

Proceedings of AIC 2013 - 1st International Workshop on Artificial Intelligence and Cognition

Edited by Antonio Lieto, Marco Cruciani

ISSN 1613-0073

Preface

Antonio Lieto, Marco Cruciani

This book of Proceedings contains the accepted papers of the first International Workshop on Artificial Intelligence and Cognition (AIC13). The workshop, held in Turin (Italy) on 3rd December 2013, has been co-located with the XIII International Conference of the Italian Association on Artificial Intelligence. The scientific motivation behind AIC13 resides on the growing impact that, in the last years, the collaboration between Cognitive Science and Artificial Intelligence (AI) had for both the disciplines. In AI this partnership has driven to the realization of intelligent systems based on plausible models of human cognition. In turn, in cognitive science, the partnership allowed the development of cognitive models and architectures (based on information processing, on representations and their manipulation, etc.) providing greater understanding on human thinking. The spirit and aim of the AI and Cognition workshop is therefore that one of putting together researchers coming from different domains (e.g., artificial intelligence, cognitive science, computer science, engineering, philosophy, social sciences, etc.) working on the interdisciplinary field of cognitively inspired artificial systems. In this workshop proceedings appear 2 abstracts of the talks provided by the keynote speakers and 16 peer reviewed papers. Specifically 8 full papers (31 % acceptance rate) and 8 short papers were selected on a total of 26 submissions coming from researchers of 14 different countries. In the following a short introduction to the content of the papers (full and short) is presented. In the paper "Simulating Actions with the Associative Self-Organizing Map" by Miriam Buonamente, Haris Dindo, Magnus Johnsson, the authors present a method based on the Associative Self Organizing Map (A-SOM) used for learning and recognizing actions. The authors show how their A-SOM based systems, once learnt to recognize actions, uses this learning to predict the continuation of an observed initial movement of an agent, predicting, in this way, its intentions. In the paper "Acting on Conceptual Spaces in Cognitive Agents" by Agnese Augello, Salvatore Gaglio, Gianluigi Oliveri, Giovanni Pilato, the authors discuss the idea of providing a cognitive agent, whose conceptual representations are assumed to be grounded on the conceptual spaces framework (CS), with the ability of producing new spaces by means of global operations. With this goal in mind two operations on the Conceptual Spaces framework are proposed. In the paper "Using Relational Adjectives for Extracting Hyponyms from Medical Texts" by Olga Acosta, Cesar Aguilar and Gerardo Sierra, the authors expose a method for extracting hyponyms and hyperonyms from analytical definitions, focusing on the relation observed between hyperonyms and relational adjectives. For detecting the hyperonyms associated to relational adjectives, they used a set of linguistic heuristics applied in medical texts in Spanish.

In the paper "Controlling a General Purpose Service Robot By Means Of a Cognitive Architecture" by Jordi-Ysard Puigbo, Albert Pumarola and Ricardo Tellez, the authors present a humanoid service robot equipped with a set of simple action skills including navigating, grasping, recognizing objects or people, etc. The robot has to complete a voice command in natural language that encodes a complex

task. To decide which of those skills should be activated and in which sequence the SOAR cognitive architecture has been used. SOAR acts as a reasoner that selects the current action the robot must do, moving it towards the goal. The architecture allows to include new goals by just adding new skills. In the paper "Towards a Cognitive Architecture for Music Perception" by Antonio Chella, the author presents a framework of a cognitive architecture for music perception. The architecture takes into account many relationships between vision and music perception and its focus resides in the intermediate area between the subsymbolic and the linguistic areas, based on conceptual spaces. Also, a conceptual space for the perception of notes and chords is discussed, and a focus of attention mechanism scanning the conceptual space is outlined. In the paper "Typicality-Based Inference by Plugging Conceptual Spaces Into Ontologies" by Leo Ghignone, Antonio Lieto and Daniele P. Radicioni the authors propose a cognitively inspired system for the representation of conceptual information in an ontology-based environment. The authors present a system designed to provide a twofold view on the same artificial concept combining a classic symbolic component (grounded on a formal ontology) with a typicalitybased one (grounded on the Conceptual Spaces framework). The implemented system has been tested in a pilot experimentation regarding the classification task of linguistic stimuli. In the paper "Introducing Sensory-motor Apparatus in Neuropsychological Modelization" by Onofrio Gigliotta, Paolo Bartolomeo and Orazio Miglino, the authors present artificial embodied neural agents equipped with a pan/tilt camera, provided with different neural and motor capabilities, to solve a well known neuropsychological test: the cancellation task. The paper shows that embodied agents provided with additional motor capabilities (a zooming motor) outperform simple pan/tilt agents even when controlled by more complex neural controllers. In the paper "How Affordances can Rule the (Computational) World" by Alice Ruggeri and Luigi Di Caro, the authors propose the idea of integrating the concept of affordance within the ontology based representations. The authors propose to extend the idea of ontologies taking into account the subjectivity of the agents that are involved in the interaction with an external environment. Instead of duplicating objects, according to the interaction, the ontological representations should change their aspects, fitting the specific situations that take place. The authors suggest that this approach can be used in different domains from Natural Language Processing techniques and Ontology Alignment to User Modeling. In the paper "Latent Semantic Analysis as Method for Automatic Question Scoring" by David Tobinski and Oliver Kraft, the authors discuss the rating of one item taken from an exam using Latent Semantic Analysis (LSA). It is attempted to use documents in a corpus as assessment criteria and to project student answers as pseudo-documents into the semantic space. The paper shows that as long as each document is sufficiently distinct from each other, it is possible to use LSA to rate open questions. In the paper "Higher-order Logic Description of MDPs to Support Metacognition in Artificial Agents" by Roberto Pirrone, Vincenzo Cannella and Antonio Chella, the authors propose a formalism to represent factored MDPs in higher- order logic. This work proposes a mixed representation that combines both numerical and propositional formalism to describe Algebraic Decision Diagrams (ADDs) using first-, second- and third-order logic. In this way, the MDP description and the planning processes can be managed in a more abstract manner. The presented formalism allows manipulating structures, which describe entire MDP classes rather than a specific process. In the paper Dual Aspects of Abduction and Induction by Flavio Zelazek, the author proposes a new characterization of abduction and induction based on the idea that the various aspects of the two kinds of inference rest on the essential features of increment of comprehension and extension of the terms involved. These two essential features are in a reciprocal relation of duality, whence the highlighting of the dual aspects of abduction and deduction. In the paper "Plasticity and Robotics" by Martin Flament Fultot, the author focuses on the link between robotic systems and living systems, and sustains that behavioural plasticity constitutes a crucial property that robots must share with living beings. The paper presents a classification of the different aspects of plasticity that can contribute to

a global behavioral plasticity in robotic and living systems. In the paper "Characterising Citations in Scholarly Articles: an Experiment" by Paolo Ciancarini, Angelo Di Iorio, Andrea Giovanni Nuzzolese, Silvio Peroni and Fabio Vitali, the authors present some experiments in letting humans annotate citations according to the CiTO ontology, a OWL-based ontology for describing the nature of citations, and compare the performance of different users. In the paper "A Meta-Theory for Knowledge Representation" by Janos Sarbo, the author faces the problem of representation of meaningful interpretations in AI. He sustains that a process model of cognitive activities can be derived from the Peircean theory of categories, and that this model may function as a metatheory for knowledge representation, by virtue of the fundamental nature of categories. In the paper "Linguistic Affordances: Making Sense of Word Senses" by Alice Ruggeri and Luigi Di Caro, the authors focus the attention on the roles of word senses in standard Natural Language Understanding tasks. They propose the concept of linguistic affordances (i.e., combinations of objects properties that are involved in specific actions and that help the comprehension of the whole scene being described), and argue that similar verbs involving similar properties of the arguments may refer to comparable mental scenes.

In the paper "Towards a Formalization of Mental Model Reasoning for Syllogistic Fragments" by Yutaro Sugimoto, Yuri Sato and Shigeyuki Nakayama, the authors consider the recent developments in implementations of mental models theory, and formulate a mental model of reasoning for syllogistic fragments satisfying the formal requirements of mental model definition.