

## Review of *Interactive Collaborative Information Systems*

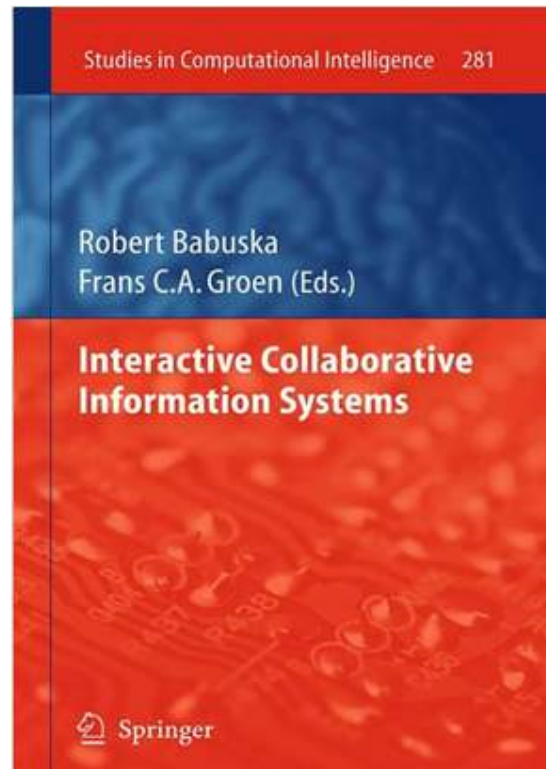
by **Robert BABUSKA** and **Frans GROEN**

The first edition of the book *Interactive Collaborative Information Systems* has been published in February 2010 at Springer Publishing House, with ISBN 978-3-642-11687-2. The main editor, Dr. Robert BABUSKA, is Professor at Delft University of Technology, Netherlands. His research interest includes fuzzy modeling and identification, nonlinear and fuzzy control and applications. He teaches Control Engineering, Control Systems and Knowledge-Based Control Systems. Dr. Frans GROEN is Professor at Faculty of Science, Informatics Institute in Netherlands.

This book focuses on the employment of innovative agent technology, advanced machine learning techniques, and cognition-based interface technology for the use in collaborative decision support systems.

This work continues the series of prestigious collection of *Studies in Computational Intelligence* which have published, over the years, exceptional works, this volume being the 281th.

The editors, Robert BABUSKA and Frans GROEN, have successfully realized a book with 595 pages, structured in five parts.



The *Part I – Reinforcement learning* is the main subject of the first part of the book and contains the followings chapters:

- *Approximate Dynamic Programming and Reinforcement Learning*: this chapter focuses on an approximate solution for reinforcement learning given a representation with continuous states; the contributors of this chapters are Lucian BUSONIU, Bart De SCHUTTER, and Robert BABUŠKA;
- *Learning with Whom to Communicate Using Relational Reinforcement Learning*: exploits relational structures to come up with strategies for multi-agent systems; this chapter was realized by Marc PONSEN, Tom CROONENBORGHS, Karl TUYLS, Jan RAMON, Kurt DRIESENS, Jaap van den HERIK, and Eric POSTMA;
- *Switching between Representations in Reinforcement Learning*: investigates when to switch online between feature sets representing the states; the authors of this chapter are Harm van SEIJEN, Shimon WHITESON, and Leon KESTER.

The *Part II – Collaborative decision making* is given to describe cooperation between multiple agents under uncertainty and is structured in four chapters:

- *A Decision-Theoretic Approach to Collaboration: Principal Description Methods and Efficient Heuristic Approximations*: in this chapter are presented approximate solution methods for these cases; the authors are Frans A. OLIEHOEK and Arnoud VISSER;

- *Efficient Methods for Near-Optimal Sequential Decision Making under Uncertainty*: discusses both Bayesian and distribution-free algorithms for sequential decision making when costs are known; this chapter was realized by Christos DIMITRAKAKIS;
- *Ant Colony Learning Algorithm for Optimal Control*: in this chapter an optimization heuristic is used and a novel algorithm is introduced in which the artificial agents (ants) work together to collectively learn optimal control policies; this chapter is realized by Jelmer Marinus van AST, Robert BABUŠKA, and Bart De SCHUTTER;
- *Map-Based Support for Effective Collaboration in Micro-Mobile Virtual Teams*: presents collaboration in geo-spatial support systems where the maps aid the distributed decision-making process; this chapter has the followings authors: Guido de BRAKE and Rick van der KLEIJ.

The *Part III – Computer-human interaction modeling* has the followings chapters:

- *Affective Dialogue Management Using Factored POMDPs*: shows that partially observable Markov decision processes are appropriate for this purpose and presents a novel approach to develop an affective dialogue model; the authors are Trung H. BUI, Job ZWIERS, Mannes POEL, and Anton NIJHOLT;
- *Context-Aware Multimodal Human-Computer Interaction*: presents multimodal interaction techniques including speech, lip movement, facial expression, and text and visual communication; the authors of this chapter are Siska FITRIANIE, Zhenke YANG, Dragos DATCU, Alin G. CHITU, and Léon J.M. ROTHKRANTZ;
- *Design Issues for Pen-Centric Interactive Maps*: focuses on pen-input recognition systems, in particular on new features for classifying iconic gestures; the authors are Louis VUURPIJL, Don WILLEMS, Ralph NIELS, and Marcel van GERVEN;
- *Interacting with Adaptive Systems*: present the response of users to intelligent systems showing adaptive behavior; this chapter was realized by Vanessa EVERS, Henriette CRAMER, Maarten van SOMEREN, and Bob WIELINGA;
- *Example-Based Human Pose Recovery under Predicted Partial Occlusions*: deals with that topic also in the case when partial occlusion occur; the chapter is realized by Ronald POPPE.

The *Part IV – Architectures for distributed agent actor communities* has the topic the architecture of intelligent decision-making system, which is an important glue that lets all the parts work together, and contains:

- *Agility and Adaptive Autonomy in Networked Organizations*: addresses the tradeoff in a multi-actor environment between global coordination of activities and respecting the autonomy of the actors involved; the authors are Martijn NEEF and Bob van der VECHT;
- *Adaptive Hierarchical Multi-agent Organizations*: present the underlying principles of multi-agents organizations that are not only hierarchical, but that can also adapt their structure; the authors of this chapter are Mattijs GHIJSEN, Wouter N. H. JANSWEIJER, and Bob J. WIELINGA;
- *Method for Designing Networking Adaptive Interactive Hybrid Systems*: the various architectures for this type of systems are given and a top-down design methodology is introduced; this chapter is written by Leon KESTER.

The *Part V – Case studies and applications* is structured in:

- *A Call for Sense making Support Systems in Crisis Management*: in this chapter the information challenges in crisis management are explored and three case studies are

- investigated; the authors are Willem J. MUHREN and Bartel Van de WALLE;
- *A Distributed Approach to Gas Detection and Source Localization Using Heterogeneous Information*: a system for early detection of gaseous substances and coarse source estimation is presented by using heterogeneous sensor measurements and human reports; the authors are Gregor PAVLIN, Frans GROEN, Patrick de OUDE, and Michiel KAMERMANS;
  - *Traffic Light Control by Multiagent Reinforcement Learning Systems*: discusses extensions to improve a basic setting of multiple local controllers (agents), each responsible for the optimization of traffic lights around a single junction using reinforcement learning; the authors are Bram BAKKER, Shimon WHITESON, Leon KESTER, and Frans C. A. GROEN;
  - *Fusing Heterogeneous and Unreliable Data from Traffic Sensors*: deals with traffic data fusion from a variety of traffic sensors using conservation laws and Poisson statistics; this chapter has the authors Qing OU, Hans van LINT, and Serge P. HOOGENDOORN;
  - *Bayesian Networks for Expert Systems: Theory and Practical Applications*: shows the strength of Bayesian modeling approaches in three different applications: medical diagnosis support, petrochemical decision support and victim identification; this chapter is written by Wim WIEGERINCK, Bert KAPPEN, and Willem BURGERS.

Techniques that support humans in situations where is required to handle complex information are presented in the book *Interactive Collaborative Information Systems*. These techniques facilitate distributed decision-making process.

The increased complexity of the world requires new perspectives on the role of technology in human decision-making process. The people need new technology to cope with the increasingly complex and information-rich nature of the modern society.

In critical environments, like crisis management and traffic management, people need to engage in close collaborations with artificial systems in order to observe and understand the situation and respond in a sensible way.

The book *Interactive Collaborative Information Systems* integrates researches from information technology, artificial intelligence and human sciences fields in order to obtain a multidisciplinary foundation from which innovative collaborative actor-agent systems for critical environments can emerge.

The book emphasizes the importance of developing actor-agent communities: close collaborations between human and artificial actors that highlight their complementary capabilities in situations where task distribution is flexible and adaptive. (<http://www.springer.com/engineering/book/978-3-642-11687-2>).

**Professor Bogdan GHILIC-MICU, PhD**

ghilic@ase.ro

Economic Informatics Department, ASE Bucharest