Segmentation of Tuna Fish Image by Mahalanobis Histogram Thresholding and Mahalanobis Fuzzy C-Means

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ABSTRACT

One of important phases in classification system of tuna fish is segmentation phase. Visually, image of tuna fish have high color variant from dark blue until light blue or white. If image of Tuna fish are mapped in feature space, pixel that arrange the body of tuna fish will form group of pixel of hyperellipsoid. Fuzzy C-Means segmentation algorithm based on Mahalanobis distance can be used to segment image that has the characteristic. However, initialization of clusters centroid randomly causes segmentation process to be inefficient in terms of iterations and computational time.

In this study, we proposed a new method for segmentation of tuna image with Mahalanobis Histogram Thresholding (M-HT) and Mahalanobis Fuzzy C-means (MFCM). The proposed method consist of three important phases namely: Initialization centroid to obtain centroid of each cluster, pixel clustering to group the background pixels and object pixels, and improvement of accuracy to improve the accuracy of pixels clustering results.

Based on the experiment, it is obtained average amount of iteration as many as 66 iteration with time of segmentation average as long as 162.03 second. While average Accuracy as big as 98.54% with level of Missclassification Error as big as 1.46%. Based on the obtained result, it can be concluded that the proposed method can improve the efficiency in terms of the number of iterations and time segmentation. Besides that, the proposed method can give accurate segmentation result compared with the conventional method.

Keywords: Tuna Fish Image, Segmentation, Fuzzy Clustering, Histogram Thresholding, Mahalanobis Distance.