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Abstract
The purpose of this research was to develop a PC-based microscopic image analysis system for quantifying static and dynamic characteristics of cells. The image analysis system was constructed by two parts of cell counting of microfluidics and cell tracing. An automatic counting algorithm based on image processing and analysis was developed for cell counting of microfluidics. Image preprocessing techniques including color model transformation, image enhancement, image negative transformation, adaptive method for thresholding, and morphological processing were applied to eliminate background noise, enhance intensity of targets and complete entire configuration of targets. Two types of microfluidics images, saccharomycete cerevisiae and Latex corpuscular, were used to experimentally verify the feasibility of the microscopic image analysis system in the part of cell counting of microfluidics. Both k-means clustering method and nearest neighbor method were applied to build algorithms of cell tracing. The verification for algorithms of cell tracing was implemented by sequential images with simulated movements of straight lines and curve lines. E. coli. sequential images were used to test the feasibility of the microscopic image analysis system in the part of cell tracing.
The results show the accuracy of automatic cell counting in this research is statistically better than that of manual cell counting by chi-square test. The consumed time of cell tracing by nearest neighbor method has been reduced as compared with k-means clustering method. According to experimental testing and verification, the microscopic image analysis system in this research is feasible for automatic cell counting and cell tracing. In the future, algorithms for cell counting and tracing need to be modified for improving the accuracy of the system.
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