Preface

In medical decision making, it is very important to take into account experience of medical doctors – and thus, to supplement traditional statistics-based data processing techniques with methods of computational intelligence, methods that allow us to take this experience into account.

In some cases, the existing computational intelligence techniques – often, after creative modifications – can be efficiently used in biomedical applications. Examples of such applications are given in the first part of this book. The corresponding applications deal with diagnostics and treatment of different types of cancer, cardiac diseases, pneumonia, stroke, and many other diseases – including Covid-19.

Biomedical problems are difficult. As a result, in many situations, the existing computational intelligence techniques are not sufficient to solve the corresponding problems. In such situations, we need to develop new techniques – and, ideally, first show their efficiency on other applications, to make sure that these techniques are indeed efficient. Such techniques and their applications are described in the second part of this book. The corresponding applications include optimization (i.e., single-criterion decision making), multi-criteria decision making, applications to agriculture, to computer networks, to economics and business, to pavement engineering, to politics, to quantum computing, to robotics, and to many other areas. The fact that these techniques are efficient in so many different areas makes us hope that they will be useful in biomedical applications as well.

We hope that this volume will help practitioners and researchers to learn more about computational intelligence techniques and their biomedical applications – and to further develop this important research direction.

We want to thank all the authors for their contributions and all anonymous referees for their thorough analysis and helpful comments.

The publication of this volume was partly supported by Thang Long University and by the Institute of Information Technology, Vietnam Academy of Science and Technology – both in Hanoi, Vietnam. Our thanks to the leadership and staff of these institutions for providing crucial support. Our special thanks to Prof. Hung T. Nguyen for his valuable advice and constant support.

We would also like to thank Prof. Janusz Kacprzyk (Series Editor) and Dr. Thomas Ditzinger (Senior Editor, Engineering/Applied Sciences) for their support and cooperation with this publication.

December 2020
Nguyen Hoang Phuong
Vladik Kreinovich