Takuzu

Assignment 4: Heuristics and grid generation

The objective of this assignment is to develop heuristics that will help solving the grid without stupidly testing all zero/one possibilities. The other objective is to generate grids to be able to test your code on your own.

A non-exhaustive list of heuristics is given below:

- If a row (respectively column) has two consecutive zeroes, the cells before/after must be ones. The same heuristics applies to ones as well.
- If a row (respectively column) has all its zeros filled, the remaining empty cells are ones. The same heuristics applies to ones.

From now up to the end of the project you will work alone.

1. Setting the Git repository

- Create an individual git repository for your code, with as starting point the code written during the first three assignment

2. Development and application of heuristics

1. Write a function for each heuristic (you may invent new ones!). The function for a given heuristic must:
    a. Take as parameter a pointer to a grid
    b. Return a Boolean value: `true` if applying the heuristic changed the grid, `false` otherwise
2. Write a function that repetitively applies the heuristics until stability (no heuristic changes the grid anymore). The function should test that the starting grid is consistent (else, no need to try to solve it!).

3. Basic grid generation

1. Write a function that generates a new grid with the grid size given as a command line argument (implementation of option -g). The generated grid should respect the following rules:
    a. Contain N% of characters ‘0’ and ‘1’. N will be defined as a constant in your code or as a new command line argument.
    b. The generated grid should be consistent (no more than two consecutive zeros/ones, no identical lines/columns). Note that grid consistency does not mean that the grid will have solutions. Grid generation will be improved later on.

4. Testing

1. Automate testing by preparing a set of grids that will be placed in the `tests/` directory
2. Heavily test your code on your own grids and the grids given to you by your professors