An Automated Technique for Fish Detection using Computer Vision Algorithms

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I. INTRODUCTION

For fish classification, shapes and measurements of component parts are needed to compare between the different species. Typically, the researchers have to measure and redraw one by one manually using magnification tools and measurement tools. This work is very time consuming, meticulous, focused, and precise requirement. Moreover, for the manual method, the fish has to be collected before, it is sometimes difficult and high cost. Therefore, a method to measure and redraw a fish automatically is greatly needed to solve these problems. For the proposed approach, we can detect fish parts in a fish image based on image processing. In addition, if we have any actual measurements of a specific part, then we can get actual measurements of all the other parts.

II. MOTIVATION

Parts of the fish are often clearly different in shape and color as shown in the figure 1. We can completely detect fish and fish features using current computer vision algorithms.

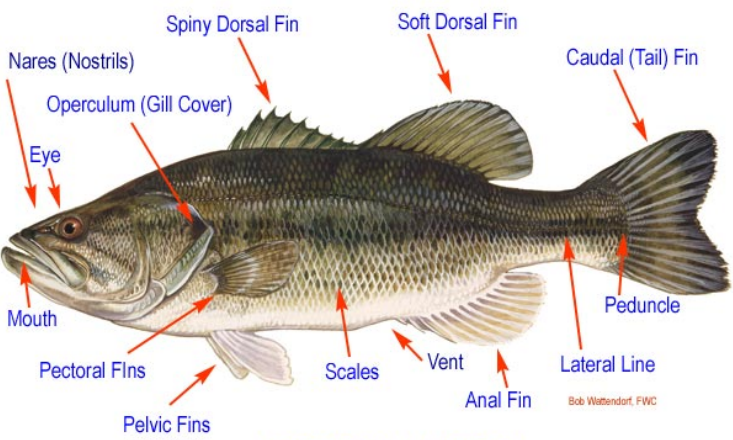


Figure 1. Fish external anatomy

III. PROPOSED APPROACH

The proposed approach is briefly described as follows:

(1) Image pre-processing enhances the visual appearance of images and improve the manipulation of datasets. Some image pre-processing methods are listed as follows:

(a) Image resampling reduces or increases the number of pixels of the dataset.

(b) Greyscale contrast enhancement improves the visualisation by brightening the dataset.

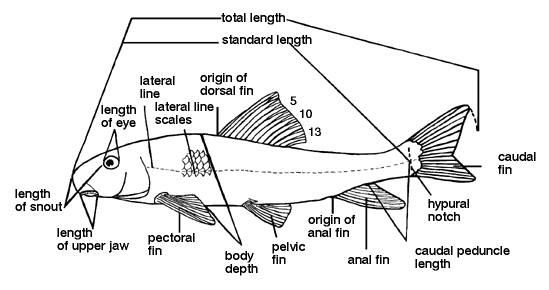
(c) Noise removal has several techniques as low-pass, high-pass, band-pass spatial filtering, mean filtering, median filtering.

(d) Mathematical operations enhances particular features. It is possible to apply to images arithmetic operations (addition, subtraction…), and morphological operations (dilation, erosion…).

(2) Fish detection, in which the fish is detected and separated from background. This process consists of identifying fish locations in an image frame (i.e., its x, y pixel coordinates), fish extent (width, height), followed by a clear segmentation of fish from background. The outcome is an image that only contains fish targets, with the background masked out, and individual non-overlapping fish targets separately labeled.

(3) Fish segmentation involves the partitioning of a fish image into distinct (usually) non-overlapping regions that is more meaningful and easier to analyze.

(4) Fish feature detection detects some of the common external features that are used to describe the differences among fish species.

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Picture 2. Some of the fish common external features after detection and segmentation

IV. CONCLUSION

This research is expected to contribute an automated method for fish detection using computer vision algorithms which has high reliability, durability and accuracy factors; as well as minimizing cost and time needed for such task. The idea is to capture the image of the fish using a camera that uploads the picture to the software to detect and measure the common external features.