Development of Software Module to Extract the Outline of Fish Eyes from Fish Images

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Abstract

The purpose of this **work placement project** in Plant and Food Research[1] (PFR) **was developed a software module** by existing code and use OpenCV **to extract the outline of fish eyes from fish images**. An addition fish eye extraction module was required to extract fish eye contour for image and merged to an existing program which perform fish image analysis such as fish contour extraction and reference point extraction. **Python and OpenCV was used to develop the module**. The fish eye extraction module development process went thought three different version and the final version successfully identify the fish eye contour and merged to the existing code. The module achieved a high overall successful fish eye extraction rate of 89%.

Implementation

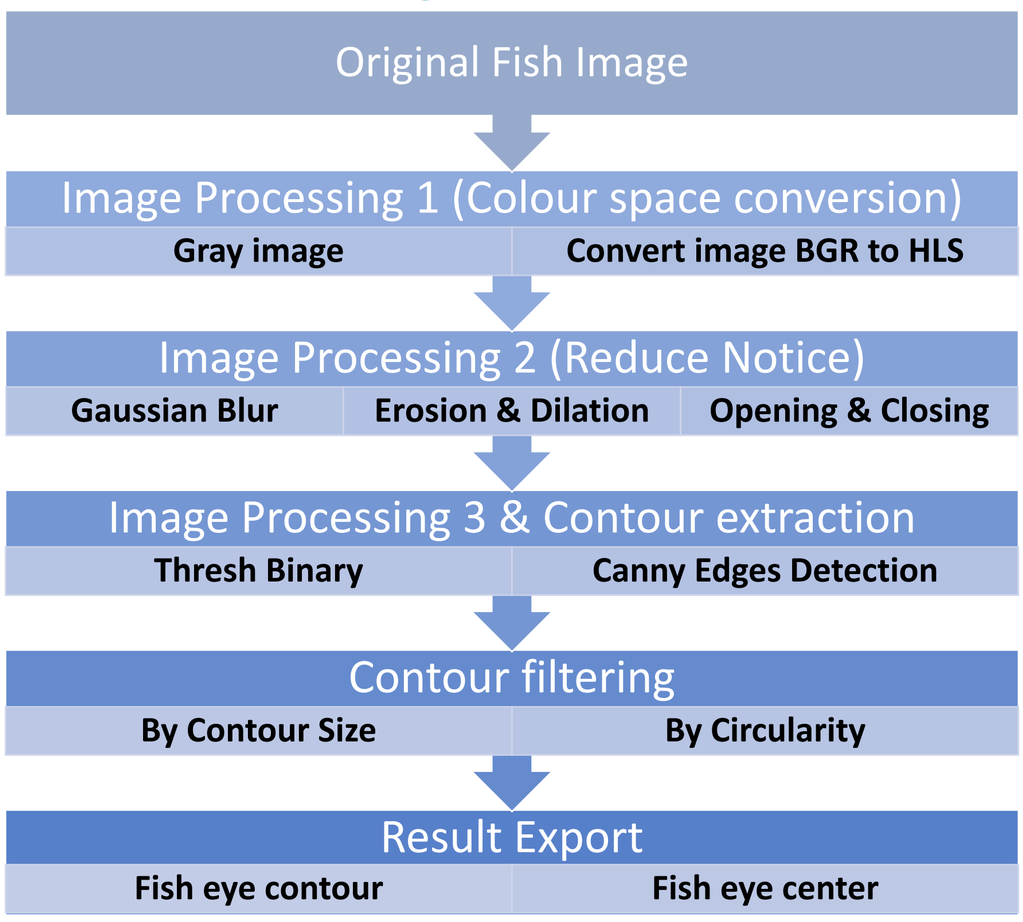
Python and **OpenCV**[2] was used to develop the fish eye extraction module.

Input data: Fish Image (Figure 1.)
Output data: Fish Eye Contour (with Preview Image)

Figure 1. Sample of input image. Species: Snapper

The fish eye extraction module divided into three phases:

1. **Image processing.**
2. **Contour extraction.**
3. **Contour filtering.**



Results

Final version of the fish eye extraction module having a 100 % successful fish eye extraction rate on the first trevally and snapper dataset and around 70 % on the second trevally and snapper dataset. **Overall 89% fish eye extraction rate.**

Combined results of Binary and Canny edge detection method had a good performance of fish eye extraction in all trevally images (Figure 2).

Figure 2a. (Left) Trevally input image: 2b. (Right) Canny edge detection result

For snapper, canny edge detection method produced too much noise (Figure 3a.) due to the eye reflection. **HLS filtering approach** (Figure 3b.) was performed at the same time to overcome the problem.

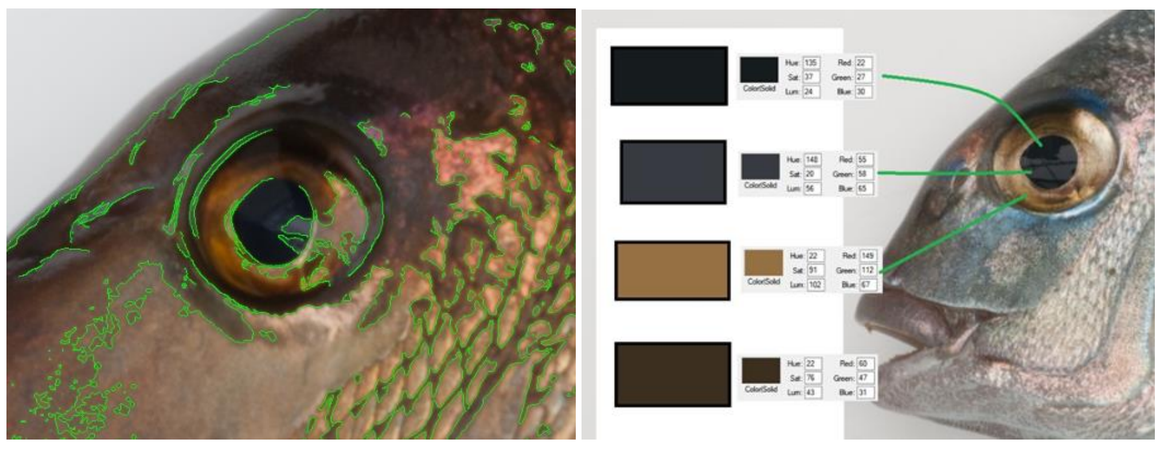


Figure 3a. (Left) Snapper edge detection result.
3b. (Right) HLS colour analysis on Snapper image

Final version of the fish eye extraction module perform both canny edge detection and HLS filtering approach. The result (Figure 4.) shown an accurate fish eye contour on both species.

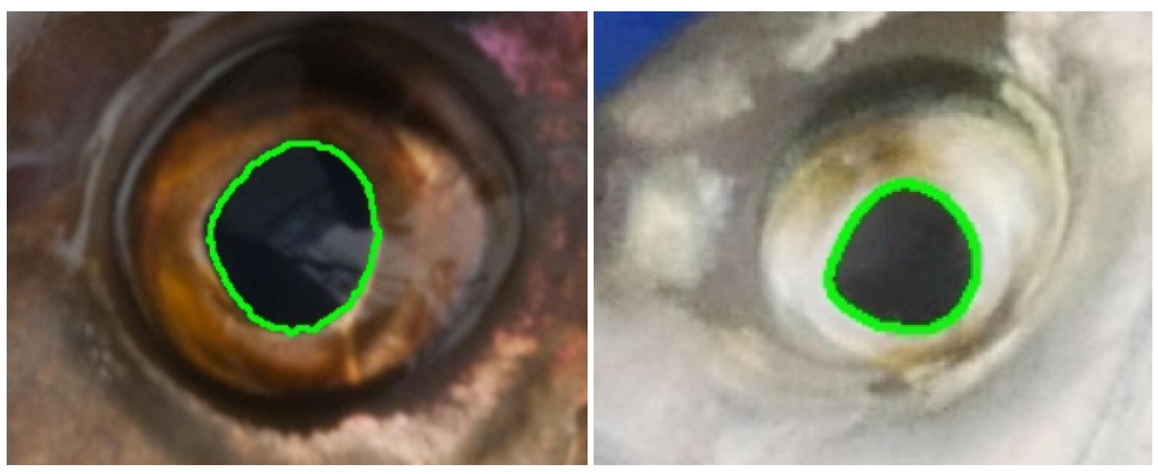


Figure 4. Contour extraction preview image: (Left) Snapper (Right) Trevally.

Conclusion

The work placement project was completed by finishing the fish eye extraction module which had an overall 89% successfully rate in both data set and committed to GitHub repository.

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References

1. *Plant & Food Research*. (2020). https://www.plantandfood.co.nz/
2. *OpenCV*. (2020). https://opencv.org/