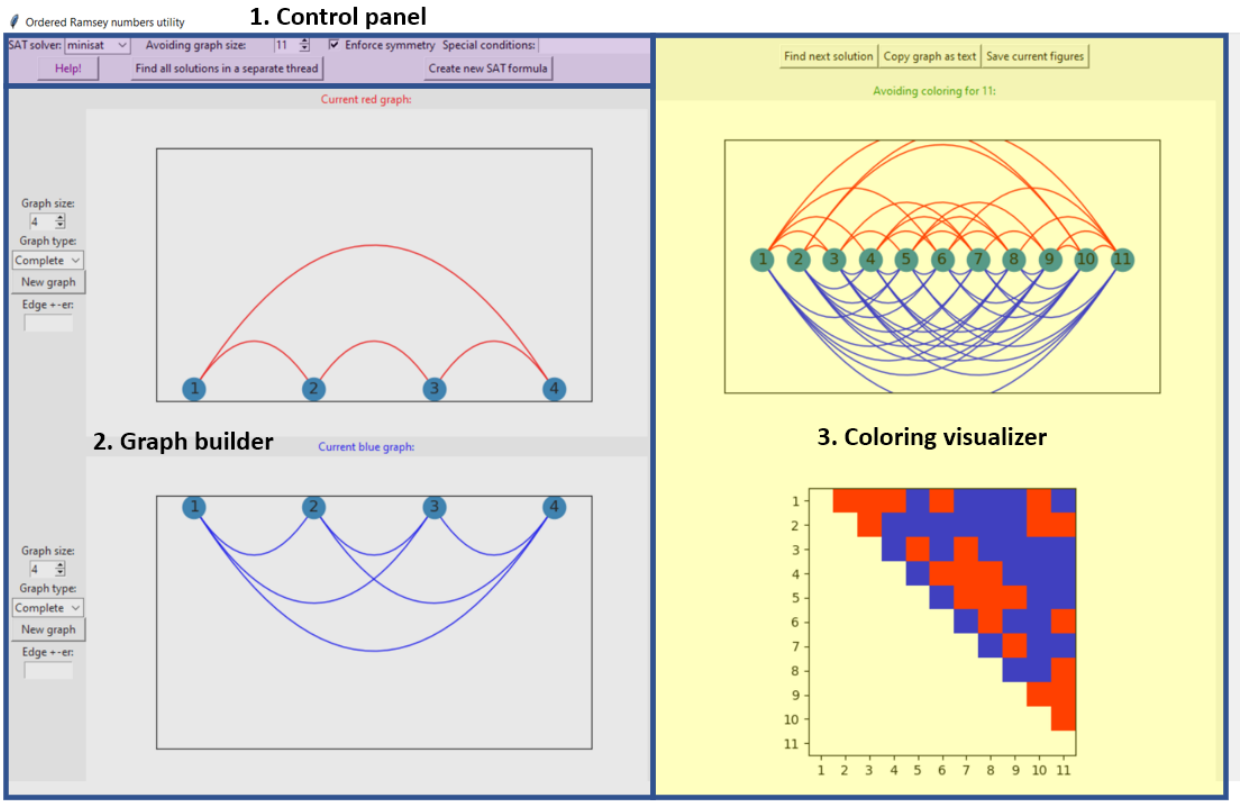
User Guide - Ordered Ramsey numbers utility

Description

This tool should help a researcher in finding Ramsey numbers for given two ordered graphs colored by 2 colors, distinguished by red and blue. Here we present the GUI interface used to control the utility.



As we can see on the picture, the GUI consists of three parts.

The Control panel section is the main interface for creating the SAT formula, setting the size of our desired avoiding coloring and applying some additional restrictions. Thus, it is based on the Graph builder section, where you can create and fine tune the red and blue graphs, for which you want to calculate the Ramsey number.

After the SAT formula is created in the Control panel, we can make use of the last, Coloring visualizer section, which outputs graph and matrix colorings for a given problem, if there are any.

Installation

I assume the user has Python 3.6 installed (the official Python website) and included in the system path, or uses an IDE such as Pycharm or Visual Studio.

The main entry point for the program is the Python file *gui.py*, which starts the graphical interface. If not using an IDE, you should be able to start the graphical interface by using the command

```
python3 gui.py
```

The app itself needs some common Python libraries like *matplotlib* and *decorator*. Other two libraries used are not so common (*satispy*) or slightly tweaked (*networkx*), they are therefore already included within the package.

The program will not work without the underlying SAT solver installed and included in the system path. For example, if we choose *minisat* as our desired solver, the application will need to execute the command

```
minisat <input_file> <output_file>
```

in the current directory.

SAT solver setup

Installation

Minisat

On Linux, it should suffice to download the statically linked binary from the official Minisat website.

For Minisat on Windows, you will need Cygwin - please follow the steps listed here. Note that minisat.exe is a 32-bit application, you will therefore need to use the 32-bit version of Cygwin, even if you have a 64-bit device.

Glucose

On Linux, please refer to the official Glucose website. Glucose is not implemented for Windows.

Adding to the system path

After the successful installation, you should know the location of the SAT solver executable and should be able to invoke it, e.g. with a command line command using its full path. In order for this command to work from anywhere, the folder which contains this executable has to be added to the system path.

On Linux, the command

```
export PATH=<your_sat_solver_executable_folder_location>:$PATH
```

should suffice. Make sure to check the PATH variable afterwards by using

```
echo $PATH
```

The SAT solver folder should be included now as the first entry.

For Windows, press the Windows button and search for “Edit the system environment variables”. Click “Environment variables” and edit the Path variable. Add a new entry specifiying the location of the folder containing the SAT solver executable.

Final note

The utility is by no means perfect – should you find any bugs you’d like to see resolved or problems during the installation, do not hesitate to either modify the code for yourself or contact the author.