

# Foreword

## Bioinformatics: From molecules to systems

Bioinformatics is not a new discipline. It has been in vogue for nearly one hundred years, ever since the analysis of biological processes using mathematical or quantitative techniques was initiated. Computational models were developed in many areas, particularly in ecology, enzymology and metabolism, with reasonable success. Attempts could not be made to simulate actual real world systems due to a lack of computing power. In the last three decades we have witnessed an explosion in our ability to generate data in the area of nucleotide sequences and protein structure, simultaneous gene expression data for thousands of genes, protein-protein interaction data and so on. Fortunately, the computing power required to analyse such information has also kept pace.

Recently, bioinformatics has emerged as a discipline in which emphasis is given to curate, store and analyse large volumes of data. However, in order to comprehend biological processes and reactions, it is necessary to carry out large scale modelling and simulation. Attempts were made to develop computational frameworks to simulate large systems such as a cell; and rudimentary simplified cells or organs were modelled with some success. But it became obvious that methods were still not available to model all the complexities that exist even in simple bacterial cells. Bioinformatics today is the application of computational methods to understand the behaviour of a single molecular species or a large ensemble as in cells and tissues. The collection of articles in this Special Issue reflects this diversity in the field. The articles range from analysing molecular interactions at the atomic level to systems-level simulations. The major areas covered by the articles are DNA regulatory site characterization, protein structure analysis and predictions, analysis of metabolic pathways, gene networks and microarray data analysis.

This Special Issue is based on presentations made at *The International Conference on Bioinformatics for the year 2006* (INCOB2006), which was held in New Delhi from December 18-20, 2006. This is an annual conference sponsored by the Asia Pacific Bioinformatics Network (APBIONET). The meeting was organized in India with the support of the Department of Biotechnology, Council of Scientific and Industrial Research, Department of Science and Technology, Jawaharlal Nehru University and the Indian Institute of Technology, New Delhi. In response to the call for papers for this Special Issue, we received a very large number of excellent manuscripts. I regret that we had to refuse a number of them due to a limitation on size. Therefore, this issue is not a reflection of INCOB-2006, but only a glimpse. I sincerely hope that it will be useful both to experts as well as lay readers.

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