Editorial

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Biographical notes: Syed N. Mujahid has received his doctorate in the Industrial and Systems Engineering from the University of Florida. Currently he serves as an Assistant Professor in the Systems Engineering Department at the King Fahd University of Petroleum and Minerals. His research areas include mathematical programming, network analysis, data analysis and machine learning.

Dmytro Korenkevych has graduated with a PhD degree from the Department of Industrial and Systems Engineering at University of Florida. In his research work he focuses on machine learning inspired approaches to biomedical data analysis. His research interests lie in machine learning, combinatorial optimisation and artificial intelligence fields.

Panos M. Pardalos serves as Distinguished Professor of Industrial and Systems Engineering at the University of Florida. He is also an affiliated faculty member of the Computer and Information Science Department, the Hellenic Studies Center, and the Biomedical Engineering Program. He is also the Director of the Center for Applied Optimization. He is a world leading expert in global and combinatorial optimisation. His recent research interests include network design problems, optimisation in telecommunications, e-commerce, data mining, biomedical applications, and massive computing. He was awarded the 2013 EURO Gold medal and the Cartheodory Prize in 2013.

Data driven modelling and analysis is one of the key research tools in the current information age. It is one of the most widespread tools covering engineering, sciences, medicine and other interdisciplinary scientific areas of research. Specifically, applying data analysis techniques to the data collected from the biomedical field proved fruitful over the past decade in the understanding of the complexities of the biomedical systems. It is now evident that the computational biomedical community needs to be strictly interdisciplinary, where the data are typically collected by medical professionals, and are analysed by engineering professionals.

It has been observed over the years that the computational biomedical research involving purely medical professionals is strong at the data collection side. However, the analysis of the data in such cases merely depends upon the usage of the commercial data analysis software. On the other side, the computational biomedical research involving purely engineering professional typically does not involve the data collection phase, and often involves simulated data. Moreover, the research is focused towards the development of highly complex and tailored data analysis methods that are not commercially available. One of the challenges in collaboration between these communities is "communication". Generally, it takes time to present the problem and the tools available at hand. If the data were collected keeping in mind the requirements of the data analysis algorithms, or if the data analysis algorithm were initially designed based on the real-world data collection scenarios, the interdisciplinary research could be accelerated as well. Thus, a platform where both the communities interact and present the topics and methods of research is very crucial for the success of this interdisciplinary field.

The International Conference on Computational Biomedicine (CBM 2012), held during 29 February – 2 March 2012 in Gainesville, Florida, is one such attempt to bring the communities together. The purpose of this conference was to bring together scientists and engineers who work in Biomedical and Operation Research (OR) fields. Researchers from industry and universities were invited to exchange knowledge and results in a quickly growing area of computational problems arising in biomedical data analysis. Application of data mining and optimisation techniques to this kind of problems has proven to be very beneficial, and many excellent results were obtained on the edge of these fields.

The current special issue of *International Journal of Bioinformatics Research and Applications* (*IJBRA*) includes manuscripts of some of the selected presentations at the CBM 2012. The topics covered in this special issue include:

- Integrating edge detection and fuzzy connectedness for automated segmentation of anatomical branching structures.

- Perpendicular Fibre Tracking for Neural Fibre Bundle Analysis using Diffusion MRI.

- Space Pruning Monotonic Search for the Non-unique Probe Selection Problem.

- A Linearly Convergent First-order Algorithm for Total Variation Minimisation in Image Processing.

- Uses and challenges of bioinformatic tools in mass spectrometric-based proteomic brain perturbation studies.

- Learning dependence from samples.

- Vectorial Total Variation Regularisation of Orientation Distribution Functions in Diffusion Weighted MRI.

We are grateful to Dr. Yi Pan, the Editor-in-Chief of the *IJBRA* journal, for his support, encouragement and willingness to dedicate a special issue of *IJBRA* to CBM 2012. Also, the help from the staff members at *IJBRA* for being patient and attentive during the publication of this issue is very commendable. It is hoped that this *IJBRA* issue will make a good reference material and be of great use for the researchers in computational biomedicine field. We hope that the readers will enjoy reading these manuscripts as much as the conference attendees enjoyed listening the presentations at the conference.