Resource-Adaptive Cognitive Processes

Matthew W. Crocker, Jörg Siekmann (Eds.)
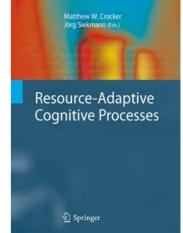
Cognitive Technologies Series

Ca. 400 pages; Euro 99.95, $129.00

Overview

The central topic of this book is the adaptation of cognitive processes to resource limitations, through evolutionary and developmental mechanisms in the case of humans and through artificial constructions in the case of computational systems. The construction and analysis of resource control in cognitive processes and an analysis of resource-adaptivity within the paradigm of concurrent computation are further topics.

The editors of this book integrated the results of a collaborative twelve-year research project that involved over fifty scientists. Following an introduction to resource-adaptive cognitive processes and self-adaptive systems, the editors organized fifteen chapters into three sections dealing with resource-bounded cognitive processses in human information processing, resource-adaptive processes in human—machine interaction, and resource-adaptive rationality in machines.

The book will benefit researchers in the fields of artificial intelligence, computer science, computational linguistics, connectionism and neural science, philosophy and psychology.

Introduction

- Resource-Adaptive Cognitive Processes [Jörg Siekmann, Matthew W. Crocker]

Part I – Resource-Bounded Cognitive Processes in Human Information Processing

- Visuo-spatial Working Memory as a Limited Resource of Cognitive Processing [Hubert D. Zimmer, Stefan Münzer, Katja Umla-Runge]
- From Resource-Adaptive Navigation Assistance to Augmented Cognition [Hubert D. Zimmer, Stefan Münzer and Jörg Baus]
- Error-Induced Learning as a Resource-Adaptive Process in Young and Elderly Individuals [Nicola K. Ferdinand, Anja Weiten, Axel Mecklinger, Jutta Kray]
- An ERP Approach to Study Age Differences in Cognitive Control Processes [Jutta Kray, Ben Eppinger]
- Simulating Statistical Power in Latent Growth Curve Modeling: A Strategy for Evaluating Age-Based Changes in Cognitive Resources [Timo von Oertzen, Paolo Ghisletta, Ulman Lindenberger]
- Conflicting Constraints in Resource-Adaptive Language Comprehension [Andrea Weber, Matthew W. Crocker, Pia Knoeferle]
- The Evolution of a Connectionist Model of Situated Human Language Understanding [Marshall R. Mayberry, Matthew W. Crocker]

Part II – Resource-Adaptive Processes in Human—Machine Interaction

- Assessment of a User's Time Pressure and Cognitive Load on the Basis of Features of Speech [Anthony Jameson, Juergen Kiefer, Christian Müller, Barbara Großmann-Hutter, Frank Wittig, Ralf Rummer]
- The Shopping Experience of Tomorrow: Human-Centered and Resource-Adaptive [Wolfgang Wahlster, Michael Feld, Patrick Gebhard, Dominikus Heckmann, Ralf Jung, Michael Kruppa, Michael Schmitz, Lübomira Spassova, Rainer Wasinger]
- Linguistic Processing in a Mathematics Tutoring System: Cooperative Input Interpretation and Dialogue Modelling [Magdalena Wolska, Mark Buckley, Helmut Horacek, Ivana Kruijff-Korbayova, Manfred Pinkal]
- Resource-Bounded Modelling and Analysis of Human-Level Interactive Proofs [Christoph Benzmüller, Marvin Schiller, Jörg Siekmann]

Part III – Resource-Adaptive Rationality in Machines

- Comparison of Machine Learning Techniques for Bayesian Networks for User-Adaptive Systems [Frank Wittig]
- Scope Underspecification with Tree Descriptions: Theory and Practice [Alexander Koller, Stefan Thater, Manfred Pinkal]
- Dependency Grammar: Classification and Exploration [Ralph Debusmann, Marco Kuhlmann]
- ΩMEGA: Resource-Adaptive Processes in Automated Reasoning Systems [Serge Autexier, Christoph Benzmüller, Dominik Dietrich, Jörg Siekmann]