The series *Studies in Computational Intelligence* (SCI) publishes new developments and advances in the various areas of computational intelligence – quickly and with a high quality. The intent is to cover the theory, applications, and design methods of computational intelligence, as embedded in the fields of engineering, computer science, physics and life science, as well as the methodologies behind them. The series contains monographs, lecture notes and edited volumes in computational intelligence spanning the areas of neural networks, connectionist systems, genetic algorithms, evolutionary computation, artificial intelligence, cellular automata, self-organizing systems, soft computing, fuzzy systems and hybrid intelligent systems. Critical to both contributors and readers are the short publication time and worldwide distribution – this permits a rapid and broad dissemination of research results.

Statistical implicative analysis is a data analysis method created by Régis Gras almost thirty years ago which has a significant impact on a variety of areas ranging from pedagogical and psychological research to data mining. Statistical implicative analysis (SIA) provides a framework for evaluating the strength of implications; such implications are formed through common knowledge acquisition techniques in any learning process, human or artificial. This new concept has developed into a unifying methodology, and has generated a powerful convergence of thought between mathematicians, statisticians, psychologists, specialists in pedagogy and last, but not least, computer scientists specialized in data mining.

This volume collects significant research contributions of several rather distinct disciplines that benefit from SIA. Contributions range from psychological and pedagogical research, bioinformatics, knowledge management, and data mining.
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Statistical implicative analysis (SIA) provides a framework for evaluating the strength of implications; such implications are formed through common knowledge acquisition techniques in any learning process, human or artificial. Therefore, the epistemological interest of SIA is, in my opinion, of universal interest for researchers. In many applications implications appear as "rules" and, as it is often the case, rules have exceptions. SIA provides a powerful instrument for quantifying the quality of a rule taking into account the reality of these exceptions. Many applications, especially in data mining, extract large sets of rules that are impossible to assimilate by humans and used efficiently in decision processes. Therefore, it is important to develop measures of interestingness for these rules and the success of SIA-based techniques in this direction is indisputable.

This volume collects significant research contributions of several rather distinct disciplines that benefit from SIA. Contributions range from psychological and pedagogical research, bioinformatics, knowledge management, and data mining.

The first applications of SIA were in the realm of didactics and this field is richly represented here by several contributions that focus on such diverse problems as didactics of algebra and geometry, the teaching of functions representations and graphing, Bayesian inference, and student representations of physical activities.

Interesting data mining applications authored by leading researchers in the field range from applying SIA in the study of rules produced by decision trees, association rules generated by the analysis of transactional data, tempo-
eral rules, measures of interestingness for various types of rules, and hierarchical
organization of rules. A novel method for analyzing DNA microarrays is for-
mulated using SIA concepts. Furthermore, applications of SIA to the study of
ontologies and textual taxonomies, as well as applications to fuzzy knowledge
discovery are also included.

We have here a new volume that confirms the validity of a novel and
powerful statistical methodology, though many convincing applications. The
contributors have done a masterful job of exposition.

After reading this book, I have in mind a few applications of SIA in my own
research. I am convinced that the readers will find this volume as stimulating
as I did.

Boston, 
September, 2007

Prof. Dan A. Simovici
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Nantes, December 2007

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