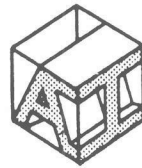




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SIMPOSIUM *de*

**A**  
ARTIFICIAL



INTELIGENCIA



# P R E F A C E

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## SECOND INTERNATIONAL SYMPOSIUM ON ARTIFICIAL INTELLIGENCE

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The International Symposium on Artificial Intelligence (2<sup>o</sup> ISAI) is a conference held in Monterrey, México every year around October. The goals of this conference are: first, to present interesting research made at universities, research centers and laboratories that present contributions to advance the field of Artificial Intelligence, second to present techniques and methodologies as well as development efforts that have the potential to solve real problems.

From these objectives, it can be said that this conference presents both theoretical as well as practical papers in the areas of Artificial Intelligence: knowledge acquisition, knowledge representation, machine learning, natural language, automated reasoning, neural nets, computer vision, etc.

The audience for this symposium is primarily people from industry, although attendees from universities and research centers such as professors and scientists are also expected. This conference will provide a technology transfer from universities to industry and to present general guidelines about future trends on AI technologies.

These proceedings contain the papers that were accepted by the Program Committee of 2<sup>o</sup> ISAI. This time 114 papers were sent from 18 countries. Of these papers, 28 were accepted for presentation and publication and 15 papers were accepted just for publication. The reason for having just 28 papers presented is that there will be just one session during the three days of the conference instead of having parallel sessions. This means that attendees of 2<sup>o</sup> ISAI will have the opportunity to survey work being done in the principal areas of AI.

There will be six general talks given by internationally recognized researchers on the field of AI. I take this opportunity to thank Raj Reddy from Carnegie Mellon University, Woodrow Bledsoe from University of Texas at Austin, Saul Amarel from Rutgers University, Richard Stern from Carnegie Mellon University, Judea Pearl from University of California at Los Angeles and Masaru Tomita from Carnegie Mellon University, who very kindly accepted our invitation to participate as guest speakers on 2<sup>o</sup> ISAI.

The members of the Program Committee did an excellent job having the papers revised in a reasonable period of time. Thank you for your cooperation. I specially thank Woodrow Bledsoe Councilor of 2<sup>o</sup> ISAI and Randolph Goebel from University of Alberta for their suggestions, encouragement, friendship and important relationships provided in organizing 2<sup>o</sup> ISAI. I also thank Wolfgang Bibel from Darmstadt University at Germany for his collaboration and support even though he had a great responsibility as Conference Chairman of 11<sup>o</sup> IJCAI held last August at Detroit.

Syntactic and Semantic Analysis of Comparative Constructions, *Italy*

Paolo Terenziani

Vincenzo Lombardo

Leonardo Lesmo

Integrated Natural language Parsing Based in Interleaved Semantic Processing, *U.S.A.*

Dongyul Ra

Caprate: A System for Understanding Problems in NL, *Spain*

Kepa Sarasola

M.F. Verdejo

### **Neural Networks**

A Hashed Associative Memory with Generalization Capabilities, *U.S.A.*

Ronald L. Greene

A Retrospective Approach to Knowledge Acquisition for Medical Applications, *U.S.A.*

Dana E. Madison, Ph. D.

Max D. Burke

Conflict Detection in a Connectionist Rule Interpreter, *U.S.A.*

Mingqi Deng

Anthony S. Maida

Back Propagation of a Computational Model of Gestalt Cognition: Evidence for a Halo Effect, *U.S.A.*

Robert B. Allen

### **Planning, Search and Uncertainty**

Compiling Search Constraints for Deductive and Recursive Databases, *Canada and U.S.A.*

Jiawei Han

Don Epley

Jianing Han

Efficient Conflict Detection and Resolution for Nonlinear Planners, *U.S.A.*

Sukhan Lee

Kyusik Chung

Soliciting Weights or Probabilities from Experts for Rule-Based Expert Systems, *U.S.A.*

Daniel E. O'Leary

### **Artificial Intelligence Languages**

Negation-as-Failure as an Approach to the Hanks and McDermott Problem, *United Kingdom*

Chris Evans

Synthesis of Simple Programs which Handle Complex Data, *France*

Bruno Ginoux

Jean-Philippe Lagrange

## CAPRATE: A SYSTEM FOR UNDERSTANDING PROBLEMS IN NL

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### ABSTRACT

CAPRATE is a problem acquisition module for the teaching component of an ICAI system in the domain of introductory programming. The system performs two tasks, the understanding of a natural language text and its integration into a pedagogic knowledge base. The first one is carried out by interleaving syntactic analysis and semantic interpretation, however syntactic, semantic and domain knowledge are defined in a declarative way and separately, so that the adaptation to another application can be done without redefining the complete system. The second task is performed by structural inference from the subject-matter Knowledge-base. A new instance belonging to the class "problem" is created and its slots filled by rules using the information provided by the natural language analyser.

### 1. INTRODUCTION.

Our work is part of a wider project: CAPRA, an ICAI system for teaching Programming following a stepwise refinement methodology [Garijo et al,89]. In this framework the goal of CAPRATE is the understanding of a problem statement in natural language to generate a structured description including its formal specification and other relevant data from the tutorial standpoint. The natural language processing component is able to deal with texts describing objects and their properties, expressed by means of declarative sentences, and asking for the computation of some results in an imperative way. In this kind of corpus noun phrases are complex; ellipsis and anaphoric references appear very frequently. Our approach has been to separate parsing tools from linguistic and domain knowledge.

The phases of syntactic analysis and semantic interpretation are organized as an incremental and interleaved process, where partial results are sended from one level onto the next. This organization helps in solving ambiguities, references and elipsis [Allen 87], relevant features of the kind of texts we are interested on, as signaled above.

The semantic representation of objects is done in an incremental way, so that the definition of an object can be further completed by subsequent sentences. The formalism used is based on sets of assertions for each object describing its type, name, components, properties and relations.

The parsing strategy explores each possible analysis in order to obtain all the interpretations corresponding to the statement, some times not even taken into consideration by its author (usually caused by an ambiguous text).

Natural Language Systems working in similar kinds of application are [Brown and Burton, 75], [Gómez, 81] and [Mellish, 85]. Compared to the first and second one, our approach is more domain independent and then transportable to other domains without major modifications. CAPRATE follows the parsing ideas of early and incremental semantic developed by Mellish, but in our case the consistency conditions are applied at the end of analysis. The analysis of Mellish's linguistic system is for english and has been done using logic programming. CAPRATE parses written work in Spanish (we are developing the Basque version), performs two different tasks (translation and integration) and uses the ATN framework.

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