

## Preface

This volume of the Springer Lecture Notes in Computer Science series contains the contributions presented at the International Symposium on Knowledge Exploration in Life Science Informatics (KELSI 2004) held in Milan, Italy, 25–26 November 2004. The two main objectives of the symposium were:

- To explore the symbiosis between information and knowledge technologies and various life science disciplines, such as biochemistry, biology, neuroscience, medical research, social sciences, and so on.
- To investigate the synergy among different life science informatics areas, including cheminformatics, bioinformatics, neuroinformatics, medical informatics, systems biology, socionics, and others.

Modern life sciences investigate phenomena and systems at the level of molecules, cells, tissues, organisms, and populations. Typical areas of interest include natural evolution, development, disease, behavior, cognition, and consciousness. This quest is generating an overwhelming and fast-growing amount of data, information, and knowledge, reflecting living systems at different levels of organization. Future progress of the life sciences will depend on effective and efficient management, sharing, and exploitation of these resources by computational means.

*Life science informatics* is fast becoming a generic and overarching information technology (IT) discipline for the life sciences. It includes areas such as cheminformatics, bioinformatics, neuroinformatics, medical informatics, socionics, and others. While the precise scientific questions and goals differ within the various life science disciplines, there is a considerable overlap in terms of the required key IT methodologies and infrastructures. Critical technologies include *databases*, *information bases* (i.e., containing aggregated, consolidated, derived data), *executable models* (i.e., knowledge-based and simulation systems), and *emerging grid computing* infrastructures and systems (facilitating seamless sharing and interoperation of widely dispersed computational resources and organizations). These base technologies are complemented by a range of enabling methodologies and systems such as knowledge management and discovery, data and text mining, machine learning, intelligent systems, artificial and computational intelligence, human-computer interaction, computational creativity, knowledge engineering, artificial life, systems science, and others.

This symposium was a first step towards investigating the synergy of these knowledge and information technologies across a wide range of life science disciplines.

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Jesús A. López  
Emilio Benfenati  
Werner Dubitzky



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