

PhotoKifu v3.1.0

for Windows[®] operating systems

© 2012–2016 Andrea Carta & Mario Corsolini

URL: www.oipaz.net/PhotoKifu.html

eMail: andrea.cartamclink.it

OiPaz@oipaz.net

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1. Introduction

↑ PhotoKifu converts a set of pictures of a goban, taken during a Go game, into an SGF file and/or a game record (the so called kifu), both containing the moves of the game. It can be also used to draw the kifu of a game whose SGF file is already available.

2. Licence

↑ PhotoKifu is licenced under the Creative Commons Attribution - Non-Commercial - NoDerivatives 4.0 International Licence (CC BY-NC-ND 4.0). To view a copy of the licence, visit:

<http://creativecommons.org/licenses/by-nc-nd/4.0/>

PhotoKifu is [donationware](#).

That means if you like it, or if you want to contribute to its development, you may send a [donation](#) to the authors using the [PayPal](#) account PhotoKifu@gmail.com (click on the “Donate” link included in the distribution of PhotoKifu or in the “About PhotoKifu” window).

3. System requirements

↑ PhotoKifu works under 32 or 64 bit Windows operating systems (Vista SP2 or later) and does not need any particular resource apart from the [Microsoft® .NET Framework 4](#), an integral component of the Windows operating system.

The required minimum screen resolution is 1024×768 pixels.

If PhotoKifu is used under Windows 8.1 (or previous), with a high-definition display and custom DPI setting higher than 100%, the “XP style DPI scaling” tick box must be left in the default unchecked state.

4. How to install

↑ PhotoKifu does not need any installation: just unzip and run it!

On old Windows versions you may need to retrieve and install the [.NET Framework 4](#) from the Microsoft official website:

<https://www.microsoft.com/en-US/download/details.aspx?id=24872>

To upgrade an old version: close PhotoKifu (if it is running) and overwrite the old files with the new ones. All the settings will be kept (from v3.0.0 on).

5. How to use

↑ The standard use of PhotoKifu is described in the following paragraphs of this chapter. Yet, the program can be also used to draw the kifu of a game whose SGF FF[4]¹ file is already available. Such an use lets PhotoKifu deal with the main line of play (ignoring variations and multiple games in the same file) and boards whose size is either 19×19 or 13×13 or 9×9 . In order to load an SGF file, start the program and drag and drop the file into the (empty) list box of the moves, placed on the right side of the main window, otherwise you may use the “+” button placed below that list box. Before creating the kifu, by means of the usual button in the lower right corner of the main window, it is possible to set its size, as well as amending or supplementing game details.

5.1 Camera setup

↑ The camera must be placed on the side of the goban (whose sides will be almost parallel to the picture’s), as high as possible. The grid of the goban must be thoroughly in focus, entirely visible (including the edges) and it must take up most of the picture frame, otherwise the program could fail to locate it.

Pictures must be in JPEG format. The optimum resolution is between one and two Mpixel (for instance 1600×1200 pixels). Bear in mind that lower resolutions could make moves recognition very hard, whereas higher resolutions are a useless waste of resources as the program works on automatically reduced images of nearly two Mpixel.

Try not to move the goban nor the camera during the game: should that happen the program is able to correct the shifts, but only if they are small (approximately the radius of a stone, at most) between two consecutive shots. If the automatic correction does not work it will be necessary to manually

¹ www.red-bean.com/sgf

correct the location of the grid, so it is essential the use of a tripod or similar tool in order to avoid frequent manual interventions.

The goban must be evenly illuminated; take care not to change too much the lighting during the game, especially trying not to have areas of the goban in the shade or, vice versa, areas of light so intense to appear almost white because of the reflections of light. If possible, check white balance of your camera and colour accuracy before taking the photos.

Please take just one picture after each move of the game (passes included), trying to avoid every obstacle between the goban and the camera. Take particular care of the hands of the players and of other common objects like pens, sheets of paper, fans that could be used during the game. If you realize that in a picture part of the goban is hidden, and you have the time, it is advisable to repeat the shot.

Each picture must be shot AFTER the completion of each move and the removal of any captured stone. If during the game you realize you made some mistakes (for instance you forgot to take a picture), it is better not to complicate things trying to go back and somehow amend the situation: if the mistakes are occasional the program should be able to put them right; if they are too many it could be anyhow impossible to correct them (in those cases you should try and reconstruct the moves manually).

It is advisable that the first picture shows the empty goban, the second one the first move of the game and so on; nevertheless you may postpone the first shot until White's first move: PhotoKifu will reconstruct the opening moves of the game, including any handicap stone. If you further postpone the first shot the program will not be able to reconstruct the opening moves.

Anybody may take the pictures during the game, but it is advisable that the players themselves do it, using a remote control if possible (perhaps placed next to the clock), always paying attention not to interpose anything between the goban and the camera.

5.2 Images transfer

↑ The pictures of the game must be copied all together into one directory. That directory may contain other pictures, but it would be better to avoid that (PhotoKifu could not be able to ignore the pictures not related to the game). The pictures must be numbered: the original progressive number

assigned by the camera would be fine.

Before using PhotoKifu it is advisable to correct any mistake made during the game. For instance: delete any duplicate, either wanted or not. During the execution the program is able to correct most common mistakes, yet, the better are the pictures, the easier will be to manage any remaining problem.

5.3 Use of PhotoKifu

↑ PhotoKifu needs you to choose (clicking in the proper text boxes) the first and the last file from the list of pictures taken during the game you want to reconstruct. It is also compulsory to select the rules of the game. The other options and information about the game are not mandatory and you may input them during data processing. For instance, you may choose to generate the SGF file containing the moves of the game and/or the kifu, customizing its size. Finally, it is possible to choose the language of the user interface and whether to save the analysis of the game (in the same directory of the pictures) or not. This will make it possible to interrupt data processing and to quickly resume it another time (if in the meanwhile no changes are made in the directory of the photos, e. g.: no files are deleted or added or renamed).

At the start PhotoKifu tries to detect the size of the goban and the location of its grid lines as they appear in the pictures; the user must confirm the grid position. If the detection goes wrong, it has to be put right by relocating the corners of the grid with the mouse and, in case, by pressing the <Esc> key to toggle the goban size.

After the confirmation PhotoKifu will examine the sequence of the pictures of the game and it will reconstructs the moves. At first it checks handicap stones and, if they do not match with the user's selection, it rectifies their number and/or typology.

Please remember that PhotoKifu does not recognize the correctness of played moves, nevertheless it may detect some kind of errors (for instance missing or faulty pictures) and it may suggest a few options to correct them. Those options are:

- [a] if PhotoKifu did not detect any moves, resume data processing after the insertion of a pass;

- [b] if PhotoKifu did not detect any moves, discard the current picture and resume data processing from the next one;
- [c] if PhotoKifu detected a move, but the colour is wrong, accept the move after the insertion of a pass;
- [d] if PhotoKifu detected two moves (even same colour's ones) choose either the first one or the second;
- [e] if PhotoKifu detected two moves - of different colour - accept both (the colour to move will decide the first one);
- [f] if PhotoKifu detected two moves - of the same colour - accept both (after choosing the correct order) but inserting a pass in between;
- [g] if PhotoKifu detected three moves, choose either the first sequence or the second (only two are possible);
- [h] if PhotoKifu detected four moves, choose the correct sequence among the possible four;
- [i] discard the current picture and resume data processing from the next one, but trying to detect any missing move;
- [j] recalibrate the grid, making use of the same procedure that was employed at first;
- [k] repeat the analysis of the current picture, usually after some manual intervention in the move list;
- [l] resume the analysis from the next picture, by means of the "play button", usually after some manual intervention in the move list.

The aforementioned options could be chosen by pressing specific buttons, which will appear each time PhotoKifu will detect the wrong number of moves (usually just one). If such were the case, data processing will stop and the user will be able to correct the error either by means of the buttons (just the ones pertaining to the specific error will appear) or by editing the list of recognized moves on the right side of the main window, adding or removing lines or editing stones coordinates. It is also possible to use the

buttons below the mini-goban (which is shown on the left of the list of the moves); it shows the status of the reconstructed game and you may navigate forward or backward along the sequence of the moves. The user may also stop data processing any moment by means of the "pause" button (for example to correct errors that PhotoKifu did not detect).

The "stop" button, if pressed for about three seconds, terminates data processing and resets the program (preserving any game detail you entered).

At last please always remember that, if there are too many errors, even a human player could have some difficulty in accurately reconstructing the game: the best way of using PhotoKifu is to let it analyse a series of well made pictures!

6. How to uninstall

↑ If, for some reason, you do not like PhotoKifu: close it (if needed) and delete its folder.

That will completely uninstall PhotoKifu. :-)

If you had to install [.NET Framework 4](#), you may remove it through the usual "Add/Remove" applet of the Control Panel (be careful: it may be shared with other applications).

7. Feedback, suggestions, bug-reports

↑ Any comments, suggestions and (most of all) bug-reports are welcome. Please use the eMail address andrea.cartamclink.it or OiPaz@oipaz.net

It is advisable to specify "PhotoKifu" in the subject field and to report the version of both the program and the operating system. While submitting an error it is also advisable to attach the last PK file (if available) saved by PhotoKifu in the directory of the pictures it was analysing.

PhotoKifu is a multilingual application: contact us if you are willing to translate it into another language!

8. Release history

- ↑ • Version **3.1.0** — May 25th, 2016
 - The grid-detection algorithm is brand new, nearly ten times faster and much more accurate than before, even with many stones on the goban.
 - The static score-counting algorithm is brand new.
 - Added: fast adjustment of shifts of the grid through arrow keys during manual realigning.
 - Preliminary use of the new grid-detection algorithm makes manual realigning easier, within reason.
 - Improved abnormal situations management.
 - The ReadMe is now distributed as a PDF file only.
 - Bug fixed: loading SGF files was not working.
 - Minor cosmetic changes and bug fixings.

- Version **3.0.0** — January 1st, 2016
 - PhotoKifu now uses OpenCV as image processing library: game analyses are nearly ten times faster.
 - Compiled for both 32-bit and 64-bit CPUs with Visual Studio Community 2015.
 - Improved stones' detection and goban tracking algorithms.
 - Added: “PhotoKifu options” tab.
 - Added: magnified view for a fast and more accurate pinpointing of the corners of the grid.
 - Selecting a cell on the right column of the list of moves will highlight the corresponding stone, selecting a cell in the left column will show the corresponding picture too.
 - Replaced some of the buttons below the mini-goban with a track bar.
 - Multiple copies of identical PK files will not be saved any more.
 - The kifu of a game will be saved in PNG format only.
 - Several bug fixings.

- Version **2.1.5** — August 25th, 2015
 - Improved detection of the first white stone.

- Version **2.1.2** — June 21st, 2015
 - Improved detection of handicap stones.
- Version **2.1.1** — February 11th, 2015
 - PhotoKifu no longer requires the Microsoft PowerPacks v10.0.
- Version **2.1.0** — January 25th, 2015
 - Improved stones recognition.
 - Added: automatic management if three moves are found in the same photograph.
 - Bug fixed: loading SGF files could generate warnings about non-existent suicides.
 - Minor cosmetic changes and bug fixings.
- Version **2.0.0** — November 11th, 2014
 - Rewritten from scratch with Visual Studio 2010 Express: the user interface and most part of data processing engine are brand new.
 - Incorporated functions of KifuMaker.
- Version **1.1.0** — December 31st, 2012
 - Improved stones recognition.
 - Improved goban location recognition.
 - Added: free choice of players' rank.
 - Added: light grey background in the kifuf.
 - Bug fixed: asymmetrical handicap stones were wrongly rotated.
 - Bug fixed: missing removable devices and files in root directory were wrongly managed.
 - Minor cosmetic changes.
- Version **1.0.0** — November 11th, 2012
 - First public release.

9. Acknowledgements

↑ Thanks to the authors of OpenCV² and Emgu CV³ for providing their useful software.

Most of the icons used in PhotoKifu belong to the collections: Must Have by VisualPharm⁴, Oxygen by Oxygen Team⁵ and Sleek XP Basic by Hopstarter (Jojo Mendoza)⁶.

The authors want to thank all the people who helped them with ideas and valuable suggestions, particularly: Dani Ferrari for his advice on the stone recognition algorithm, Hyun-Soo Park⁷ (and coworkers) for his works on a static score-counting algorithm, as well as the beta testers!

And, obviously, thanks to Laura and EmmeTi!!

Well, that's all about it, happy playing!!!

² opencv.org

³ www.emgu.com

⁴ www.visualpharm.com

⁵ www.oxygen-icons.org

⁶ hopstarter.deviantart.com

⁷ Department of Computer Information Technology, Kyungdong College of Techno-Information, 224-1, Buho, Hayang, Kyungpook, Korea.