

Sky View Factor Calculator

User Manual - Version 1.1

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Introduction

This manual describes how to install and make use of the **SkyViewFactorCalculator** that is able to compute the Sky View Factor (SVF) on hemispherical photographs using a Graphical User interface (GUI). A detailed description of the calculation proceedings can be found in Holmer et al. (2001) and in Johnson & Watson (1984). This software is free to use.

Version history

V 1.1

This version now calculates SVF using two different methods. First the pixel-based method developed by Holmer et al. (2001) and the annulus method as presented in Johnson and Watson (1984). The calculation procedure for annulus method make use of 45 annuli with a 5 degree azimuth interval resulting in that 3240 pixels in the hemispheric image is used in the calculation. The pixel method includes all pixels within the radius of the image. This results for example in approximately 404000 pixels that is examined in a 720x720 pixel image.

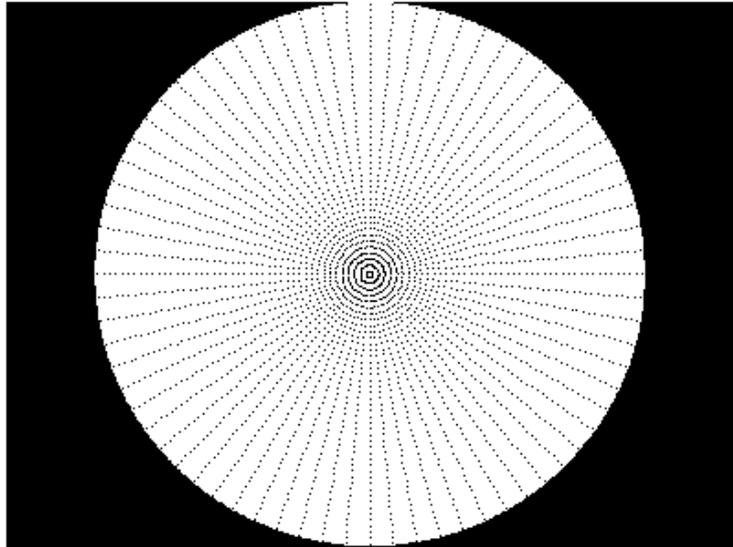


Figure: Black dots represents the pixels investigated using the annulus method.

Several bugs are also corrected in this version and results can now optionally be written to a text file called 'SVF_results.txt' that will be saved in the same folder as the calculator is executed from. If several images is examined, new results will be appended in the same text file.

V 1.0

First version. Released 2010-10-20

Installation

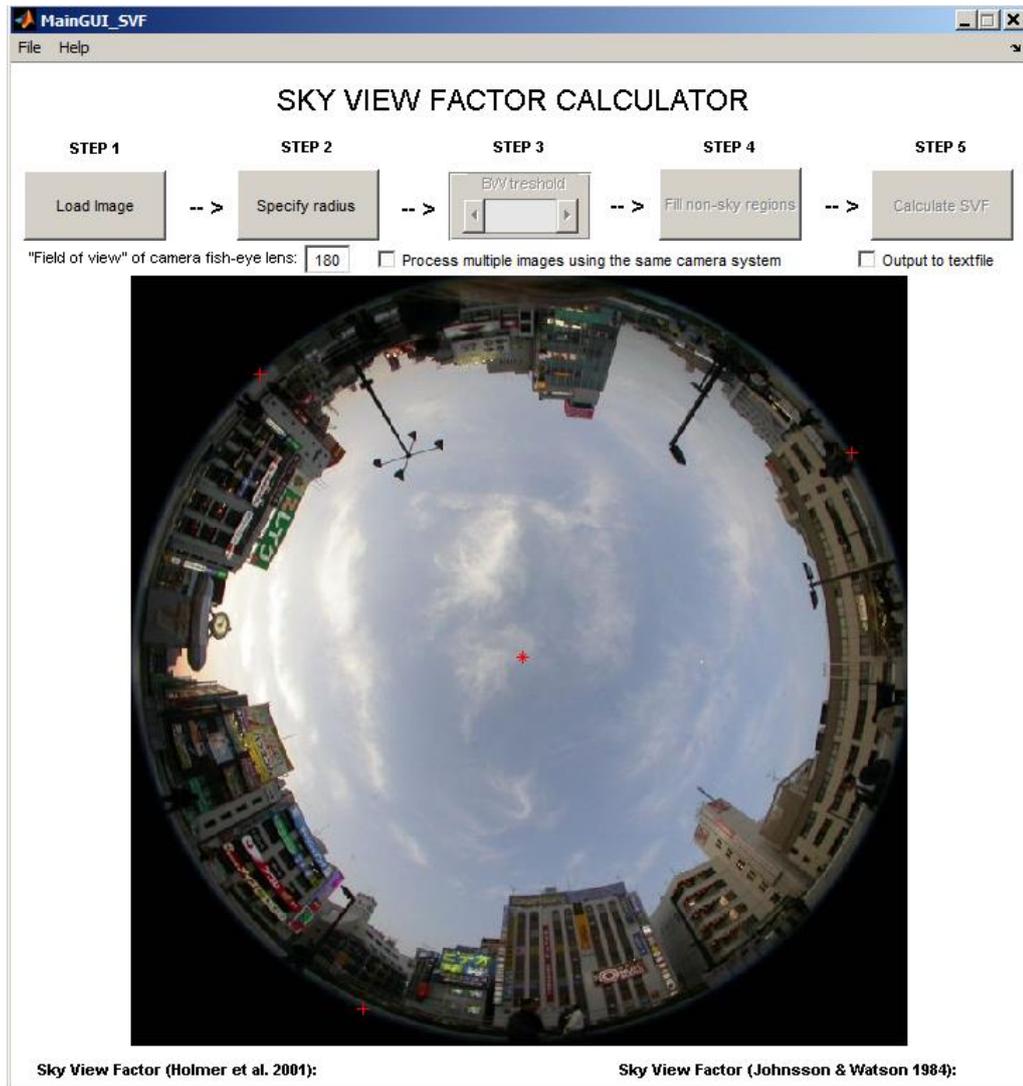
This model is written in MATLAB computing language and is executed using the MATLAB Compiler Runtime (MCR), which can be distributed royalty free. Hence, the user can run the model without having a MATLAB license or any skills in MATLAB programming. The MCR runs on WINDOWS platforms.

To be able to run the model the MCR must be installed locally on the computer that will be used. The MCR and the SVF calculator can be downloaded from: <https://www.gu.se/en/earth-sciences/software-download>

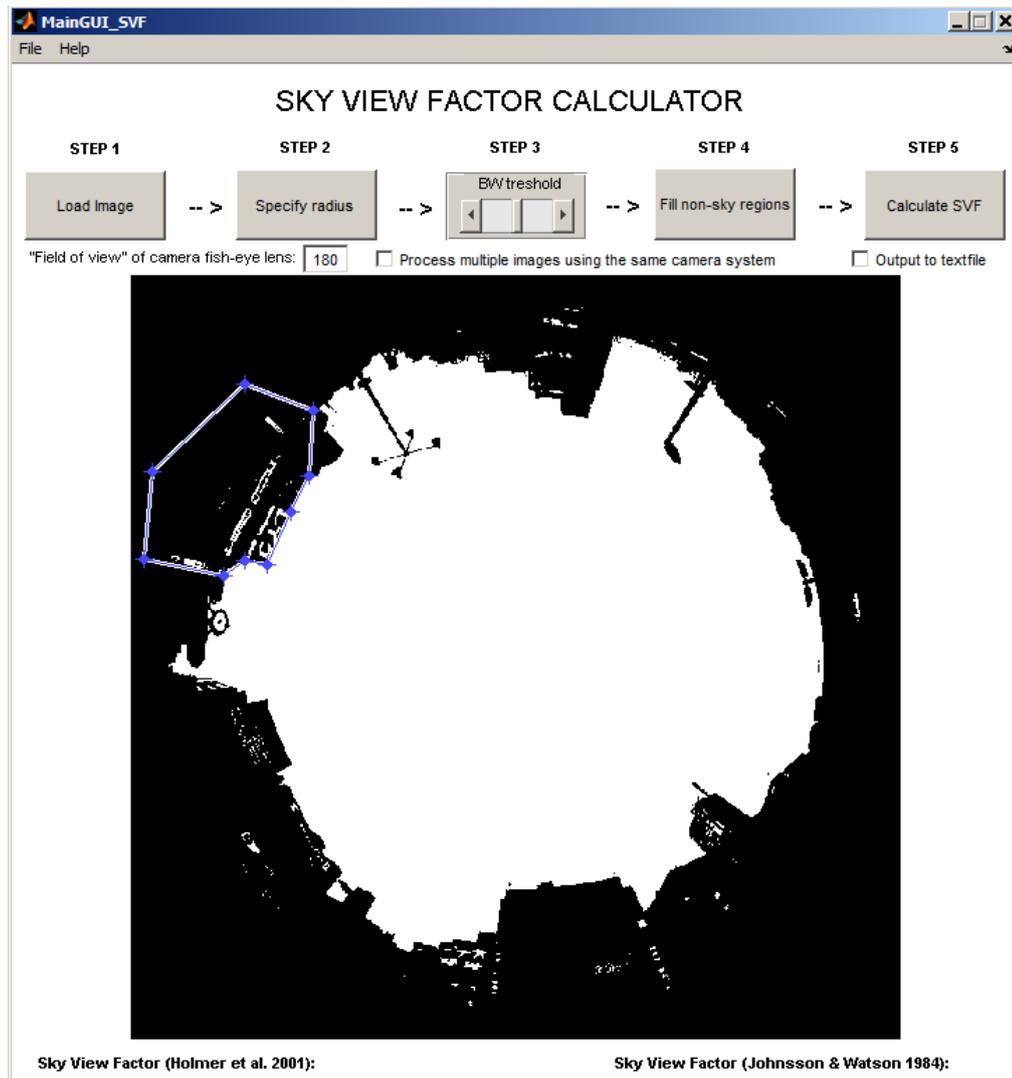
Running the model

To run the model the user simply needs to double click on the **SkyViewFactorCalculator.exe**. The GUI is divided into five sequential steps.

1. **STEP 1 – Loading image:** File formats possible for image files are *.jpg, *.png, *.gif, *.tif or *.pgm.
 2. **STEP 2 –Specify radius:** In order to compute the radius and the center point (red star in the figure below) of the image, three point on the circumference line has to be specified (red crosses in the figure below). Click on the “Specify radius” and move your mouse pointer over the image. It will turn to a cross and now you can click on three separate locations on the circumference.
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3. **STEP 3 – Converting image to black and white:** sky and non-sky pixels has to be separated. To make this separation as good as possible a slide-bar is available. Make sure that all sky pixels are correctly classified.
4. **STEP 4 – Manual correction of non-sky pixels (optional):** Usually, light areas such as windows and white walls is classified as sky and this has to be corrected in order to obtain correct SVF-values. If you have areas that are wrong classified, click on the “Fill non-sky regions”, move your mouse pointer over the BW-image and the pointer will turn into a cross. Fill regions where you have wrong classified by inserting vertices of a polygon as shown in the figure below. To finish a polygon, click on the first vertices in the polygon and finally double click in the polygon. You can fill as many polygons as possible by just clicking the “Fill non-sky regions”-button again.



5. **STEP 5 – Calculate SVF:** Click on the Calculate SVF- button and the SVF-value will appear below the image calculated by the methods mentioned above.

Additional settings

There are three additional settings that could be made. Some fish eye lenses do not have 180 degree field of view. Therefore an option to change this is included. Also, an option to process more than one image from the same camera system is available. A new option where the results is written to a text file is also available.

References

- B. Holmer, U. Postgård, and M. Eriksson (2001). Sky view factors in forest canopies calculated with IDRISI. *Theoretical and Applied Climatology* 68, 33-40
- Johnson G, Watson I (1984). The Determination of View-Factors in Urban Canyons. *Journal of Climate and Applied Meteorology* 23, 329-335