Basic Concepts of Genomics & Bioinformatics

Basics of Bioinformatics is a concise yet inclusive book of bioinformatics for understanding of the essentials of genomics and bioinformatics, and to integrate this with use of computational platforms. Written for students and researchers wishing to develop their knowledge of bioinformatics to facilitate their own research, the basics of genomics and bioinformatics are explained in simple context, followed by practical use of computational tools available to solve biological research problems. Important areas of bioinformatics including mining of biological databases, sequence alignment, gene prediction, molecular phytogenetics, structural bioinformatics, genomics and proteomics are described in the book. The book does not emphasizes the details of computer science or sophisticated programming skills but supports the need of students and researchers wishes to analyse bioinformatics problems. Technical details of work algorithms are explained with a minimum use of mathematical formulas and with graphical illustrations to aid understanding. The authors believe that the book will be useful for easy grasping of computational ideas and subsequent use of existing bioinformatics tools more effectively, and advancement of research goals by envisioning new computational goals in biological researches.

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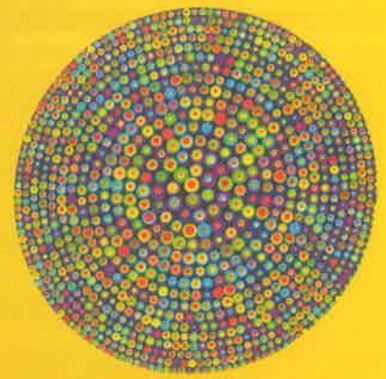

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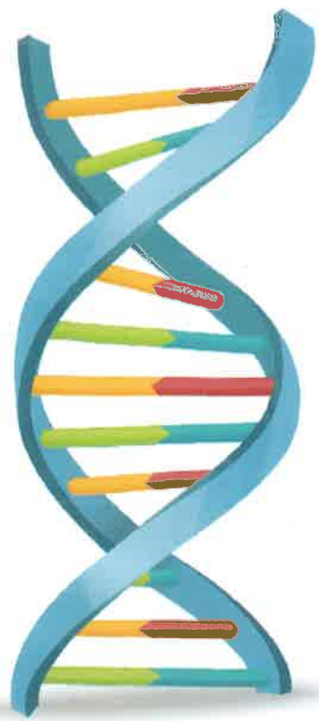

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Preface

The "omics" technologies are generating an extraordinary amount of information at an unprecedented speed. Bioinformatics as tool of data acquisition, storage, analysis and integration of these information have become central themes of modern biological research. Therefore, a sound knowledge of bioinformatics has become imperative for the new generation of biologists to handle the new challenges in the omics era. Conceptualization of writing this book was to support this important dimension of biological research with a comprehensive coverage on the recent bioinformatics topics in a concise manner.

This book is aimed at graduate and undergraduate students in biology and researchers in molecular biology. An in-depth knowledge on computer algorithms is not a prerequisite for understanding the fundamental principles of bioinformatics explained in the book. The book covers basics of database, retrieval of data, software programs for data analysis. Emphasis has put on theoretical basis and practical applications of these computational tools for analysis of molecular biology data. This book is organized in such a way to cover basic topics of bioinformatics, such as biological databases, sequence alignment, genes prediction, molecular phytogenetics, structural bioinformatics, genomics and proteomics. Since this book is primarily for molecular biologists, very few mathematical formulas are used. A small number of carefully chosen formulas are used where they are absolutely necessary to understand a particular concept. Most of the programs described in this book are online tools that are freely available and are user-friendly. It would be impractical and beyond the scope of this book to provide detail manual for every software program, hence the authors insist the user to make special efforts to learn the intricacies of using the programs. The authors would like to thank all the scientists, students and research scholars who have contributed chapters for the book. We sincerely hope that the book will be useful as guide for use of bioinformatics tools for advancement of research goals in the area of molecular biology.

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