AUTOMATIC DETECTION AND RECORDING OF MOVING A SUBJECT ON A VIDEO

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Usually, marine biologists establish the existence and quantities of different types of fish using methods such as casting nets in the ocean, human underwater observation and photography, combined net casting and acoustic (sonar) and, more recently, human hand-held video filming. These methods have two main shortcomings: first, they are invasive, hence not able to capture normal fish behaviours, and second, the quantity of collected data is not enough to describe the observed environment. In order to overcome such limitations in acquiring biological data of fish in their natural environment, in recent years embedded video cameras have been widely used.

Abstract
The aim of this work is to propose an automatic fish classification system that operates in the natural underwater environment to assist marine biologists in understanding fish behavior. In other words, by analysing an underwater video, we want to detect and indicate in a report file, which frames contain one or more fish(es).

I - FISH DETECTION FROM A VIDEO CAPTURE

This program is made on LabVIEW and also with Vision and Acquisition toolkits. We have to analyse an underwater video capture in which we can see, punctually, a fish appear. In order to make the work of biologistseasier, this program should be able to save, in an Excel file for example, which frames of the vid eo, contain one or more fish(es). Moreover, an approximation of the size of the fish(es) could be given.

The image processing starts by retrieving the first frame of the video. This frame has to contain no fish(es) because it will be the background of the video. With the Acquisition toolkit, we can get each frame from the video. Thanks to the Vision toolkit, we are able to bring out the differences between each frame of the video and the background. The result, for each frame of this process, is an RGB image. Then, this image is converted in an grayscale image. The next step is the detection of object(s) in this grayscale picture. This task is done with the Vision toolkit. By using the "IMAQ Count Objects 2" block, we are able to detect an object in this picture. For instance, the frame number 34 of the video capture contain a fish. The grayscale image will be composed by a black background while the fish will be highlighted because this object (fish) is the only difference between the frame number 34 and the background that we recovered earlier. Finally, the number 34 is written in the Excel results file. By this way, the biologist do not have to analyse every frames of the video capture.

II – PROGRAM IMPROVEMENTS

Some aspects of this program could be improve. On one hand, instead of having the background by retrieving the first frame of the video, we could process the mean image with all the frames from the video. Thanks to this method, even if there is a fish in the first frame, we can have the video background.

On the other hand, we could implement an automatic shape detection. Biologists could save a lot of time, because the program should be able to give the name, or an approximation of the name of the fish.

Finally, in order to improve the image processing, it could be good to apply a Gaussian filter on each video frame before starting the analyses. In fact, with well-chosen coefficients, the Gaussian filter can bring out the most important image information. This would facilitate the image detection, which is the next step of the process.

CONCLUSION

To conclude, this LabVIEW program is a good starting point. Obviously, it can be improved, as shown above. LabVIEW with Acquisition and Vision toolkits is a very user friendly way for the image processing. The tools make the work easier and faster.

Nowadays, 95% remain unexplored abyss, that's why, there is a real interest to develop tools in order to help biologists to understand these unknown lands.