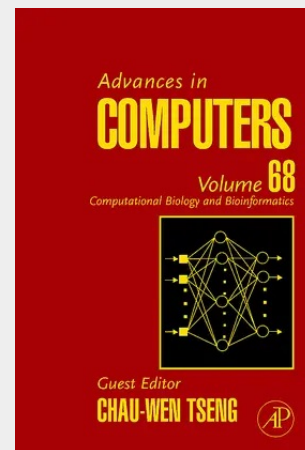


Advances in Computers: Computational Biology and Bioinformatics

The field of bioinformatics and computational biology arose due to the need to apply techniques from computer science, statistics, informatics, and applied mathematics to solve biological problems. Scientists have been trying to study biology at a molecular level using techniques derived from biochemistry, biophysics, and genetics. Progress has greatly accelerated with the discovery of fast and inexpensive automated DNA sequencing techniques. As the genomes of more and more organisms are sequenced and assembled, scientists are discovering many useful facts by tracing the evolution of organisms by measuring changes in their DNA, rather than through physical characteristics alone. This has led to rapid growth in the related fields of phylogenetics, the study of evolutionary relatedness among various groups of organisms, and comparative genomics, the study of the correspondence between genes and other genomic features in different organisms. Comparing the genomes of organisms has allowed researchers to better understand the features and functions of DNA in individual organisms, as well as provide insights into how organisms evolve over time. The first four chapters of *Advances in Computers* focus on algorithms for comparing the genomes of different organisms. Possible concrete applications include identifying the basis for genetic diseases and tracking the development and spread of different forms of Avian flu. As researchers begin to better understand the function of DNA, attention has begun shifting towards the actual proteins produced by DNA. The final two chapters explore proteomic techniques for analyzing proteins directly to identify their presence and understand their physical structure.



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