

Mathematics of Bioinformatics: Theory, Methods and Applications

By Matthew He, Sergey Petoukhov

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Mathematics of Bioinformatics: Theory, Methods, and Applications provides a comprehensive format for connecting and integrating information derived from mathematical methods and applying it to the understanding of biological sequences, structures, and networks. Each chapter is divided into a number of sections based on the bioinformatics topics and related mathematical theory and methods. Each topic of the section is comprised of the following three parts: an introduction to the biological problems in bioinformatics; a presentation of relevant topics of mathematical theory and methods to the bioinformatics problems introduced in the first part; an integrative overview that draws the connections and interfaces between bioinformatics problems/issues and mathematical theory/methods/applications.

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Editorial Review

Review

From the Back Cover
Mathematical methods that illuminate fundamental problems related to the genetic code and bioinformatics

Mathematics of Bioinformatics: Theory, Practice, and Applications provides a comprehensive blueprint for connecting and integrating information derived from mathematical methods and applying it to the understanding of biological sequences, structures, and networks. It offers valuable knowledge about mathematical tools, phenomenological results, and interdisciplinary connections in the fields of molecular genetics, bioinformatics, and informatics.

Each chapter is divided into sections based on bioinformatics topics and related mathematical theory and methods. Each topic is comprised of an introduction to the biological problems in bioinformatics; a presentation of topics in mathematical theory and methods relevant to the problems; and an integrative overview that draws the connections and interfaces between the problems, theory, methods, and applications. This practical resource:

- Covers genetic codes, sequences, structures, functions, biological networks/systems, and interfaces with mathematics, making connections between mathematics and bioinformatics for the bioinformatics specialist
- Provides integrative models for potential simulations, modeling, and implementation utilizing algorithms and analysis for the computer scientist
- Details recent research covering other branches of mathematics such as linear algebra, topology, differential geometry, fractals, and chaos theory that have found useful applications in bioinformatics
- Emphasizes applications of mathematics in bioinformatics while eschewing mathematical proofs and deep theories

Mathematics of Bioinformatics is intended for scientists, researchers, and upper-level undergraduate and graduate students in bioinformatics, mathematics, computer informatics, theoretical biology, mathematical biology, and biotechnology who seek information on the possibilities and challenges of interface between mathematics and bioinformatics. Readers with a foundation in calculus can also adapt to the mathematical topics introduced throughout.

About the Author
Matthew He, PhD, is Full Professor and Director of the Division of Math, Science, and Technology of Nova Southeastern University, Florida. He is Full Professor and Grand PhD from the World Information Distributed University, Belgium, since 2004. Dr. He has published more than 100 research papers in mathematics, computer science, information theory, and bioinformatics, and is an editor of both International Journal of Biological Systems and *International Journal of Cognitive Informatics and Natural Intelligence.*

Sergey Petoukhov, PhD, is a chief scientist of the Department of Biomechanics, Mechanical Engineering Research Institute of the Russian Academy of Sciences, Moscow, as well as Full Professor and Grand PhD

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