Héctor Muñoz-Avila
Francesco Ricci (Eds.)

LNAI 3620

Case-Based Reasoning Research and Development

6th International Conference
on Case-Based Reasoning, ICCBR 2005
Chicago, IL, USA, August 2005, Proceedings

Springer

Series Editors

Jaime G. Carbonell, Carnegie Mellon University, Pittsburgh, PA, USA
Jörg Siekmann, University of Saarland, Saarbrücken, Germany

Volume Editors

Héctor Muñoz-Avila
Lehigh University, Department of Computer Science and Engineering
19 Memorial Drive West, Bethlehem, PA 18015, USA
E-mail: munoz@cse.lehigh.edu

Francesco Ricci
Electronic Commerce and Tourism Research Laboratory, ITC-irst
Via Solteri 38, Trento, Italy
E-mail: ricci@itc.it

Library of Congress Control Number: 2005930340

CR Subject Classification (1998): I.2, J.4, J.1, F.4.1

ISSN 0302-9743
ISBN-10 3-540-28174-6 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-28174-0 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2005
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 11536406 06/3142 5 4 3 2 1 0

The International Conferenc
eminent international meeti
(http://www.iccbr.org/ic
ternational conferences highli
of CBR. The conference took
campus of DePaul University
vious ICCBR conferences we
Canada (2001), Seeon, Germ
and Sesimbra, Portugal (199

Day 1 of ICCBR 2005 wa
ences utilizing CBR in fielde
CBR in the health sciences, t
simulation environments, and
comprised presentations and
well as invited talks from thr
College Cork, Craig Knoblo
Seifert, University of Michiga

The presentations and po
adaptation, applications, cas
soning, knowledge representa
knowledge acquisition, multia
tems, bioinformatics, and tex

This volume comprises pa
45 papers were chosen after
missions, the Program Comm
26 papers for poster present
one of three categories and
cal/methodological research
quality; and clarity). 2. App
search or innovative commer
clarity). 3. Deployed applicat
mental or economic significa
management and user accept

Many people participated
DePaul University, served as
University, and Francesco Ri
pecially like to thank Stefani
ing as Workshop Coordinator
and Bill Cheetham, GE Resea
gram Committee and the ad

Table of Contents

Invited Talks

The Virtue of Reward: Performance, Reinforcement and Discovery in Case-Based Reasoning
Derek Bridge 1

Learning to Optimize Plan Execution in Information Agents
Craig A. Knoblock 2

Cased-Based Reasoning by Human Experts
Colleen M. Seifert 4

Scientific Papers

Learning to Win: Case-Based Plan Selection in a Real-Time Strategy Game
David W. Aha, Matthew Molineaux, Marc Ponsen 5

An Ensemble of Case-Based Classifiers for High-Dimensional Biological Domains
Niloofar Arshadi, Igor Jurisica 21

Language Games: Solving the Vocabulary Problem in Multi-Case-Base Reasoning
Paolo Avesani, Conor Hayes, Marco Cova 35

Evaluation and Monitoring of the Air-Sea Interaction Using a CBR-Agents Approach
Javier Bajo, Juan M. Corchado 50

A Comparative Analysis of Query Similarity Metrics for Community-Based Web Search
Evelyn Balfe, Barry Smyth 63

A Case-Based Approach for Indoor Location
Carlos Bento, Joao Peixoto, Marco Veloso 78

P2P Case Retrieval with an Unspecified Ontology
Shlomo Berkovsky, Tsvi Kuflik, Francesco Ricci 91

Autonomous Internal Control System for Small to Medium Firms
M. Lourdes Borrajo, Juan M. Corchado, J. Carlos Yáñez, Florentino Fdez- Riverola, Fernando Díaz 106

The Application of a Case-Based Reasoning System to Attention-Deficit Hyperactivity Disorder
Donald Brien, Janice Glasgow, Douglas Munoz 122

Reasoning with Textual Cases
Stefanie Brüninghaus, Kevin D. Ashley 137

Using Ensembles of Binary Case-Based Reasoners
Bill Cheetham, Joe Shultz 152

Transfer in Visual Case-Based Problem Solving
Jim Davies, Ashok K. Goel, Nancy J. Nersessian 163

Generating Estimates of Classification Confidence for a Case-Based Spam Filter
Sarah Jane Delany, Pádraig Cunningham, Dónal Doyle, Anton Zamolotskikh 177

Improving Gene Selection in Microarray Data Analysis Using Fuzzy Patterns Inside a CBR System
Florentino Fdez-Riverola, Fernando Díaz, M. Lourdes Borrajo, J. Carlos Yáñez, Juan M. Corchado 191

CBR for State Value Function Approximation in Reinforcement Learning
Thomas Gabel, Martin Riedmiller 206

Using CBR to Select Solution Strategies in Constraint Programming
Cormac Gebruers, Brahim Hnich, Derek Bridge, Eugene Freuder 222

Case-Based Art
Andrés Gómez de Silva Garza, Arám Zamora Lores 237

Supporting Conversation Variability in COBBER Using Causal Loops
Hector Gómez-Gauchía, Belén Díaz-Agudo, Pedro Pablo Gómez-Martín, Pedro A. González Calero 252

Opportunities for CBR in Learning by Doing
Pedro Pablo Gómez-Martín, Marco Antonio Gómez-Martín, Belén Díaz-Agudo, Pedro A. González-Calero 267

Navigating Through Case Base Competence
Maarten Grachten, F. Alejandro García, Josep Lluís Arcos 282

A Knowledge-Intensive Method for Conversational CBR
Mingyang Gu, Agnar Aamodt 296

Re-using Implicit Knowledge in Short-Term Information Profiles for Context-Sensitive Tasks
Conor Hayes, Paolo Avesani, Emiliano Baldo, Pádraig Cunningham 312

Acquiring Similarity Cases for Classification Problems
Andrew Kinley 327

A Live-User Evaluation of Incremental Dynamic Critiquing
Kevin McCarthy, Lorraine McGinty, Barry Smyth, James Reilly 339

Case Based Representation and Retrieval with Time Dependent Features
Stefania Montani, Luigi Portinale 353

The Best Way to Instil Confidence Is by Being Right
Conor Nugent, Pádraig Cunningham, Dónal Doyle 368

Cooperative Reuse for Compositional Cases in Multi-agent Systems
Enric Plaza 382

Evaluating the Effectiveness of Exploration and Accumulated Experience in Automatic Case Elicitation
Jay H. Powell, Brandon M. Hauff, John D. Hastings 397

HYREC: A Hybrid Recommendation System for E-Commerce
Bhanu Prasad 408

Extending jCOLIBRI for Textual CBR
Juan A. Recio, Belén Díaz-Agudo, Marco Antonio Gómez-Martín, Nirmalie Wiratunga 421

Critiquing with Confidence
James Reilly, Barry Smyth, Lorraine McGinty, Kevin McCarthy 436

Mapping Goals and Kinds of Explanations to the Knowledge Containers of Case-Based Reasoning Systems
Thomas R. Roth-Berghofer, Jörg Cassens 451

An Approach for Temporal Case-Based Reasoning: Episode-Based Reasoning
Miquel Sánchez-Marré, Ulises Cortés, Montse Martínez, Joaquim Comas, Ignasi Rodríguez-Roda 465

How to Combine CBR and RBR for Diagnosing Multiple Medical Disorder Cases
Wenqi Shi, John A. Barnden 477

Case-Based Student Modeling Using Concept Maps
Frode Sørmo 492

Learning Similarity Measures: A Formal View Based on a Generalized CBR Model
Armin Stahl 507

Knowledge-Rich Similarity-Based Classification
Timo Steffens 522

Autonomous Creation of New Situation Cases in Structured Continuous Domains
Haris Supic, Slobodan Ribaric 537

Retrieval and Configuration of Life Insurance Policies
Alexander Tartakovski, Martin Schaaf, Ralph Bergmann 552

Analogical and Case-Based Reasoning for Predicting Satellite Task Schedulability
Pete Tinker, Jason Fox, Collin Green, David Rome, Karen Casey, Chris Furmanski 566

Case Adaptation by Segment Replanning for Case-Based Planning Systems
Flavio Tonidandel, Marcio Rillo 579

Selecting the Best Units in a Fleet: Performance Prediction from Equipment Peers
Anil Varma, Kareem S. Aggour, Piero P. Bonissone 595

CCBR-Driven Business Process Evolution
Barbara Weber, Stefanie Rinderle, Werner Wild, Manfred Reichert 610

CBR for Modeling Complex Systems
Rosina Weber, Jason M. Proctor, Ilya Waldstein, Andres Kriete 625

CBE-*Conveyor*: A Case-Based Reasoning System to Assist Engineers in Designing Conveyor Systems
Fei Ling Woon, Brian Knight, Miltos Petridis, Mayur Patel 640

Author Index 653

Evaluation and Monitoring of the Air-Sea Interaction Using a CBR-Agents Approach

Javier Bajo[1] and Juan M. Corchado[2]

[1] Universidad Pontificia de Salamanca, C/ Compañía 5,
37002 Salamanca, Spain
jbajope@upsa.es
[2] Departamento Informática y Automática, Universidad de Salamanca,
Plaza de la Merced s/n, 37008, Salamanca, Spain
corchado@usal.es

Abstract. This paper presents a model constructed for the evaluation of the interaction of the atmosphere and the ocean. The work here presented focuses in the development of an agent based architecture that has been constructed for the evaluation of the interaction, between the atmosphere and the ocean waters, of several parameters. Such evaluation needs to be made continuously in a dynamic environment and therefore requires the use of autonomous models that evolve with the time. The proposed architecture incorporates CBR-agents whose aim is to monitor the evolution of the interaction of parameters and facilitate the creation of an explanation model. The system has been tested and this paper presents the results obtained.

1 Introduction

The agent paradigm is gaining relevance in the development of applications for flexible and dynamic environments, such as the web, personalized user interfaces, oceanography, control systems or robotic environments. Agents are often characterized by their capabilities such as autonomy, reactivity, pro-activeness, social ability, reasoning, learning, and mobility, among others. These capabilities can be modelled in different ways and with different tools [26], one of the possibilities is the use of CBR systems. This paper presents a CBR-agent based architecture that is the core of a distributed system developed for the analysis and evaluation of the interaction between ocean water masses and the atmosphere. The aim of this paper is to present a successful architecture that allows the construction of dynamic systems capable of growing in dimension and of adapting their knowledge to environmental changes. In this work we are mainly interested in the modelling of deliberative agents with CBR systems, as they can be used for implementing adaptive systems. Agents must be able to respond to events, which occur within their environment, take the initiative according to their goals, interact with other agents (even human), and to use past experiences to achieve current goals. Several architectures have been proposed for building deliberative agents, most of them based on the BDI model [21]. In this

H. Muñoz-Avila and F. Ricci (Eds.): ICCBR 2005, LNAI 3620, pp. 50 – 62, 2005.
© Springer-Verlag Berlin Heidelberg 2005

15. Kinny, D. and Georgeff, M. (1991). Commitment and effectiveness of situated agents. In: Proceedings of the Twelfth International Joint Conference on Artificial Intelligence (IJCAI'91), Sydney, Australia, pp. 82-88.
16. Lefevre N., Aiken J., Rutllant J., Daneri G., Lavender S. and Smyth T. (2002) Observations of pCO2 in the coastal upwelling off Chile: Sapatial and temporal extrapolation using satellite data. Journal of Geophysical research. Vol. 107, no. 0
17. Martín F. J., Plaza E., Arcos J.L. (1999). Knowledge and experience reuse through communications among competent (peer) agents. International Journal of Software Engineering and Knowledge Engineering, Vol. 9, No. 3, 319-341.
18. Myers, K. (1996). A Procedural Knowledge Approach to Task-Level Control. Proceedings of the Third International Conference on Artificial Intelligence Planning Systems,, pp. 158-165.
19. Olivia C., Chang C. F., Enguix C.F. and Ghose A.K. (1999). Case-Based BDI Agents: An Effective Approach for Intelligent Search on the World Wide Web, AAAI Spring Symposium on Intelligent Agents, 22-24 March 1999, Stanford University, USA.
20. Rao, A. S. (1996). AgentSpeak(L): BDI Agents speak out in a logical computable language. Agents Breaking Away, 7th European Workshop on Modelling Autonomous Agents in a Multi-Agent World, Eindhoven, The Netherlands, January 22-25, 1996, Proceedings. Lecture Notes in Computer Science 1038, Springer Verlag, pp. 42-55.
21. Rao, A. S. and Georgeff, M. P. (1995). BDI Agents: From Theory to Practice. First International Conference on Multi-Agent Systems (ICMAS-95). San Franciso, USA.
22. Sarmiento J. L. and Dender M. (1994) Carbon biogeochemistry and climate change. Photosynthesis Research, Vol. 39, 209-234.
23. Seung H.S., Socci N.D. and Lee D. (1998) The Rectified Gaussian Distribution, Advances in Neural Information Processing Systems, 10.
24. Takahashi T., Olafsson J., Goddard J. G., Chipman D. W. and Sutherland S. C. (1993) Seasonal Variation of CO2 and nutrients in the High-latitude surface oceans: a comparative study. Global biochemical Cycles. Vol. 7, no. 4. pp 843-878.
25. Wendler J. and Lenz M. (1998). CBR for Dynamic Situation Assessment in an Agent-Oriented Setting. Proc. AAAI-98 Workshop on CBR Integrations. Madison (USA) 1998.
26. Wooldridge, M. and Jennings, N. R. (1995) Agent Theories, Architectures, and Languages: a Survey. In: Wooldridge and Jennings, editors, Intelligent Agents, Springer-Verlag, pp. 1-22.
27. Wooldridge, M. and Jennings, N. R. and Kinny, D. (2000) The Gaia Methodology for Agent-Oriented Analysis and Design. Journal of Autonomous Agents and Multi-Agent Systems, 3 (3). pp. 285-312.

A Comparative Anal
Metrics for Commu

Evelyn Balfe

Smart Media Institute, De
University College Dubl
{Evelyn.Balfe,

Abstract. Collaborative Web s
to adaptive Web search that is fu
similar past search sessions are re
Previously, we have demonstrate
offer communities of like-minded
comes to result relevance. In this p
of query similarity that drives th
sessions. In the past we have prop
of query similarity, based on the
we examine and compare a colle
different types of knowledge (qu
behaviour) as the basis for simila

1 Introduction

None of the major Web search engi
meaningful way, when responding t
searches can be usefully informed b
searches that originate from a search
relate to motoring topics and searche
looking to select results that are ca
from the employees of a software com
relate to application servers instead o
to make here. First, Web queries ar
many queries originate from ad-hoc
the visitors to a motoring Web site c

When we examined the behaviou
to community-based search scenario
the types of queries submitted and
of pages that are selected for these
motivates our case-based approach t
search results of a base-level search

* The support of the Informatics Resea
acknowledged.

H. Muñoz-Avila and F. Ricci (Eds.): ICCBR
© Springer-Verlag Berlin Heidelberg 2005

Lecture Notes in Artificial Intelligence

Subseries of Lecture Notes in Computer Science

The LNAI series reports state-of-the-art results in artificial intelligence research, development, and education, at a high level and in both printed and electronic form. Enjoying tight cooperation with the R&D community, with numerous individuals, as well as with prestigious organizations and societies, LNAI has grown into the most comprehensive artificial intelligence research forum available.

The scope of LNAI spans the whole range of artificial intelligence and intelligent information processing including interdisciplinary topics in a variety of application fields. The type of material published traditionally includes

- proceedings (published in time for the respective conference)
- post-proceedings (consisting of thoroughly revised final full papers)
- research monographs (which may be based on PhD work)

More recently, several color-cover sublines have been added featuring, beyond a collection of papers, various added-value components; these sublines include

- tutorials (textbook-like monographs or collections of lectures given at advanced courses)
- state-of-the-art surveys (offering complete and mediated coverage of a topic)
- hot topics (introducing emergent topics to the broader community)

In parallel to the printed book, each new volume is published electronically in LNCS/LNAI Online.

Detailed information on LNCS/LNAI can be found at
http://www.springeronline.com

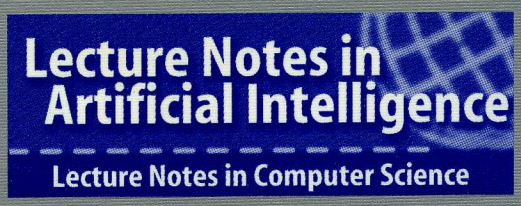
Proposals for publication should be sent to

LNCS/LNAI Editorial, Tiergartenstr. 17, 69121 Heidelberg, Germany
E-mail: lncs@springer-sbm.com

ISSN 0302-9743

ISBN 3-540-28174-6

9 783540 281740



springeronline.com