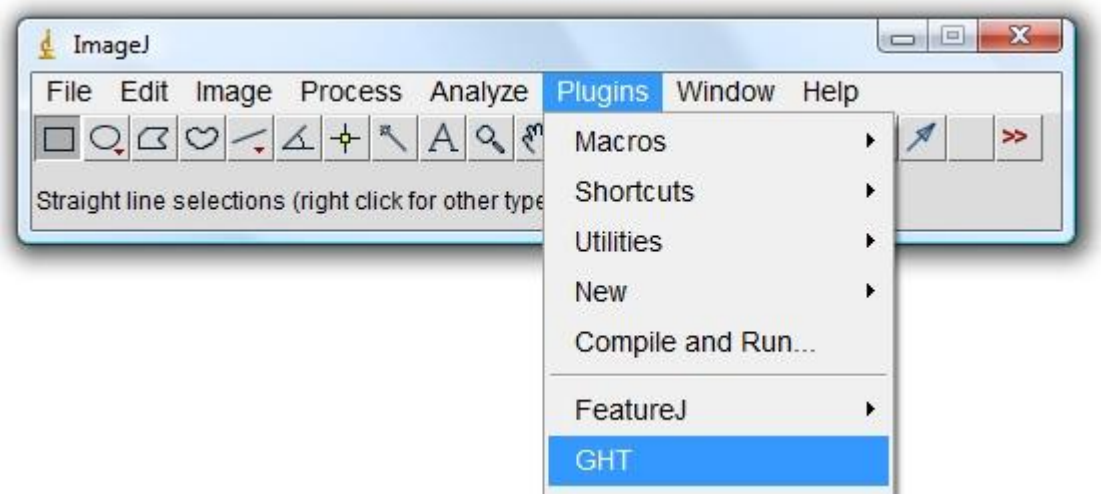
GHT-Plugin

The GHT-plugin uses the General Hough Transformation (GHT) to recognize rotated and scaled objects with a various shape. It is multithreaded and offers you some options to adjust it. The GHT-plugin works with grayscale-edge-pictures (white background, black edges).

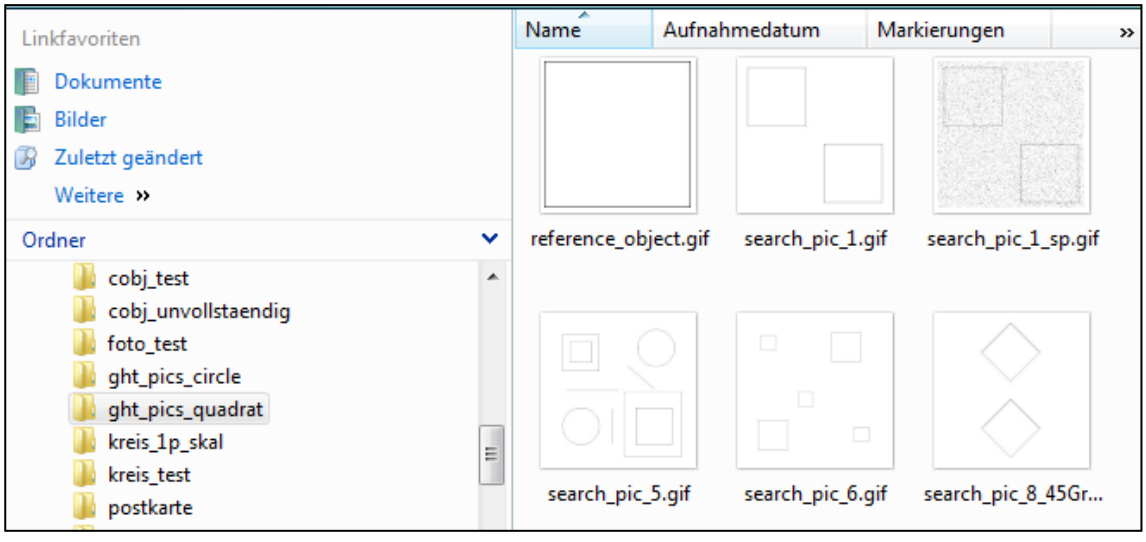
Once you have copied the .jar-File to your plugins-directory you can start the GHT-plugin via the Plugins-menu.



Working directory

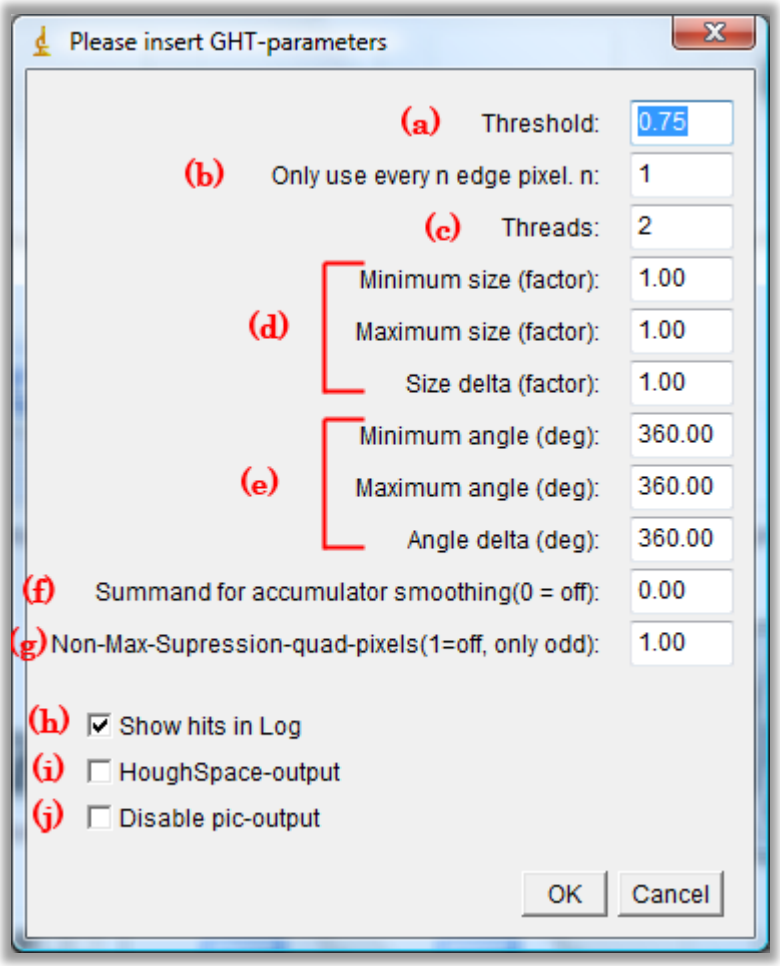
At first you have to choose a folder which contains the (grayscale-)images to be analyzed. In this folder the GHT-Plugin searches for a file containing the reference object. To tell the Plugin which file it should take, the filename must contain the string “reference object.”.

The GHT-Plugin will search for the reference object in all the other files in the chosen directory. An example:



Menu

After you have chosen a folder the plugin-menu appears.



A brief description of the parameters:

Parameter	Description	default
a	Threshold	0,75
b	Every n pixel of the reference-object is used to build the reference table	1, off
c	Number of threads	2
d	Scaling: min, max and delta	1, off
e	Rotation in degrees: min, max and delta	360, off
f	Summand for accumulator-smoothing	0, off
g	Edge length for non-maximum-suppression	1, off
h	Show hits in log	on
i	Output of accumulator in an own picture	off
j	Disable picture-output	off

The result and the speed of the object recognition depend very much on the parameters you have chosen.

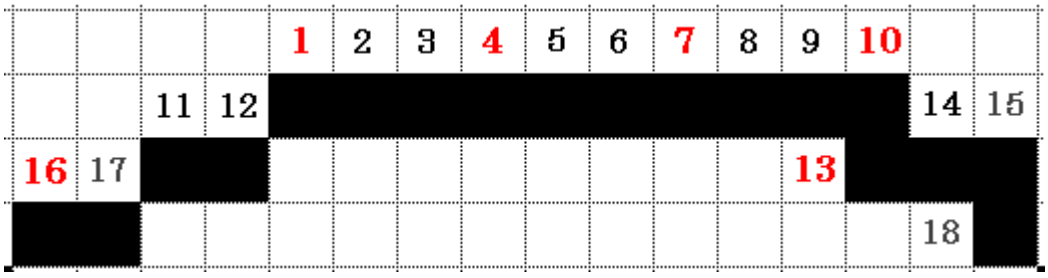
The parameters

a) threshold

The number of reference-object-edge-pixels gets multiplicated with this number to calculate a threshold value, above witch a pixel counts as a hit.

b) n-pixel

Every n reference-object-edge-pixel is used for the reference table. With this option you can make the calculation faster. An example with n = 3:



c) number of threads

With this option you can set the number of threads used for calculation. The calculation of the different variations (different angle and/or scale of the reference object) is evenly distributed over all threads.

d) scaling

Enter a minimum, maximum value and the step size for the scaling of the object. Take care to choose the right values so that the estimated objects are recognized in an appropriate time. The more variations of an object you use, the slower the calculation is.

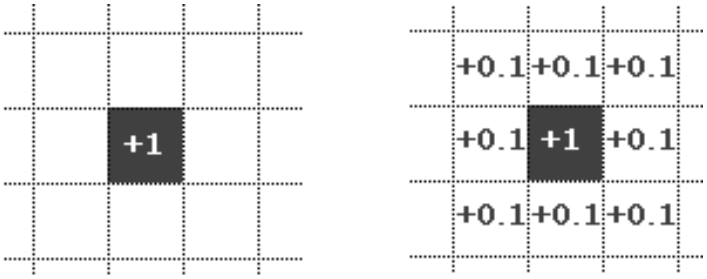
e) rotation

Enter a minimum, maximum value and the step size for the rotation of the object. Take care to choose the right values so that the estimated objects are recognized in an appropriate time. The more variations of an object you use, the slower the calculation is.

f) accumulator-smoothing

With this option you can smooth the accumulator to deal with inaccuracies and rounding errors. The inserted value gets added to the pixels surrounding the central pixel. Good experiences have been made with values between 0,1 and 0,25.

Calculation of the accumulator with (right) and without (left) accumulator-smoothing:

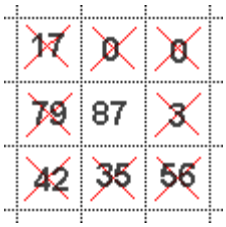


The accumulator-smoothing is an expensive feature and slows the object-recognition down.

g) non-maximum-suppression

You can enter the edge-length (in pixels) for a non-maximum-suppression. This is also an expensive feature. If the surrounding pixel-values of the accumulator are higher than the central-pixels-value the surrounding pixels are set to 0 and vice versa.

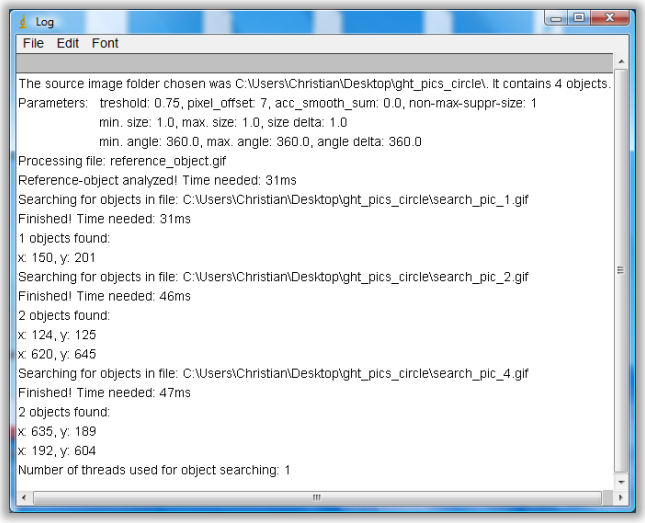
Non-maximum-suppression with edge-length = 3:



h) log output

You can enable or disable the log output. If you have many hits (for instance because of a low threshold) the log output can last long.

A log example:



i) hough-space output

Output of the hough-space in an own picture.

j) disable picture output

You can disable the output of any result pictures to accelerate the GHT and to minimize the memory usage.