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UNSUPERVISED IMAGE SEGMENTATION FOR FISH EGG IMAGES

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ABSTRACT

Fisheries sector is still actively developing in most countries. Fish is one of most important source of human diet since it contain high amount of protein and fat. Fish aquaculture requires detailed and delicate process. The egg counting process is purposely to check and maintain the quality of the females. This process occurred to distinguish the good and poor quality of female. At present, the counting process is conducted manually by operator. The staff captures images of fish egg. Then, the counting process is performed manually based on the fish image displayed on the computer monitor. This manual counting process is time consuming, eye strain and usually prone to error. The use of image processing for fish egg counting is relatively new technique that can help to improve the accuracy and efficiency of counting process. Image segmentation is a main part in image processing based-fish egg counting. The success of the final counting process depends mainly on the performance of image segmentation. Therefore this thesis investigates the performance of three unsupervised image segmentation methods for tilapia egg image segmentation. The unsupervised methods are k-mean clustering, watershed and Otsu thresholding. First, a total of twenty tilapia egg images with size of 1280 x 1280 is acquired from a private tilapia hatchery, Aquadesa Resources Sdn. Bhd. and used in the experiment. The tilapia egg images are segmented to remove the unwanted background. For the segmentation technique, the proposed method is based on gray level image for computational simplicity. The gray level intensities are fed into the k-mean clustering, watershed and Otsu's thresholding to perform the segmentation process. The results of the proposed method are evaluated using Jaccard index to evaluate its effectiveness in segmenting tilapia egg images. Simulation results indicated that the watershed algorithm outperformed the other two methods with average of 99.62% and 99.65% for clear and blur tilapia egg images, respectively.

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CHAPTER 1
INTRODUCTION

1.1   OVERVIEW

This section consists of three parts. In the first part, the background study which is the main focus of the work have been reviewed and presented. The second part presented the problem statement to outline the justifications for the work and also the objectives of the work based on the problem statement. The scope of study also has been reviewed after the objectives have been outlined. This is the last part of this section that narrows down the work conducted in this project. It specifies the boundaries of the work by explaining the limitations of the project also explaining the work relevancy.

1.2   BACKGROUND STUDY

Segmentation is a process in which an image is separated into different regions in order to segregate the areas of interest on it. Segmentation enables us to gain a high level of knowledge [1]. Image segmentation is considered as the important part of image processing method and technique. Image segmentation have well established technique such as histogram-based thresholding, region growing, region dividing and merging, clustering, graph theoretic approach and knowledge-driven approach [2]. Fingerprint recognition, remote sensing, counting system, biological image segmentation and Optical Character Recognition (OCR) system are the example of image segmentation.

Image classification is the process where the images taken that are in form of pixel is categories into classes of interest. The two basic classifications are supervised and unsupervised. Supervised classification has two stage; training sites and signature