

PREFACE

In general, "Computational modeling" uses computer science methods, techniques and tools to study the behavior of different types and categories of artificial as well as natural systems – socio-technical (e.g. business and engineering), biological, physical and chemical systems. A computational model is a computational representation of the specific object, process or phenomenon finally developed in a form of computer program. It means that the model can be run on specific hardware/software architecture and advanced analysis of the structure or behavior of such artificial system may be conducted. Nowadays, thanks to advances in computer science, computational modeling is used in many application domains. This monograph is focused on computational models related to business and engineering systems where there is a need to understand how the complex system will behave under specific conditions. In such cases intuitive analytical solutions are not always available (sometimes even possible) or do not provide a solution in a reasonable time. The results of a computational model analysis can help researchers to make predictions about what will happen in the real systems that are being studied in response to changing conditions. What is more, operation theories can be derived/deduced and verified on the basis of computational experiments. Rather than deriving a mathematical analytical solution to the problem, experimentation with the model is done by adjusting the parameters of the system in the computer program (computational representation of the model), and studying the differences in the outcome of the experiments. A computational model may contain numerous variables that characterize the system under study and computational analysis is done by adjusting these variables and observing how the changes affect the outcomes predicted by the model. Modeling can expedite research by allowing scientists to conduct thousands of experiments at a relatively low cost.

This issue of a monograph concerns the most recent problems solutions and new approaches in the form of models, algorithms, techniques and methods for computational modeling and analysis used in applications of intelligent and information systems to business and engineering domains. The topics we consider as most important, which have been included in this issue are:

- Automatic control systems models
- Computational intelligence models
- Knowledge discovery and data mining models
- Natural language processing models
- Agent-oriented software engineering models
- Computational models and simulation
- Business intelligence models

We hope that this monograph constitutes a valuable source of knowledge for experts in the field of modern ICT solutions as well as for practical users.

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