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## Cascaded-Automatic Segmentation for *Schistosoma japonicum* Eggs in Images of Fecal Samples

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### Abstract

**Background:** To recognize parasite eggs automatically, the automatic segmentation of parasite egg images is very important for the extraction of characteristics and genera classification.

**Methods:** A Cascaded-Automatic Segmentation approach was proposed. Firstly, image contrast between the border of an egg and its background for all samples was strengthened by the Radon-Like Features algorithm and the enhanced image was processed into a binary image to get an initial set. Then, the elliptical targets are located with Randomized Hough Transform (RHT). The fitted data of an elliptical border are considered the initial border data and the accurate border of a *Schistosoma japonicum* egg can be finally segmented using an Active Contour Model (Snake).

**Results:** Seventy-three cases of *Schistosoma japonicum* eggs in fecal samples were found; 61 images contained a parasite egg and 12 did not. Although the illumination, noise pollution, boundary definitions of eggs, and egg position are different, they are all segmented and labeled accurately.

**Discussion:** The results proved that accurate borders of *Schistosoma japonicum* eggs could be recognized precisely using the proposed method, and the robustness of the method is good even in images with heavy noise. This indicates that the proposed method can overcome the disadvantages of the traditional threshold segmentation method, which has limited adaptability to images with heavy background noise.

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