Chapter

Introductory Chapter: Computational Methods in Biomedical Engineering and Biotechnology

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1. Introduction

Computers have significantly changed everyone's daily lives since the first computer came to the world. With the rapid development of medical care and biomedical technologies, the requirements for computational methods and programs in biomedical engineering and biotechnology are becoming higher and higher [1]. Traditional biomedical and clinical data collection and analysis methods are replaced by computer programs that can predict clinical decisions. As a result, more cost-effective and powerful computing methods and programs have been replaced by expensive equipment, tests, and examinations.

There is no doubt that a large number of biomedical and clinical data, such as signals and images, cannot be extracted by human eyes. The rapid development of computer programs has provided great help to solve such problems. Computer programs can truly simulate abstract models of specific or equivalent clinical systems [2]. Computer models have become a useful part of mathematical modelling of many natural systems, including psychology, physiology, biology, biomedicine and biotechnology, as well as all branches of bioengineering, in order to better understand the work of the systems mentioned above.

With the fast development of biomedical engineering, electronics and computer technologies, computational methods and programs have attracted much interest in biomedical signal and imaging processing over the past 2 decades [3–5]. Effective computational approach and devices need to be developed to analyse complex data and to provide clinician and health care providers a prominent recommendation and prediction. The applications of computer methods and programs in biological signals and imaging have attracted the attention of researchers all over the world. Many computational methods and devices have been proposed, tested, implemented and analysed in biotechnology and biomedical engineering applications. Although the application of computer methods and programs has both advantages and advantages. Obviously, they have more advantages than their limitations, and it is certain that computer methods and programs will dominate all fields of biomedicine and bioengineering.

With the design of more advanced computer methods and programs, it is expected that the methods and equipment for processing the data generated by these systems need to be improved accordingly. These new methods not only help to extract new knowledge, which is difficult to obtain from existing traditional interpretations, but also lay a foundation for providing fast prediction information

and helping clinicians make better clinical decisions. As shown in the chapters, these changes need to address both the size and complexity of the generated data.

The book 'Computer Methods and Programs in Biomedical Signal and Image Processing' aims to provide a brief update to the current status of and advances in the computer methods and programs used for the development of the theory and practice of biomedical signal and image communication. The book comprises a collection of invited manuscripts, written in a convenient way and manageable length. These timely collections will provide an invaluable resource for initial enquiries about technologies and encapsulating the latest developments and applications with reference sources for further detailed information. The methods described in this book cover a wide range of computational algorithms that are widely used in bioengineering and biomedicine. The content and format are specifically designed to stimulate the further development and application of these technologies by reaching out to the non-specialist across a wide audience.

This book is intended to expose the latest developments of scientists and engineers, covering a variety of complementary topics, with a view to enhancing people's overall understanding of the computer science and biomedical image communications. It will benefit students, scientists and researchers in applied computer science. Engineers and clinicians working in imaging will also find this book very useful. I hope you will enjoy this book.

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