Abstract

Microarrays are novel and dominant techniques that are being made use in the analysis of the expression level of DNA, with pharmacology, medical diagnosis, environmental engineering, and biological sciences being its current applications. Studies on microarray have shown that image processing techniques can considerably influence the precision of microarray data. A crucial issue identified in gene microarray data analysis is to perform accurate quantification of spot shapes and intensities of microarray image. Segmentation methods that have been employed in microarray analysis are a vital source of variability in microarray data that directly affects precision and the identification of differentially expressed genes. The effect of different segmentation methods on the variability of data derived from microarray images has been overlooked. This article proposes a methodology to investigate the accuracy of spot segmentation of a microarray image, using morphological image analysis techniques, watershed algorithm and iterative watershed algorithm. The input to the methodology is a microarray image, which is then subjected to spotted microarray image preprocessing and gridding. Subsequently, the resulting microarray sub grid is segmented using morphological operators, watershed algorithm and iterative watershed algorithm. Based on the precision of
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segmentation and its intensity profile, a formal investigation of the three segmentation algorithms employed (morphological operators, watershed algorithm and iterative watershed algorithm) is performed. The experimental results demonstrate the segmentation effectiveness of the proposed methodology and also the better of the three segmentation algorithms employed for segmentation.

Reference

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Iterative Watershed Algorithm