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PORNCHAI PIPATSATITPONG : AUTOMATED IDENTIFICATION OF HELMINTH EGGS USING PHYSICAL IMAGE ANALYSIS. THESIS ADVISOR : DAMRAS WONGSAWANG Ph.D. 99 p. ISBN 974-664-077-1

Automated Identification of Helminth Eggs (AIHE) is developed to detect the helminth eggs, which are the eggs of parasitic worms, and to identify the types of them. Physical image analysis methods were applied for detecting the helminth eggs and identifying the types of them. Prevalence helminth eggs mostly found in some rural areas of Thailand and that AIHE could identify were *Ascaris lumbricoides* eggs, *Hookworm* eggs, *Trichuris trichiura* eggs, and *Opisthorchis viverrini* eggs. We classify *Ascaris lumbricoides* eggs into two forms by outward appearance: fertilized and unfertilized. Dominant features of the helminth eggs we used for the identification are sizes, areas, means of gray levels, second moments, boundary shapes, polar plugs, dense ovum mass (DOV), and gap between hyaline shell and DOV (GHD).

We explored and developed the algorithms to separate the helminth eggs and to identify the types of helminth eggs using the dominant features of the helminth eggs. We simulated the test environments for the automated identification. The samples consist of 84 color Windows Bitmap images on which the helminth eggs are. We measure the accuracy of the separation of helminth eggs from other objects and the classifications to identify the types of helminth eggs. The classifications were divided into two groups: using individual features and multiple features. We found that the helminth eggs were separated with accuracy rate of 52%. The helminth eggs that are occluded by other objects and have the boundaries that have gray levels close to the ones of the background were separated incorrectly. The samples of the classification testing were the helminth eggs that were separated manually. Using individual features, the types of helminth eggs could not be identified. The accuracy rates of the classification using individual features were 24-82%. By using multiple features of helminth eggs, the types of helminth eggs were identified correctly with accuracy rate 100%.

This research project describes AIHE in detail including the methods and the implementation of models. The prototype of AIHE were developed and tested. The experimental results were presented and discussed. Finally, improvements of the model were also proposed.