

Nonograms

User guide

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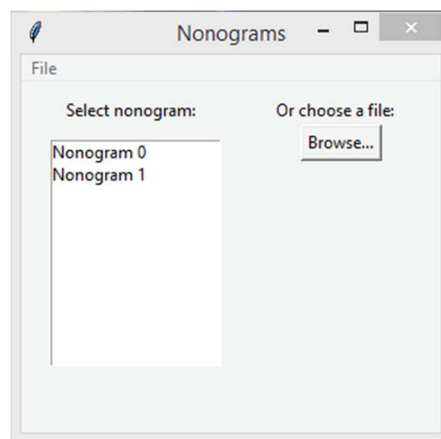
1. INTRODUCTION

This is a simple program to generate and solve nonograms (a Japanese crosswords with a picture as a solution). You can use our prepared patterns or add your own by a text file or an image file. The program will try to convert it into a nonogram but be careful – not every image is easy to convert and not every is solvable!

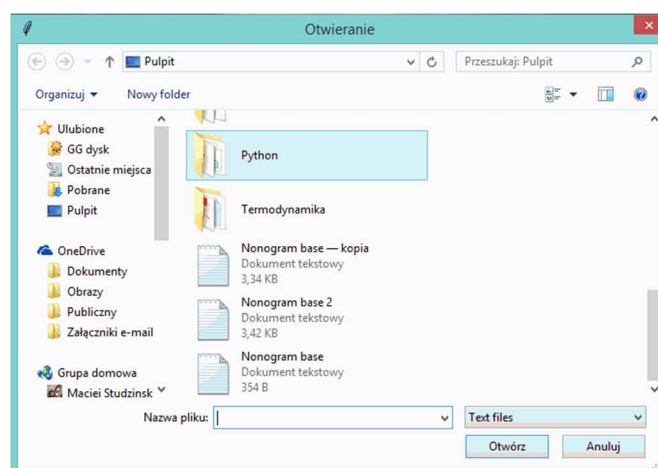
There are some simple rules user need to follow while solving a nonogram. At first, numbers in rows and columns indicates how many cells should be filled. We call them '**clues**'. For example if there are clues: 1, 2, 1 in a certain row it means that in this row exactly one cell is filled, then two cells and then again one cell. The user need to remember that there is always at least one-cell break between given numbers. If the nonogram is solved correctly user should get a simple graphic at the end. Easy? Not always.

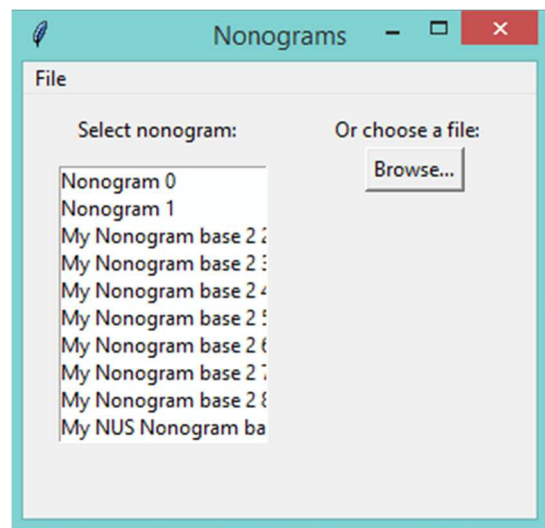
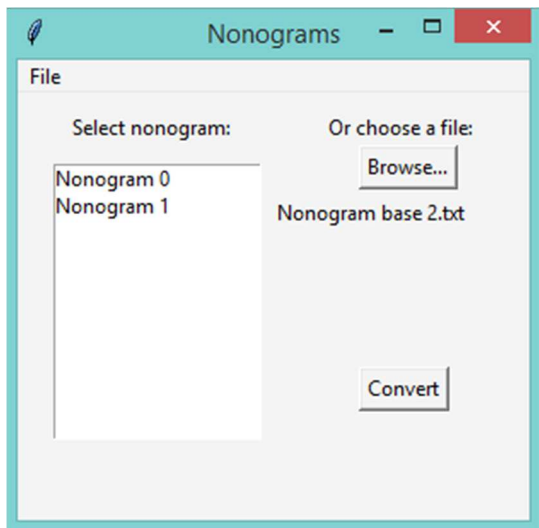
2. FIRST STEPS

After running the application user have some options to choose. On the left there is a list of built-in nonograms. User can click on any of them and the program will open a window with a solver.



As we said user can also add your own nonogram. To do this user should select the 'Browse' button on the right and choose a file. Nonogram will be added to list on the left. Remember – **only text and image file are allowed**.

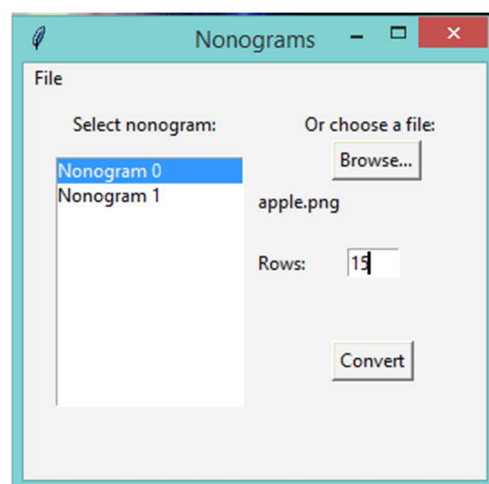


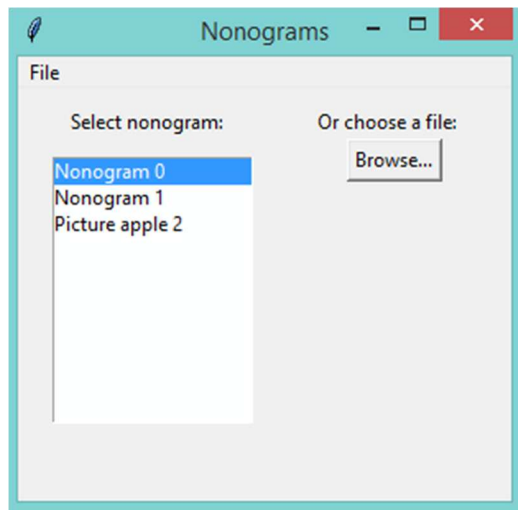


The form of the **text file** is strictly determined. The row clues are written as an array. Each list in the array represents different row. Next, in the new line, there is an array with column clues. If the file contains more than one nonogram there is exactly one blank line between them.

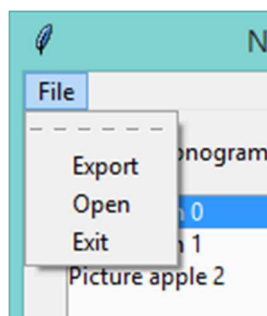
```
[[3, 1], [1, 1], [1, 1, 1], [1, 1], [1, 1, 1]]
[[1, 1, 1], [2, 1], [1, 1, 1], [1, 1], [1, 1, 1]]
```

If user choose an **image file** the program will ask about target row size (10 means that the picture will have 10 cells in each row) and automatically set the column size. User need to remember to change the file type while browsing. Nonograms created by user won't be available in the next session unless exported.





There are also some options which user can choose from the menubar: **Export**, **Open** and **Exit**.



Export – exports nonograms from the list to a text file.

Open – works as the 'Browse' button.

Exit – quits the program.

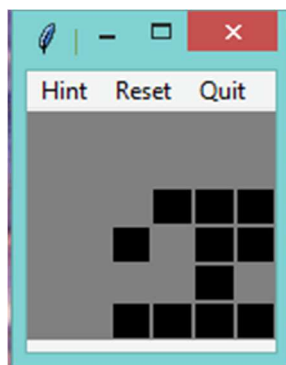
3. SOLVER

A window with a nonogram to solve opens automatically after selecting a nonogram from a list in the main window. There are row clues and column clues written in a given order (numbers with lighter background). As shown in the picture below the user have to check i.e. four cells in the third column, one and two cells in the second row, etc. L-Click **fills chosen cell**. An option which is also really helpful is **marking empty cells**. The user can do this by R-Click (the 'x' mark means that this cell will be empty). If the user make a mistake she can easily **erase the cell** by Middle-Click.

Another thing the user can do is changing color to red of clues that are already done by L-Click. L-Click on the clue which is red changes the color back to normal.



If the user solve a nonogram correctly the program will change all non-black to gray and show the picture.



There are also some options in the menubar: **Hint**, **Reset** and **Quit**.

Hint – gives the user a hint. If the user need some help the program may fill a cell which should be filled or unchecked the cell which should be empty. Filling cells has a higher priority than unchecking.

Reset – clears whole picture.

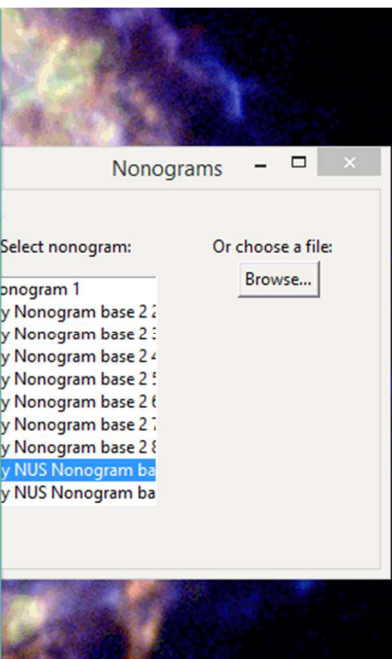
Quit – closes the Solver window.

4. TYPES OF NONOGRAMS

Not every nonogram has a unequivocal solution. Sometimes the solution doesn't exist. We decided to classify them into a three groups: **Normal**, **NUS** (Non-Unique Solution) and **Hard**.

Normal is a set of nonograms which have a simple solution – the algorithm finds the solution basing only on fitting rows and columns without any additional operations. The solution is unequivocal.

NUS is a set of nonograms which don't have a simple solution but after adding one filled cell it can be solve by previous method. When opening a nonogram from this group the user will start with one obligatory hint.



Deciding whether a nonogram has a unique solution or not is a hard question. There is no algorithm which can solve all the nonograms in a polynomial time. More information about this is available here: <https://en.wikipedia.org/wiki/Nonogram>.