[col] ) {
           deletedCol[col] = true;
           opt++;
           for( int r = 1; r <= m; r++ )
             if( --freq[ A[r][col] ][r] == 0 ) {
                morituriNums.push( A[r][col] );
                //cout << A[r][col] << " devi morire!" << endl;
             }
        }
     }
  }

  ofstream fout("output.txt"); assert( fout );
  fout << opt << endl;
  fout.close();
  return 0;
}
```