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## Preface

Data mining techniques are applied in a great variety of practical problems nowadays. With the overwhelming growth of the amounts of data arising in diverse areas, the development of appropriate methods for extracting useful information from this data becomes a crucial task.

Biomedicine has always been one of the most important areas where information obtained from massive datasets can assist medical researchers and practitioners in understanding the structure of human genome, exploring the dynamics of human brain, disease diagnosis and treatment, drug discovery, etc. Data mining techniques play an essential role in analyzing and integrating these datasets, as well as in discovering biological processes underlying this data.

This volume presents a collection of chapters covering various aspects of data mining problems in biomedicine. The topics include new approaches for the analysis of biomedical data, applications of data mining techniques to diverse problems in medical practice, and comprehensive reviews of recent trends in this exciting research area.

A significant part of the book is devoted to applications of data mining techniques in genomics. The success of the Human Genome Project has provided the data on the DNA sequences of the human genome. New tools for analyzing this data have been recently developed, including the widely used DNA microarrays. A number of chapters present novel approaches to microarray data analysis with applications in disease diagnosis based on gene expression profiling.

Analyzing protein structure and protein fold prediction is another interesting research field addressed in this volume. The methods discussed here include global optimization models and topological methods that proved to be applicable in practice.

One more exciting research area discussed in this book deals with data mining techniques for studying human brain dynamics. Recent advances in this field are associated with the extensive use of electroencephalographic (EEG) recordings, which can be treated as a quantitative representation of

the brain function. The analysis of EEG data combines different methodologies, including statistical preprocessing and hypothesis testing, chaos theory, classification models, and network-based techniques.

Moreover, several chapters present new promising methodological frameworks for addressing data mining problems in biomedicine, including Logical Analysis of Data, Sparse Component Analysis, and Entropy Minimization.

We believe that this book will be of interest to both theoreticians and practitioners working in diverse fields of biomedical research. It can also be helpful to graduate students and young researchers looking for new exciting directions in their work.

We would like to take the opportunity to thank the authors of the chapters for their valuable contributions, and Springer staff for their assistance in producing this book.

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