

Segmentation Using Multi-Thresholded Sobel Images: Application to the Separation of Stuck Pollen Grains

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Abstract : Being able to identify biological particles such as spores, viruses, or pollens is important for health care professionals, as it allows for appropriate therapeutic management of patients. Optical microscopy is a technology widely used for the analysis of these types of microorganisms, because, compared to other types of microscopy, it is not expensive. The analysis of an optical microscope slide is a tedious and time-consuming task when done manually. However, using machine learning and computer vision, this process can be automated. The first step of an automated microscope slide image analysis process is segmentation. During this step, the biological particles are localized and extracted. Very often, the use of an automatic thresholding method is sufficient to locate and extract the particles. However, in some cases, the particles are not extracted individually because they are stuck to other biological elements. In this paper, we propose a stuck particles separation method based on the use of the Sobel operator and thresholding. We illustrate it by applying it to the separation of 813 images of adjacent pollen grains. The method correctly separated 95.4% of these images.

Keywords : image segmentation, stuck particles separation, Sobel operator, thresholding

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