Egg Counter

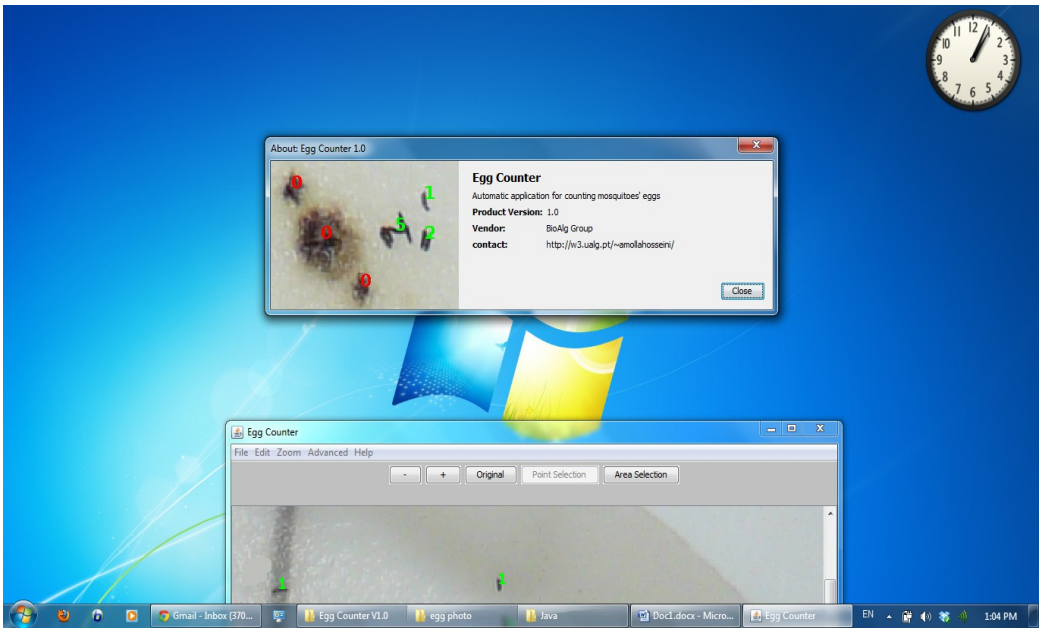
Version 1.0

Application Manual

Contents

About Egg Counter

Egg counter is a simple and automatic application for the detection and counting mosquitoes' eggs in a given image. After the automatic analysis it is possible to change and edit the result and save the final result as an image.



Egg Counter version 1.0 supports zooming, marking objects as valid eggs or excrement, unmarking detected objects, multiple object selection, changing the quantity of eggs inside an object, selection of the object inside an area, and changing application's sensitivity.

This application is implemented by the BioAlg Group at the University of Algarve, Portugal.

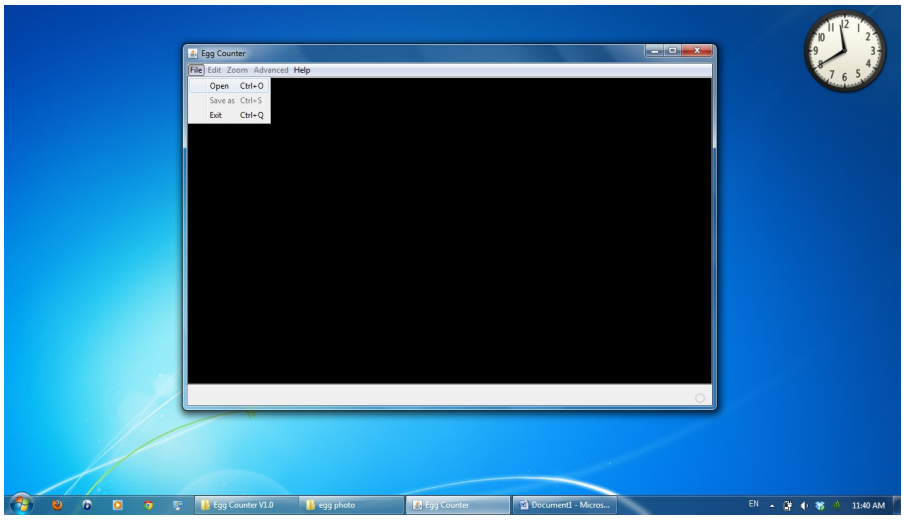
Image and Photography Conditions

The proposed algorithm works well if eggs are clearly darker than background paper, no matter if they are brown or in other dark color. To introduce a better and higher contrast and wider color difference between paper and laid eggs, we suggest using white or semi-white paper.

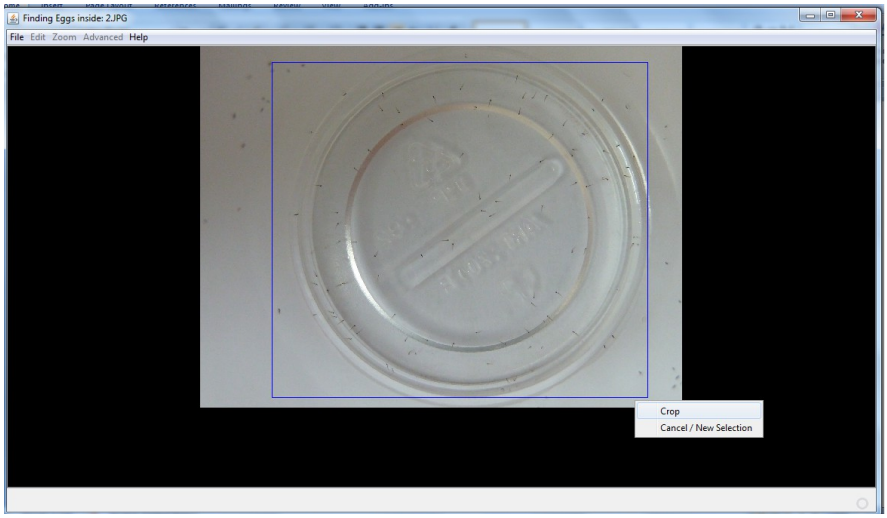
Although there is an automatic quality measurement that warns the user in case that the image quality is poor, it is highly recommended to take images with a 5M pixels camera, at least, using a low ISO and maximum shutter speed, avoiding any image re-sizing afterward. Avoid the use of flash, since it may introduce shadows.

Open an image

You can open an image from menu ‘File/Open’, or by using a keyboard shortcut (Ctrl + O).

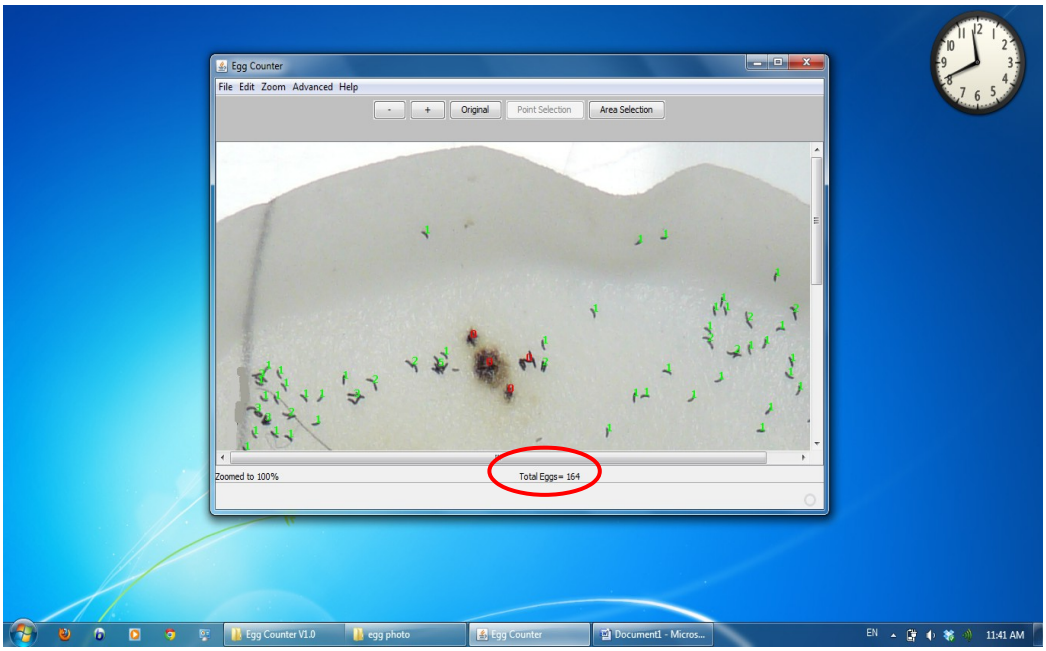


After opening the image, the application asks the user if he wants to crop the image. It is highly recommended to crop the images in a way that it only includes the area of interest. Cropping is very easy. It only requires clicking on one corner of the image and the application will draw a rectangle. Then a menu allows cropping the image or cancel the selected area and start over.



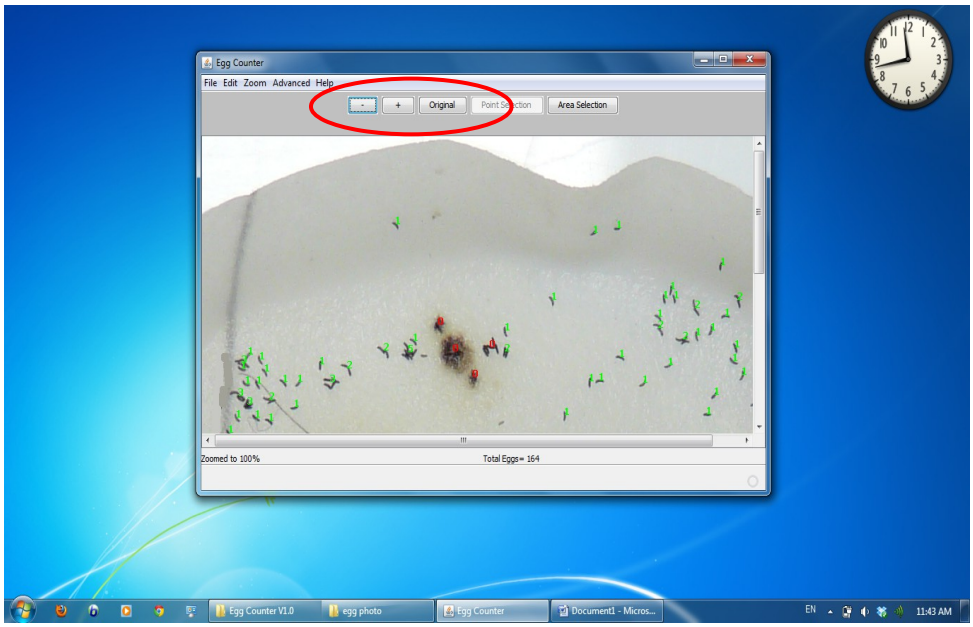
The application automatically differentiates valid objects from excrement, and estimates the number of eggs inside the valid objects. The following figure shows a

sample result of the detection. Valid eggs are shown as green numbers and the excrement is marked with red zeros. The estimated total is shown in the bottom right side of the application.



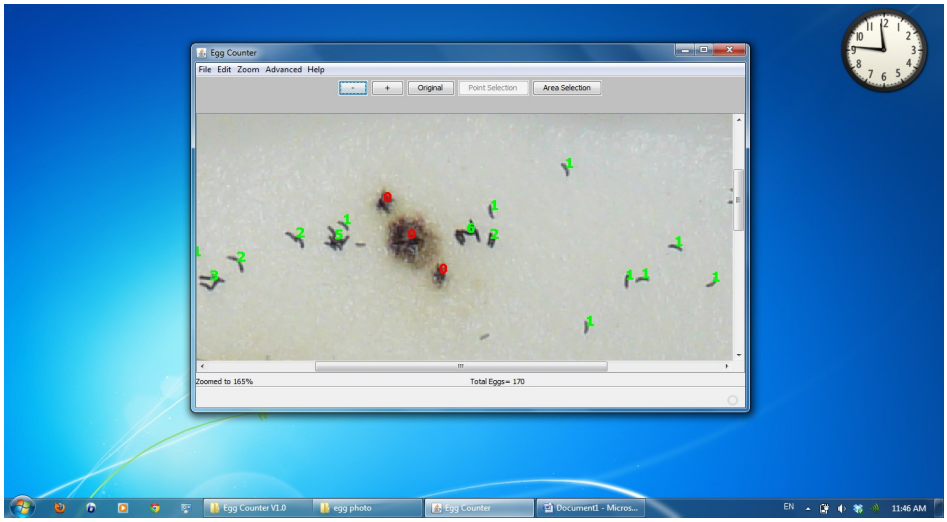
Zooming

It is possible to zoom in, zoom out and see the original size of image from the ‘zoom’ menu, by means of the three buttons on the toolbar, mouse scrolling, or keyboard shortcuts (Ctrl + =),(Ctrl + -) and (Ctrl + 0).



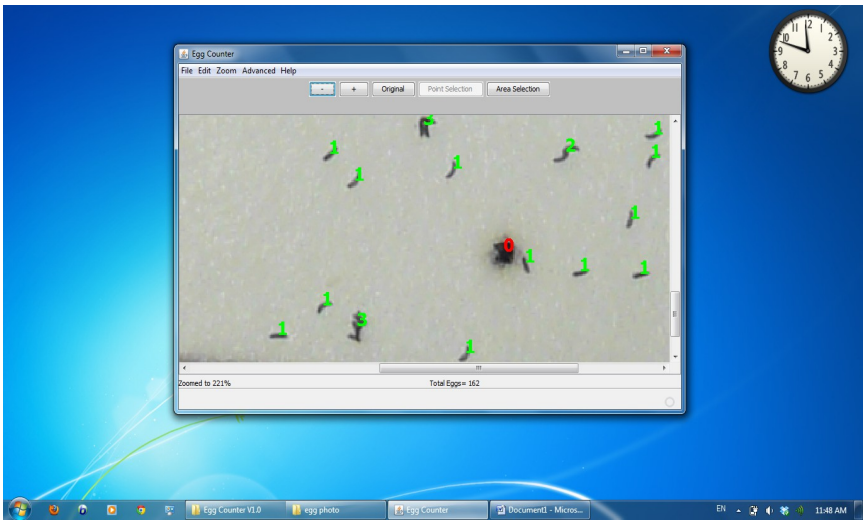
Marking Valid Eggs

You can edit and modify the automatic detection result. For this purpose, you should click beside the desired object. The selected object will be marked in yellow. Then, if you right click, a menu will appear. The first item will mark the selected objects as a valid object. The number of eggs inside the object will be automatically estimated and the total estimation number in the bottom of the form will be updated.



Marking Invalid Objects

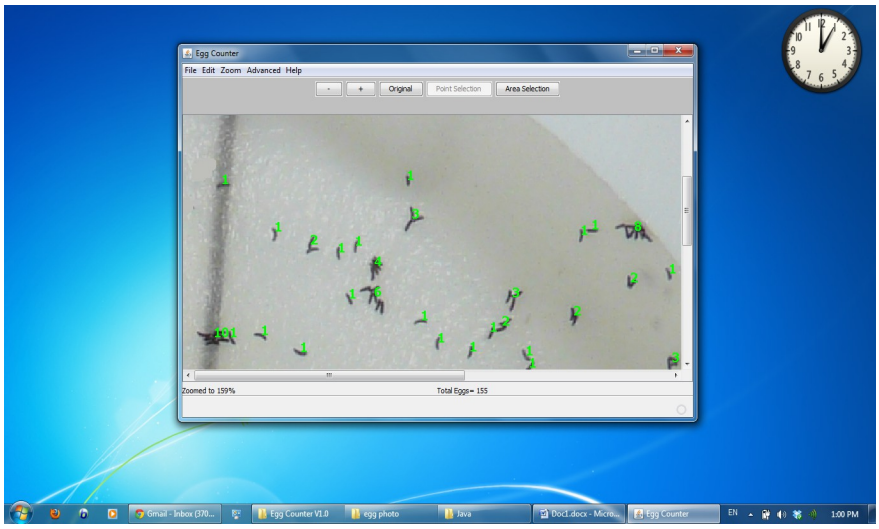
Sometimes automatic analysis mar identify misdetected objects. After selecting the objects, if you right click, a menu will pop up. The second item will mark the selected objects as invalid eggs or the excrement. NOTE: The user is able change application's sensitivity. (See page 12) to improve detection.



Changing the Quantity

Sometimes, the application is not able to estimate the number of the eggs inside an object precisely. In this case, you can change the estimation of any object by selecting it and choose ‘Change Quantity’ from the menu.

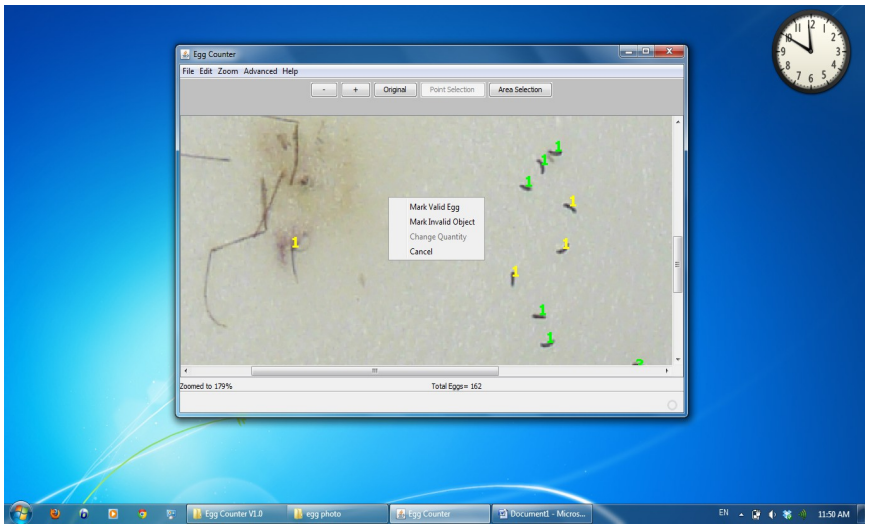
After that a dialogue form will be shown and you can increase or decrease the number of eggs inside the selected object.



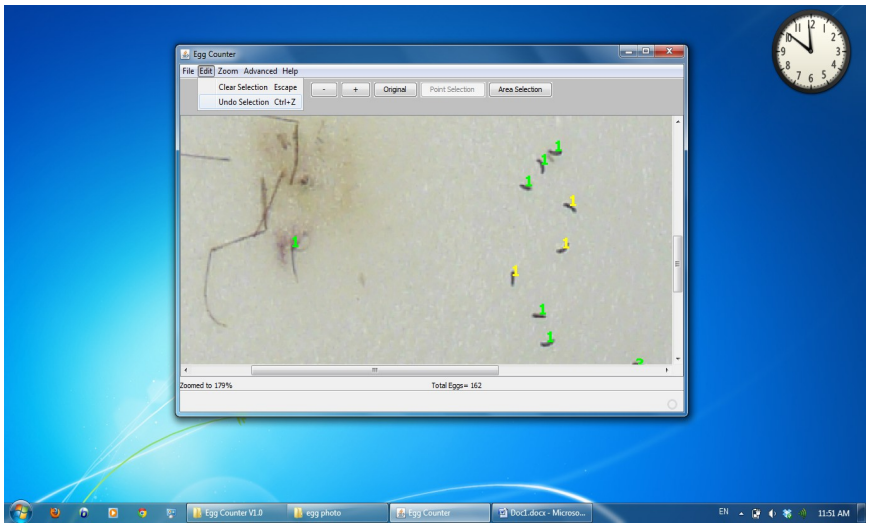
Please notice that, if the number of the eggs is set manually, the total number of eggs is updated automatically.

Multiple Object Selection

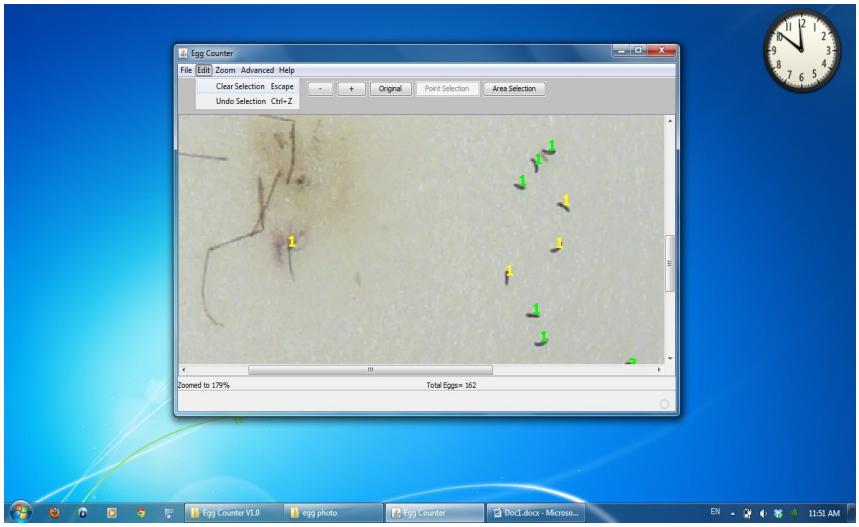
Many objects may be marked by holding the ‘Ctrl’ key in keyboard and clicking beside the objects by mouse. In that case, objects that are selected will be all shown in yellow.



If multiple objects are being selected, you can undo the selection in case of any mistake, from the ‘Edit/Undo Selection’ menu or by the shortcut key (Ctrl+Z).

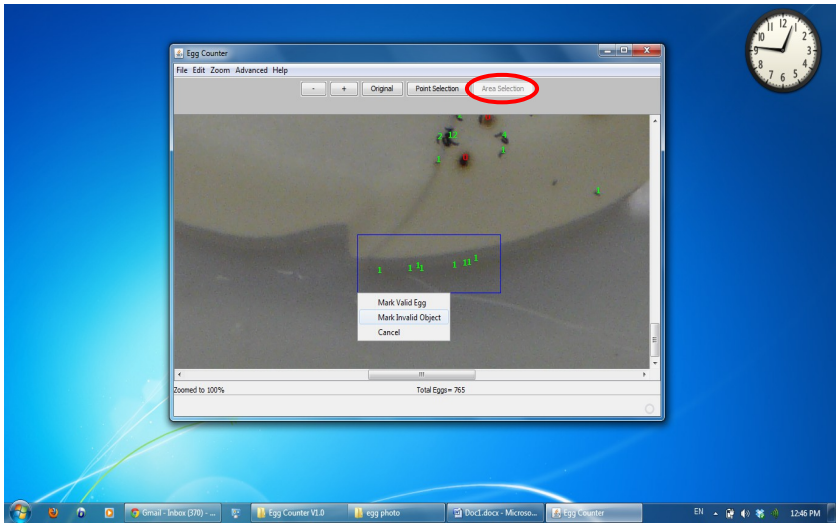


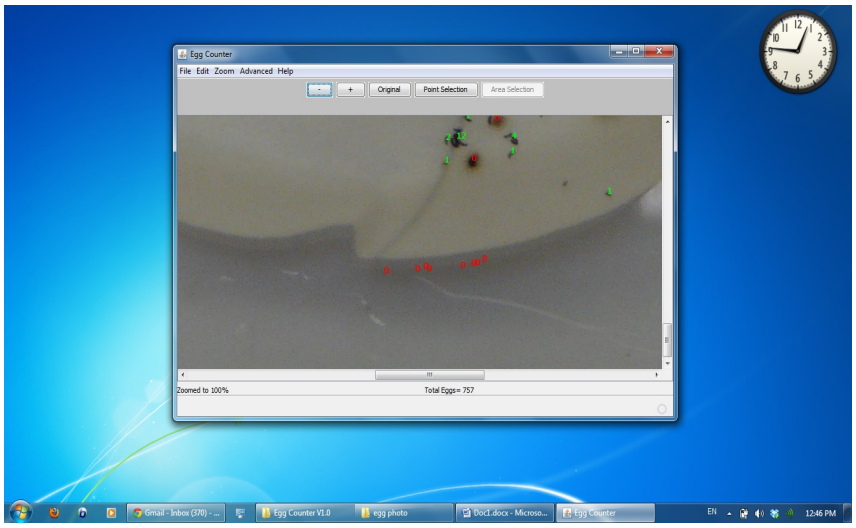
You can clear the multiple selected objects from ‘Edit/Clear Selection’ or by a shortcut key (Escape).



Area selection

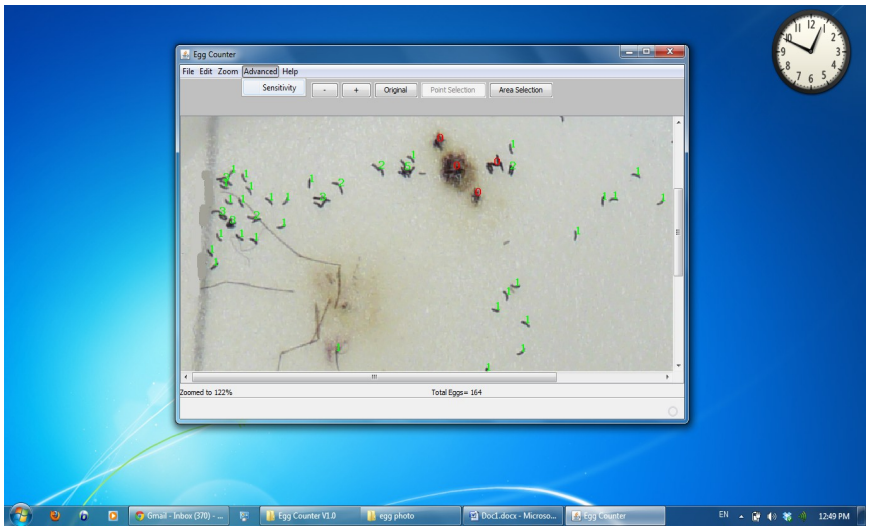
By default, the application allows you to select objects one by one, or select multiple by holding the ‘Ctrl’ key. In addition, you can also select multiple objects in a given rectangle area. For this purpose, you should first choose the ‘Area Selection’ button from the top panel and then a rectangle can be drawn by clicking and holding the mouse button. After, a menu will be shown and you are able to mark the ojects in that area as valid eggs or invalid objects.





Application Sensitivity

The application automatically estimates the sensitivity according to the given image. However, you can also change the application's sensitivity from the 'Advanced/Sensitivity' menu.

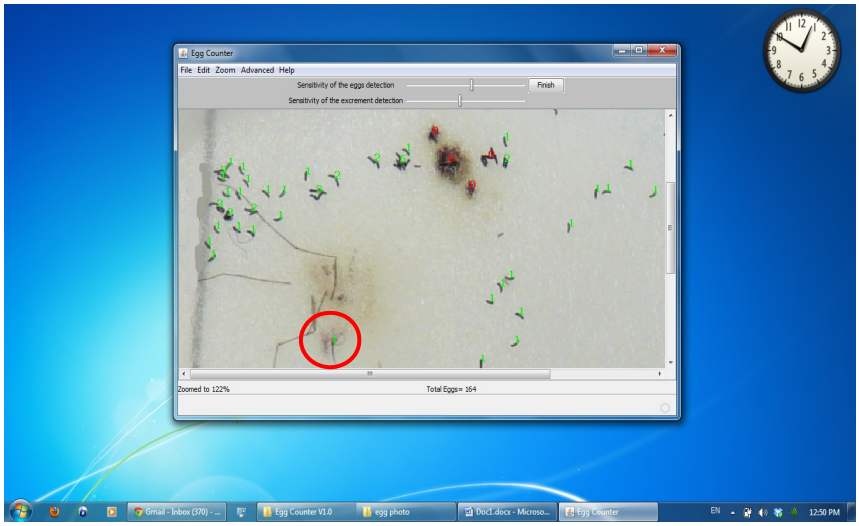


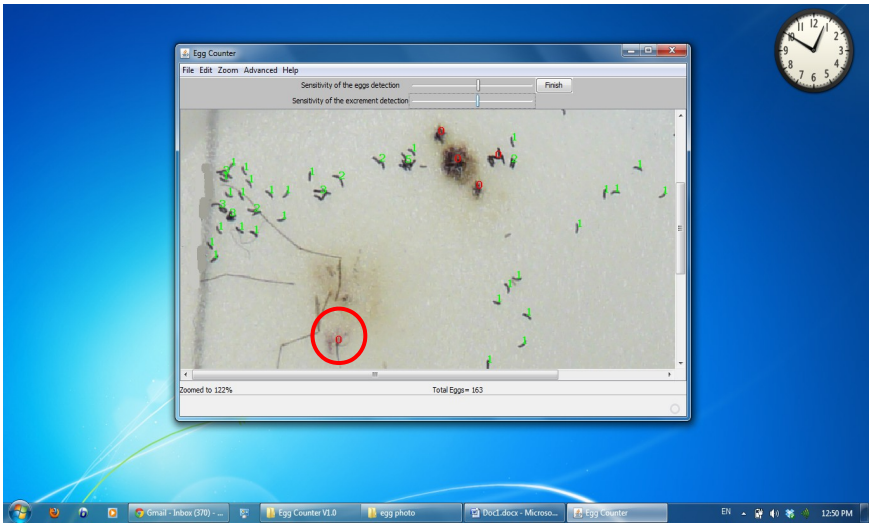
When sensitivity is selected, two options are shown on the top panel, i.e. changing the sensitivity for egg and excrement detections. It should be noticed that changes will apply to the whole image. Therefore, we advise the user to verify the results of the detection in the whole image after changing the sensitivity, especially if a specific area is being zoomed to obtain fine result there.

Note: For better fine tuning, change the sensitivity slowly by leaving the slide bar and allow the application calculate result.

Changing sensitivity of the excrement detection

The sensitivity of the excrement's detection can be changed by sliding the second bar. The following figures show how increasing the sensitivity improved results in the identification of excrement.

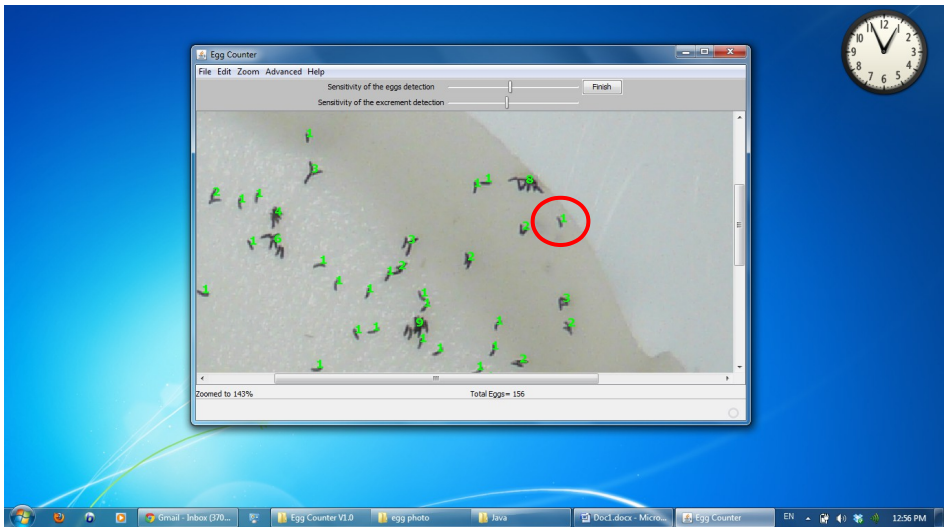




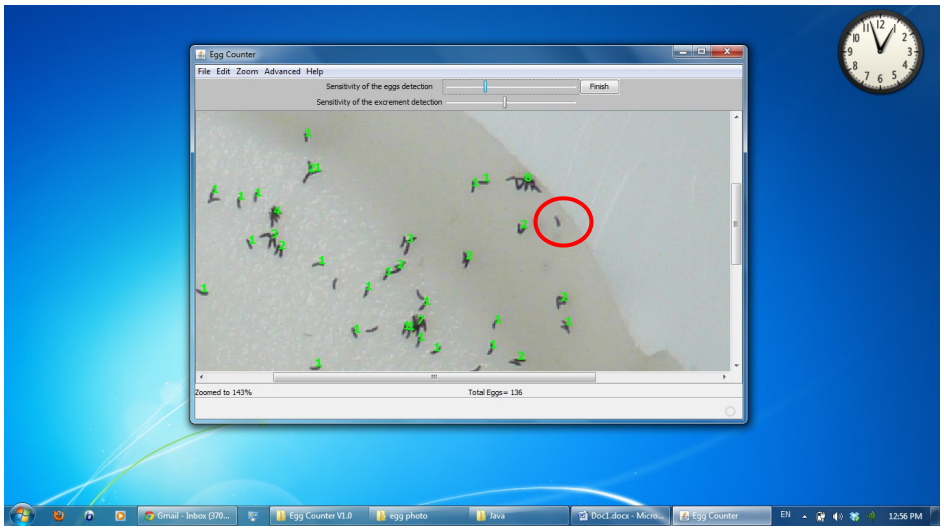
Note: Change the sensitivity slowly, leave the slider bar and allow the application to calculate the new result.

Changing the sensitivity of the egg detection

You can change the sensitivity of the egg's detection by sliding the second bar. This may improve the automatic approach. Don't forget to check the whole image after changing the sensitivity, especially if you are zooming into a specific area to obtain fine results there.



For example, in the image above, decreasing the sensitivity will cause the application to eliminate the marked objects, and some objects are detected more precisely.



It should be mentioned that, the best way to obtain a better estimation is to select objects manually and edit them, if the initial automatic estimation is not precise enough.

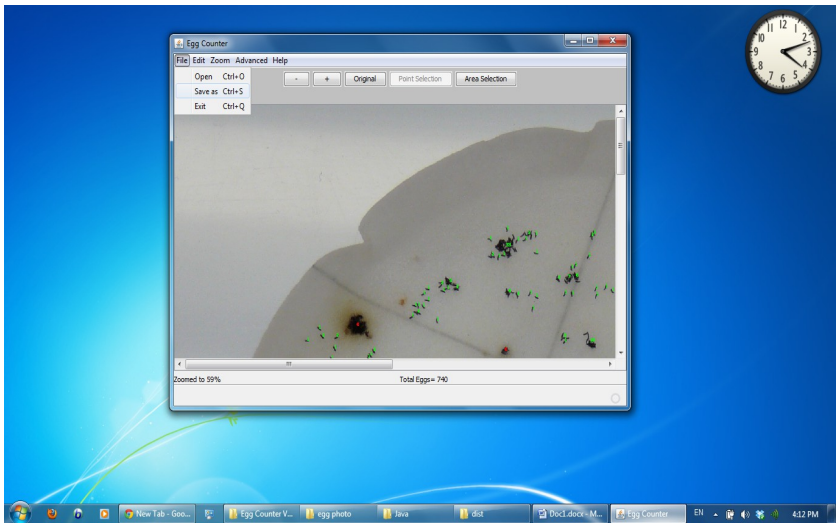
Note: Change the sensitivity slowly, leave the slide bar and allow the application to recalculate the result.

Turning off Excrement Detection

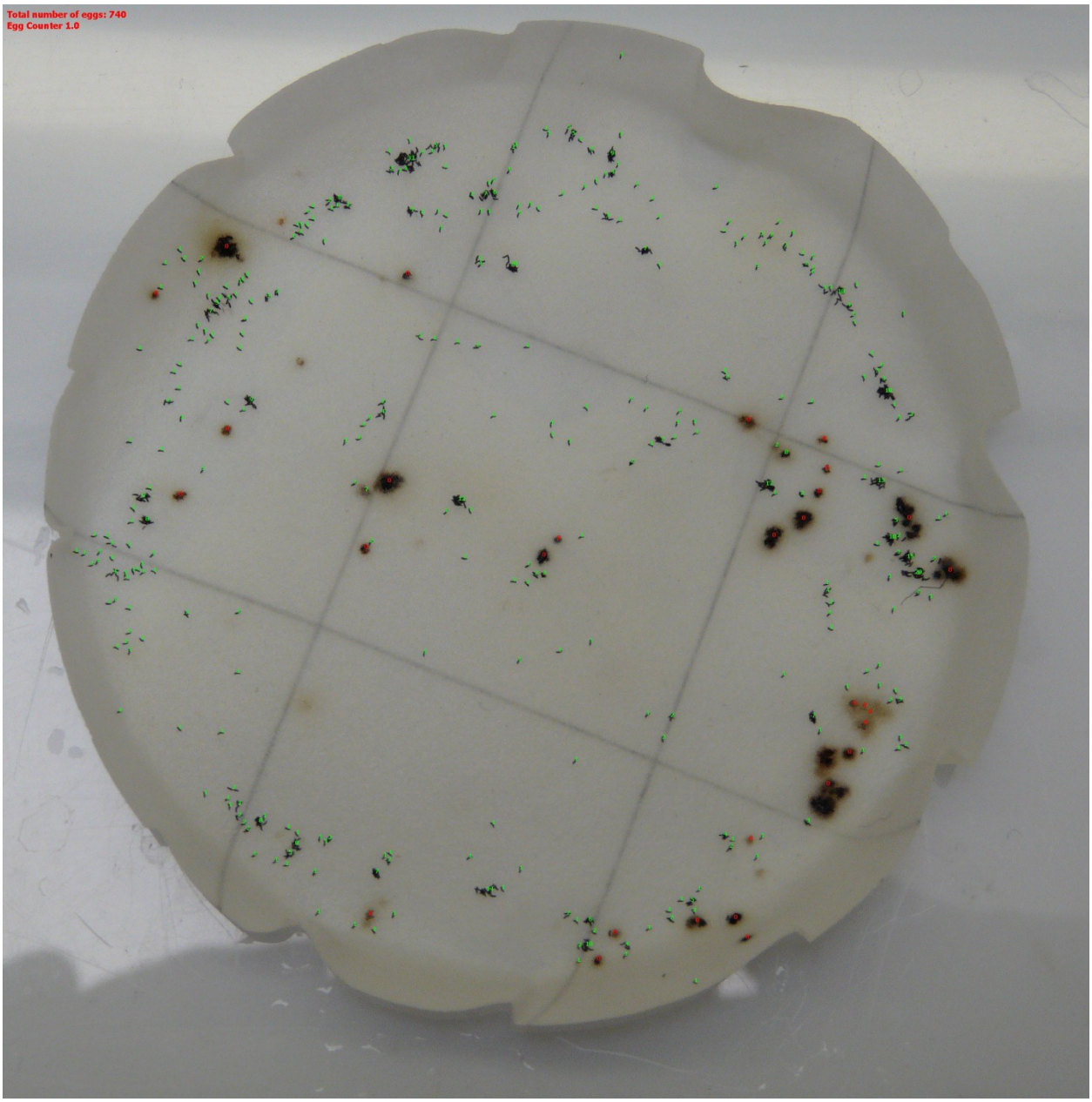
Automatic excrement detection works on color images. However, using color paper may compromise the automatic analysis. In this case, the Automatic excrement detection can be turned of from ‘File/ Automatic excrement detection’. The application will run much faster, but the excrement will need to be marked manually. You can turn it off/on before or after opening an image.

Saving the result

You can save the final result on the ‘File/Save as’ menu or by keyboard shortcut (Ctrl + S).



The results will be an image, marked with green and red numbers, on which the total estimation is written. The following image shows a sample result of the application.


Total number of eggs: 740
Egg Counter 1.0

Contact us

Please feel free to ask any question, report any problem or suggest your ideas to improve the application. We are waiting for your feedback on:

ali.mollahosseini@gmail.com

or

hshah@ualg.pt