Abstract

A major challenge in microbial ecology is to develop reliable and facile methods of computer assisted microscopy that can analyze digital images of complex microbial communities at single cell resolution, and compute useful quantitative characteristics of their organization and structure without cultivation. The objective of the present study is to develop an automatic tool to identify and classify the bacterial growth phases of bacilli cells in digital microscopic cell images. Geometric features are used to identify the different growth phases of bacilli bacterial cells, namely, normal, grownup and about-to-divide. The current methods rely
on the subjective reading of profiles by a human expert based on the various manual staining methods. In this paper, we propose a method for bacterial cell classification based on their different growth phases by segmenting digital bacilli bacterial cell images and extracting geometric features for cell growth phase identification and classification using 3σ. classifier, k-NN classifier, Neural Network classifiers and Fuzzy classifiers. The experimental results are compared with the manual results obtained by the microbiology expert and demonstrate the efficacy of the proposed method.

Reference

Automatic Identification and Classification of Bacilli Bacterial Cell Growth Phases

Statistical Imaging methods”, IEEE Transactions on Medical Imaging”, 23(7), 807-820.

Index Terms

Computer Science Pattern Recognition

Key words

Cell classification segmentation

bacterial image analysis bacilli

cell growth phases k-NN classifier

Neural Network classifier 3σ classifier

Fuzzy classifier