

Proteomics and Genomics Signal Processing

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Abstract

Genomics and Proteomics engineering is an emerging field and involves with the biology, medicine, computer science and engineering. It is an interdisciplinary field and focus on the understanding of the structural and functional relationship among gene sequences. The related computational technologies can be classified as the DNA sequence and DNA mircoarray analysis methods. The DNA sequence analysis methods have been used to extract the useful information related to the sequence structure including the detection of the coding and non-coding regions in DNA sequence and the detection of the similarity among DNA sequences. But, the DNA microarray technology based on the parallel processing has been used to monitor the large scale gene expressions simultaneously. These two technologies have revolutionized the computational biology and biomedical informatics.

In this paper, we will discuss the traditional and advanced signal and image processing methods to analyze, model and interpret the DNA, RNA and protein sequences to gain insights into the dynamics of genomic functions for the early diagnosis of diseases and the development of more targeted drugs. We will mainly review the widely used statistical and nonstationary and stationary signal and image processing methods for the DNA structure prediction, detection, feature extraction, and classification of differentially expressed genes. We will mainly discuss the wavelet transform applications in DNA sequence analysis, and on cellular neural network in microarray image analysis, which can have a potentially large impact on the real-time realization of DNA analysis.